Habitat modelling with single- and multi-target trees and ensembles
Supplementary material

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Abstract

This document provides a supplementary material for the manuscript entitled *Habitat modelling with single- and multi-target trees and ensembles.*

Contents

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1. Performance measures for classification

What evaluation measure to use in the case of classification algorithms is not as clear as in the case of regression. Sokolova and Lapalme (2009) conducted a systematic analysis of twenty four performance measures that can be used in a classification context. They conclude that evaluation measures for classification algorithms should be chosen based on the application domain.

In our study, we used five evaluation measures for classification: accuracy, precision, recall, F-score, the Matthews correlation coefficient and balanced accuracy (also known as Area Under the Curve). These measures are calculated by using the confusion matrix resulting from the evaluation of each algorithm. Since we are interested in correctly predicting both the presence and the absence of a given species, we aggregate the values from the confusion matrix. We use two averaging approaches to adapt these measures for multi-class problems: micro and macro averaging.

The micro averaging approach first combines the values for true positives (TPs), true negatives (TNs), false positives (FPs) and false negatives (FNs) for each of the classes from the target attribute into global values for TPs, TNs, FPs and FNs, and then calculates the respective performance measure. This approach takes into consideration the frequency of the classes, i.e., the more frequent classes have stronger influence on the performance value. The macro averaging approach, on the other hand, first calculates the performance measures for each class from the target attribute, and then averages them into a single value. This means that all classes (regardless of their frequency) influence the overall score equally. In other words, two classes with frequency of 95% and 5%, respectively, will equally contribute to the performance measure. Considering the above, and the fact that the balanced accuracy can capture the performance of a method over all classes, we present here the results in terms of micro balanced accuracy, but similar conclusions hold for the other measures (for which the results are given in the Supplementary material).

Table 1: Abbreviations used in the performance measures and their meaning.

Abbreviation	Meaning
c_i	class value
T	number of classes
TP_i	true positives for class c_i
FP_i	false positives for class c_i
FN_i	false negatives for class c_i
TN_i	true negatives for class c_i
P_i	precision for class c_i
R_i	recall for class c_i
F	F-score
MCC	Matthews Correlation Coefficient
$BACC$	Balanced Accuracy

Table 2: Evaluation measures - general definitions.

Measure	Formula
Precision	$P = \frac{TP}{TP+FP}$
Recall	$R = \frac{TP}{TP+FN}$
F-score	$F = 2 \cdot \frac{P \cdot R}{P+R}$
MCC	$MCC = \frac{TP \cdot TN - FP \cdot FN}{\sqrt{(TP+FP) \cdot (TP+FN) \cdot (TN+FP) \cdot (TN+FN)}}$
BACC	$BACC = \frac{sensitivity + specificity}{2} = \frac{1}{2} \cdot \left(\frac{TP}{TP+FN} + \frac{TN}{TN+FP} \right)$

Table 3: Micro averaged evaluation measures.

Measure	Formula
μPrecision	$\frac{\sum_i^T TP_i}{\sum_i^T TP_i + \sum_i^T FP_i}$
μRecall	$\frac{\sum_i^T TP_i}{\sum_i^T TP_i + \sum_i^T FN_i}$
μF-score	$2 \cdot \frac{P_i^\mu \cdot R_i^\mu}{P_i^\mu + R_i^\mu}$
μMCC	$\frac{\sum_i^T TP_i \cdot \sum_i^T TN_i - \sum_i^T FP_i \cdot \sum_i^T FN_i}{\sqrt{(\sum_i^T TP_i + \sum_i^T FP_i) \cdot (\sum_i^T TP_i + \sum_i^T FN_i) \cdot (\sum_i^T TN_i + \sum_i^T FP_i) \cdot (\sum_i^T TN_i + \sum_i^T FN_i)}}$
μBACC	$\frac{1}{2} \cdot \left(\frac{\sum_i^T TP_i}{\sum_i^T TP_i + \sum_i^T FN_i} + \frac{\sum_i^T TN_i}{\sum_i^T TN_i + \sum_i^T FP_i} \right)$

Table 4: Macro averaged evaluation measures.

Measure	Formula
MPrecision	$\sum_i^T P_i$
MRecall	$\sum_i^T R_i$
MF-score	$\sum_i^T F_i$
MMCC	$\sum_i^T MCC_i$
MBACC	$\sum_i^T BACC_i$

2. Statistical significance tests

We adopt the recommendations by Demšar (2006) for the statistical evaluation of the results. We use the non-parametric Friedman test (Friedman, 1940) for statistical significance with the correction from Iman and Davenport (1980). Afterwards, to check where the statistically significant differences appear (between which methods), we use the Nemenyi post-hoc test (Nemenyi, 1963).

The Friedman test is a non-parametric test for multiple hypotheses testing. It ranks the algorithms according to their performance for each dataset separately, thus the best performing algorithm gets the rank of 1, second best the rank of 2..., and so on: In the case of ties it assigns average ranks. Then, the Friedman test compares the average ranks of the algorithms and calculates the Friedman statistic χ_F^2, distributed according to the χ_F^2 distribution with $k-1$ degrees of freedom (k being the number of algorithms). Iman and Davenport (1980) show that the Friedman statistic is undesirably conservative and derive a corrected F-statistic that is distributed according to the F-distribution with $k-1$ and $(k-1)\cdot(N-1)$ degrees of freedom (k being the number of algorithms and N being the number of datasets).

If there is a statistically significant difference in performance, we can proceed with a post hoc test. The Nemenyi test is used to compare all the classifiers to each other. In this procedure, the performance of two classifiers is significantly different if their average ranks differ more than some critical distance. The critical distance depends on the number of algorithms, number of datasets and critical value (for a given significance level) that is based on the Studentized range statistic and can be found in statistical textbooks.

3. Complete results for predicting species' abundance

In this section, we present the complete results for the datasets that contain information about species abundance. First, we give the detailed results containing the quantitative performance of the methods used in the data analysis. We then present the average rank diagrams summarizing the statistical evaluation of the performance of the methods on each of the dataset separately, for all evaluation measures. We next present such results for all of the datasets considered together. Finally, we show the variable importance for the descriptive attributes, obtained by using feature ranking via random forests of predictive clustering trees. A detailed description of the procedures used to obtain these results and explanations for all the abbreviations used can be found in the main manuscript.

3.1. Predictive performance of the methods on the multi-target regression tasks

3.1.1. Results for the RRMSE measure

Table 5: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll* dataset, evaluated by using RRMSE as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Amphora aeq.	0.985	0.950	0.568	0.503	0.578	0.498	1.008	1.085	0.992	1.018	0.985	1.019
Achnanthidium cl.	0.980	0.949	0.590	0.490	0.620	0.507	1.018	1.040	1.002	1.072	1.000	1.043
Achnanthidium cl. bal.	0.937	0.833	0.573	0.440	0.570	0.442	0.972	0.992	0.948	0.972	0.966	0.970
Achnanthes sp.	0.979	0.907	0.637	0.587	0.633	0.569	1.016	1.074	1.040	1.118	1.021	1.049
Amphora cop.	0.948	0.914	0.578	0.462	0.591	0.484	1.025	1.047	0.975	1.002	0.978	0.978
Amphora fog.	0.992	0.961	0.605	0.573	0.617	0.592	1.016	1.050	1.034	1.098	1.023	1.051
Achnanthes lac.	0.928	0.854	0.549	0.456	0.560	0.464	0.989	1.002	0.977	1.028	0.970	0.999
Amphora in.	0.939	0.908	0.521	0.486	0.564	0.492	0.989	1.015	0.996	1.081	0.999	1.042
Achnanthidium min.	0.964	0.886	0.511	0.498	0.479	0.477	1.024	0.961	0.967	1.025	0.936	0.910
Amphora ov.	0.982	0.974	0.612	0.616	0.619	0.624	1.011	1.032	1.086	1.123	1.032	1.034
Amphora ped.	0.943	0.858	0.566	0.424	0.565	0.431	0.990	1.016	0.980	0.966	0.963	0.962
Amphora th.	0.979	0.940	0.528	0.509	0.584	0.510	1.006	1.064	0.983	1.085	0.989	1.017
Aulacoseira gra.	0.994	0.922	0.576	0.504	0.580	0.540	0.989	0.985	1.005	1.046	1.013	1.005
Amphora ven.	0.974	0.935	0.576	0.588	0.575	0.541	1.020	1.019	1.059	1.095	1.006	1.033
Cymbella aff.	0.959	0.949	0.592	0.617	0.596	0.563	1.022	1.013	1.086	1.138	1.015	1.035
Cocconeis dis.	0.968	0.927	0.571	0.573	0.610	0.547	1.013	1.079	0.990	1.133	0.996	1.036
Cymatopleura el.	0.970	0.912	0.596	0.536	0.583	0.547	1.012	1.091	1.030	1.069	1.008	1.025
Cyclotella jur. nud.	0.977	0.859	0.583	0.500	0.551	0.547	0.975	0.996	0.977	0.955	0.956	0.967
Cymbella lan.	0.820	0.813	0.491	0.467	0.489	0.465	1.082	0.977	0.914	0.999	0.911	0.956
Cyclotella men.	0.811	0.806	0.476	0.454	0.483	0.466	1.082	0.958	0.943	0.995	0.882	0.903
Cocconeis neo.	0.975	0.968	0.608	0.622	0.610	0.631	1.016	1.037	1.094	1.136	1.040	1.022
Cyclotella oc.	0.955	0.779	0.480	0.344	0.492	0.370	1.021	0.957	0.886	0.839	0.879	0.848
Cocconeis pl.	0.853	0.886	0.474	0.462	0.495	0.481	1.080	1.022	0.956	1.018	0.904	0.919
Cocconeis pl. eug.	0.983	0.926	0.590	0.569	0.566	0.569	1.018	1.016	1.015	1.059	1.005	1.011
Cocconeis pl. li.	0.987	0.893	0.577	0.485	0.556	0.473	1.051	1.019	1.017	0.976	0.981	0.972
Caloneis sch.	0.966	0.956	0.607	0.634	0.595	0.613	1.028	1.036	1.075	1.150	1.037	1.034
Cavinula scu.	0.927	0.823	0.514	0.393	0.538	0.420	1.008	1.023	0.932	0.970	0.927	0.930
Cymbella neo.	0.955	0.942	0.578	0.535	0.575	0.521	1.024	1.078	0.979	1.054	0.996	1.019
Diatoma ang.	0.981	0.959	0.592	0.576	0.629	0.575	1.014	1.054	1.019	1.109	1.023	1.053
Diploneis mau.	0.992	0.897	0.536	0.410	0.554	0.433	1.025	1.003	0.918	0.951	0.920	0.939
Diploneis mod.	0.979	0.940	0.606	0.519	0.621	0.520	1.007	1.023	1.018	1.075	0.986	1.000
Diploneis ov.	0.994	0.901	0.555	0.479	0.577	0.475	1.005	0.999	0.965	1.013	0.949	0.973
Epithemia ad.	0.883	0.876	0.499	0.481	0.480	0.479	1.074	1.044	0.960	1.017	0.935	0.978
Encyonema cae.	0.987	0.936	0.612	0.606	0.628	0.578	0.995	0.999	1.022	1.082	1.013	1.028
Encyonema min.	0.968	0.963	0.624	0.644	0.606	0.603	1.029	1.034	1.022	1.084	1.022	1.039
Encyonopsis mic.	0.971	0.943	0.628	0.655	0.611	0.619	1.024	1.019	1.031	1.098	0.995	1.022
Encyonema sil.	0.983	0.913	0.645	0.638	0.584	0.572	1.047	1.083	1.073	1.124	1.023	1.027
Epithemia so.	0.969	0.954	0.598	0.546	0.589	0.540	1.009	1.070	1.034	1.051	1.004	1.017
Fragilaria cap.	0.977	0.904	0.653	0.559	0.610	0.529	1.015	1.068	1.056	1.077	1.028	1.027
Fragilaria cap. va.	0.978	0.942	0.590	0.587	0.578	0.545	1.015	1.027	1.035	1.071	1.003	1.021
Fallacia och.	0.982	0.893	0.577	0.518	0.604	0.512	1.008	1.072	1.034	1.084	1.002	1.045
Fragilaria par.	0.953	0.857	0.597	0.588	0.633	0.539	0.978	1.088	1.017	1.056	1.013	1.004
Frustulia vul.	0.987	0.940	0.575	0.578	0.608	0.554	1.018	1.034	1.039	1.100	1.027	1.033
Gomphonema cl.	0.989	0.949	0.628	0.618	0.612	0.618	1.019	1.043	1.074	1.149	1.043	1.062
Geissleria dec.	0.965	0.911	0.553	0.536	0.604	0.512	1.025	1.091	1.007	1.021	1.011	1.003
Gomphonema it.	0.979	0.966	0.607	0.623	0.619	0.622	1.017	1.041	1.085	1.140	1.039	1.030
Gomphonema min.	0.959	0.928	0.530	0.489	0.532	0.479	0.987	1.046	0.937	1.010	0.956	0.965
Gomphonema ol. Horn.	0.927	0.907	0.529	0.527	0.515	0.489	1.018	0.970	0.983	1.076	0.964	0.969
Gomphonema par.	0.946	0.894	0.579	0.554	0.586	0.534	1.039	1.044	1.012	1.069	0.975	1.031
Gomphonema pum.	0.930	0.907	0.560	0.461	0.561	0.460	0.991	0.988	0.977	0.993	0.964	0.956
Gomphonema ol.	0.987	0.962	0.602	0.594	0.642	0.600	1.015	1.038	1.032	1.085	1.032	1.051
Gomphonema sar.	0.977	0.951	0.655	0.645	0.637	0.655	1.026	1.028	1.031	1.065	1.024	1.020
Gomphonema ter.	0.957	0.943	0.614	0.605	0.576	0.611	1.021	1.064	1.009	1.060	1.003	1.022
Gyrosigma mac.	0.962	0.870	0.570	0.443	0.591	0.457	0.991	1.037	0.985	1.011	0.968	0.972
Hannea ar.	0.995	0.970	0.586	0.624	0.579	0.535	1.019	1.036	1.062	1.081	1.039	1.033
Hantzschia amp.	0.995	0.938	0.635	0.583	0.644	0.595	1.011	1.076	1.050	1.079	1.024	1.040
Hippodonta ros.	0.980	0.959	0.631	0.593	0.621	0.574	1.003	1.057	1.017	1.095	1.025	1.035

Table 5: (ctd) Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll* dataset, evaluated by using RRMSE as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Meridion cir. con.	0.921	0.912	0.604	0.551	0.599	0.552	1.045	1.106	1.053	1.062	1.012	1.034
Meridion cir.	0.993	0.967	0.610	0.637	0.583	0.568	1.034	1.042	1.073	1.105	1.036	1.039
Martyana mar.	0.987	0.958	0.605	0.592	0.618	0.588	1.013	1.059	1.046	1.105	1.020	1.060
Nitzschia alp.	0.979	0.914	0.500	0.500	0.489	0.480	1.045	1.056	0.972	1.006	0.951	0.954
Navicula ant.	0.949	0.907	0.575	0.528	0.595	0.510	1.010	1.078	1.044	1.118	1.003	1.032
Navicula cap.	0.968	0.899	0.576	0.521	0.598	0.526	1.008	1.088	1.015	1.075	1.002	1.031
Navicula cry.	0.993	0.942	0.599	0.603	0.593	0.584	1.001	1.047	1.024	1.093	1.011	1.042
Nitzschia dis.	0.977	0.949	0.575	0.556	0.583	0.548	1.020	1.091	1.060	1.102	1.018	1.025
Neidium du.	0.990	0.918	0.605	0.603	0.609	0.611	1.011	1.014	1.034	1.088	1.024	1.033
Navicula gre.	0.993	0.952	0.609	0.624	0.573	0.556	1.037	1.047	1.062	1.091	1.024	1.021
Navicula has.	0.976	0.926	0.608	0.585	0.589	0.590	1.050	1.080	1.038	1.095	1.031	1.053
Navicula krs.	0.970	0.893	0.566	0.453	0.583	0.469	1.006	1.077	0.977	0.997	0.977	0.980
Navicula lan.	0.985	0.928	0.629	0.637	0.584	0.570	1.032	1.035	1.079	1.115	1.037	1.038
Nupela la.	0.995	0.970	0.609	0.655	0.546	0.627	1.019	1.026	1.091	1.132	1.069	1.048
Nitzschia lin.	0.979	0.883	0.625	0.589	0.603	0.554	1.018	1.089	1.062	1.102	1.042	1.048
Navicula pra.	0.938	0.872	0.553	0.450	0.555	0.466	1.009	1.018	0.971	1.023	0.953	0.972
Navicula pre.	0.957	0.849	0.538	0.438	0.562	0.481	0.974	0.961	0.935	0.934	0.936	0.962
Navicula pro.	0.942	0.919	0.564	0.464	0.550	0.467	0.989	1.090	0.962	1.009	0.955	0.976
Nitzschia rec.	0.927	0.905	0.572	0.512	0.625	0.510	1.011	0.982	0.989	1.004	0.992	0.994
Navicula rei.	0.959	0.918	0.591	0.484	0.595	0.493	1.008	1.085	1.008	1.052	0.999	1.018
Navicula rot.	0.932	0.852	0.564	0.460	0.576	0.476	0.992	1.056	0.956	0.992	0.948	0.958
Navicula subh.	0.933	0.866	0.561	0.454	0.566	0.461	0.971	1.074	0.998	0.988	0.971	0.990
Navicula subr.	0.960	0.860	0.544	0.465	0.565	0.472	1.019	1.099	0.993	1.050	0.984	1.015
Nitzschia suba.	0.962	0.839	0.524	0.424	0.527	0.443	1.018	0.943	0.924	0.943	0.904	0.928
Navicula tri.	0.943	0.926	0.565	0.527	0.567	0.539	1.002	1.045	1.011	1.066	0.992	1.027
Navicula vircl.	0.957	0.897	0.603	0.521	0.623	0.507	1.005	1.036	1.021	1.079	0.998	1.038
Navicula virdu.	0.858	0.860	0.492	0.485	0.498	0.479	1.079	1.120	0.940	1.059	0.949	0.983
Orthoseira ros.	0.866	0.859	0.510	0.461	0.540	0.473	1.049	1.080	0.987	1.076	0.956	1.001
Placoneis bal.	0.935	0.893	0.554	0.442	0.572	0.473	1.028	1.052	0.975	1.008	0.961	0.977
Pinnularia bor.	0.921	0.880	0.507	0.493	0.486	0.468	1.091	1.039	0.981	1.014	0.949	0.968
Placoneis min.	0.951	0.954	0.564	0.556	0.549	0.538	1.021	1.096	0.983	1.114	0.952	1.040
Placoneis elg.	0.975	0.923	0.572	0.577	0.597	0.562	1.068	1.091	1.034	1.072	1.032	1.035
Planothidium lan.	0.985	0.951	0.629	0.591	0.618	0.556	1.018	1.057	1.069	1.071	1.044	1.066
Planothidium ros.	0.977	0.976	0.645	0.631	0.685	0.650	1.011	1.018	1.015	1.048	1.018	1.022
Placoneis neo.	0.926	0.868	0.554	0.488	0.578	0.474	1.014	1.000	0.992	1.014	0.989	0.986
Pseudostaurosira bre.	0.986	0.876	0.561	0.458	0.576	0.483	1.009	1.080	0.998	1.018	0.976	0.991
Pinnularia subc.	0.974	0.974	0.610	0.629	0.610	0.599	1.014	1.028	1.094	1.148	1.038	1.030
Rhoicosphenia abb.	0.985	0.902	0.551	0.457	0.567	0.473	1.005	1.042	0.970	0.946	0.970	0.937
Rhopalodia gib.	0.967	0.925	0.586	0.518	0.582	0.508	1.017	1.049	1.003	1.070	0.969	1.016
Reimeria sin.	0.969	0.935	0.568	0.572	0.585	0.536	1.015	1.124	1.040	1.091	1.020	1.052
Surirella ang.	0.957	0.884	0.554	0.487	0.605	0.479	1.048	0.998	0.991	1.053	0.987	0.990
Surirella min.	0.951	0.898	0.567	0.512	0.550	0.513	1.061	1.100	1.010	1.051	0.981	1.005
Sellaphora perb.	0.962	0.877	0.561	0.456	0.576	0.460	1.001	1.032	1.000	1.007	0.979	0.978
Sellaphora pu.	0.955	0.918	0.595	0.484	0.597	0.506	0.995	1.063	1.019	1.047	1.012	1.020
Stauroneis gra.	0.988	0.940	0.623	0.651	0.615	0.628	1.016	1.051	1.034	1.088	1.008	1.030
Staurosira con. bin.	0.975	0.944	0.569	0.532	0.583	0.527	0.987	1.030	1.021	1.080	1.013	1.031
Staurosira con.	0.979	0.930	0.517	0.497	0.549	0.482	1.017	1.001	0.950	1.048	0.954	1.005
Staurosira con. ven.	0.987	0.922	0.633	0.647	0.649	0.617	1.016	1.082	1.044	1.124	1.034	1.048
Stauroneis pho.	0.983	0.916	0.603	0.601	0.604	0.565	1.043	1.086	1.023	1.076	1.013	1.029
Staurosirella pin.	0.990	0.840	0.555	0.494	0.568	0.487	1.005	0.996	0.993	1.035	0.976	0.973
Stauroneis sm.	0.975	0.964	0.622	0.593	0.645	0.606	1.001	1.056	1.022	1.081	1.023	1.039
Tryblionella ang.	0.981	0.920	0.602	0.512	0.633	0.517	1.017	1.126	1.026	1.089	1.025	1.058
Tabellaria floc.	0.848	0.842	0.482	0.454	0.482	0.477	1.089	1.003	0.933	1.054	0.913	0.988
Ulnaria ul.	0.981	0.889	0.551	0.523	0.576	0.507	1.007	1.036	0.960	1.046	0.962	0.977

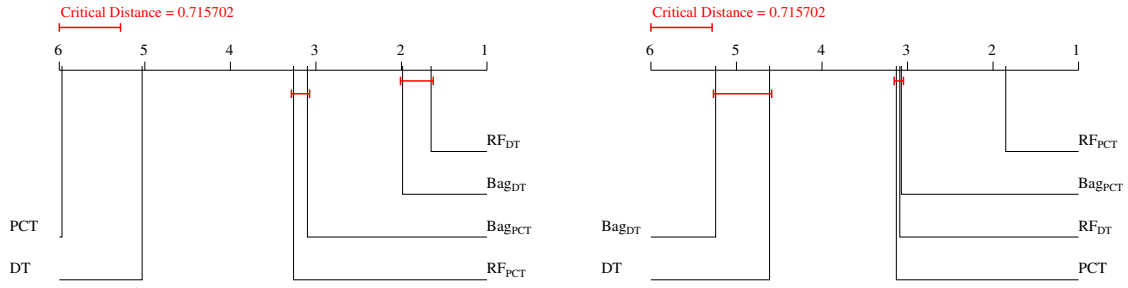
Table 6: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsTop10* dataset, evaluated by using RRMSE as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Amphora ped.	0.931	0.858	0.496	0.424	0.512	0.431	0.999	1.016	0.947	0.966	0.955	0.962
Cyclotella jur. nud.	0.911	0.884	0.511	0.500	0.490	0.547	0.963	0.979	0.952	0.955	0.947	0.967
Cyclotella oc.	0.879	0.779	0.405	0.344	0.427	0.370	0.935	0.957	0.862	0.839	0.855	0.848
Cocconeis pl.	0.887	0.886	0.430	0.462	0.438	0.481	0.997	1.023	0.932	1.018	0.910	0.919
Cavinula scu.	0.905	0.832	0.460	0.393	0.485	0.420	0.955	1.014	0.932	0.970	0.921	0.930
Diploneis mau.	0.911	0.897	0.465	0.410	0.480	0.433	1.012	1.003	0.926	0.951	0.920	0.939
Navicula pre.	0.956	0.849	0.502	0.438	0.501	0.481	1.015	0.961	0.959	0.934	0.965	0.962
Navicula rot.	0.915	0.852	0.495	0.460	0.518	0.476	0.981	1.058	0.966	0.992	0.958	0.958
Navicula subr.	0.956	0.860	0.494	0.465	0.514	0.472	1.007	1.098	1.000	1.050	0.988	1.015
Staurosirella pin.	0.972	0.840	0.512	0.494	0.509	0.487	0.997	1.000	0.997	1.035	0.985	0.973

Table 7: Predictive performance of the methods (columns) on all targets (rows) of the *WaterQuality* dataset, evaluated by using RRMSE as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

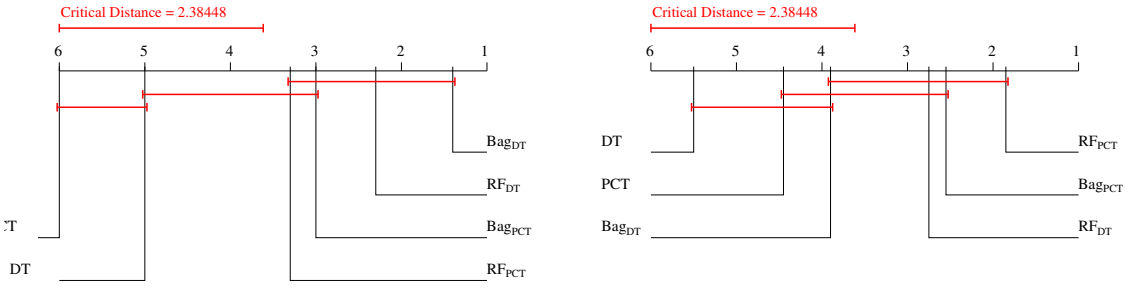
	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Cladophora sp.	0.981	0.925	0.484	0.408	0.504	0.423	0.988	0.965	0.931	0.939	0.938	0.928
Gongrosira inc.	0.991	0.969	0.511	0.447	0.522	0.457	0.995	1.006	0.970	0.996	0.968	0.988
Oedogonium sp.	0.991	0.926	0.497	0.451	0.512	0.460	0.997	0.972	0.940	0.967	0.943	0.948
Stigeoclonium ten.	0.928	0.877	0.453	0.418	0.469	0.430	0.945	0.916	0.887	0.898	0.878	0.883
Melosira var.	0.957	0.916	0.472	0.407	0.486	0.420	0.976	0.953	0.904	0.906	0.900	0.894
Nitzschia pal.	0.877	0.830	0.443	0.365	0.454	0.376	0.902	0.877	0.831	0.839	0.830	0.828
Audouinella ch.	0.966	0.945	0.498	0.450	0.510	0.460	0.977	0.995	0.968	0.987	0.963	0.973
Erpobdella oc.	0.963	0.901	0.472	0.414	0.489	0.429	0.973	0.955	0.906	0.926	0.909	0.914
Gammarus fo.	0.896	0.869	0.424	0.344	0.434	0.356	0.928	0.919	0.800	0.796	0.797	0.783
Baetis rh.	0.968	0.897	0.472	0.394	0.480	0.409	0.974	0.943	0.894	0.875	0.891	0.878
Hydropsyche sp.	0.967	0.929	0.477	0.407	0.490	0.420	0.976	0.972	0.905	0.925	0.901	0.910
Rhyacophila sp.	0.941	0.907	0.461	0.413	0.468	0.422	0.956	0.949	0.901	0.932	0.897	0.913
Simulium sp.	0.986	0.956	0.489	0.419	0.498	0.430	0.989	0.998	0.934	0.955	0.937	0.947
Tubifex sp.	0.878	0.847	0.435	0.374	0.447	0.389	0.887	0.893	0.848	0.850	0.843	0.847

3.1.2. Average rank diagrams for each dataset for the RRMSE measure



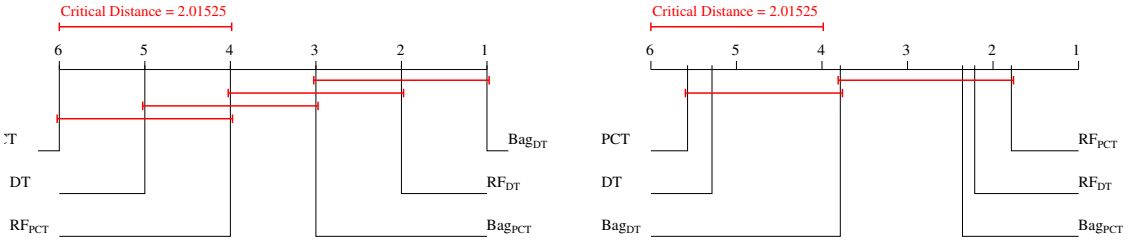
(a) Train (b) Cross-validation

Figure 1: The average rank diagrams for the RRMSE evaluation measure on the dataset *DiatomsAll*.



(a) Train (b) Cross-validation

Figure 2: The average rank diagrams for the RRMSE evaluation measure on the dataset *DiatomsTop10*.



(a) Train (b) Cross-validation

Figure 3: The average rank diagrams for the RRMSE evaluation measure on the dataset *WaterQuality*.

3.1.3. Results for the RMSE measure

Table 8: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll* dataset, evaluated by using RMSE as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Amphora aeq.	0.394	0.38	0.227	0.201	0.231	0.199	0.405	0.436	0.398	0.409	0.396	0.409
Achnanthidium cl.	0.851	0.824	0.513	0.426	0.538	0.44	0.886	0.906	0.873	0.934	0.871	0.909
Achnanthidium cl. bal.	1.134	1.007	0.693	0.532	0.69	0.534	1.18	1.205	1.152	1.18	1.174	1.179
Achnanthes sp.	0.335	0.31	0.218	0.201	0.217	0.195	0.349	0.369	0.357	0.384	0.35	0.36
Amphora cop.	1.158	1.117	0.707	0.564	0.723	0.591	1.26	1.286	1.198	1.231	1.202	1.202
Amphora fog.	0.388	0.376	0.237	0.224	0.242	0.232	0.399	0.412	0.406	0.431	0.402	0.413
Achnanthes lac.	0.872	0.803	0.516	0.428	0.526	0.436	0.933	0.946	0.922	0.97	0.916	0.942
Amphora in.	0.876	0.847	0.486	0.454	0.526	0.459	0.927	0.952	0.935	1.014	0.937	0.977
Achnanthidium min.	1.547	1.423	0.821	0.799	0.77	0.766	1.651	1.55	1.559	1.653	1.51	1.467
Amphora ov.	0.515	0.511	0.321	0.323	0.325	0.327	0.532	0.543	0.572	0.592	0.543	0.544
Amphora ped.	2.653	2.415	1.592	1.195	1.59	1.212	2.799	2.873	2.772	2.734	2.724	2.721
Amphora th.	0.362	0.348	0.195	0.188	0.216	0.188	0.373	0.395	0.365	0.402	0.367	0.377
Aulacoseira gra.	1.734	1.61	1.005	0.879	1.013	0.943	1.746	1.74	1.775	1.847	1.789	1.774
Amphora ven.	0.369	0.355	0.218	0.223	0.218	0.205	0.389	0.389	0.404	0.418	0.384	0.394
Cymbella aff.	0.391	0.387	0.242	0.252	0.243	0.229	0.419	0.415	0.445	0.467	0.416	0.424
Cocconeis dis.	0.46	0.441	0.272	0.273	0.29	0.26	0.483	0.515	0.472	0.541	0.475	0.494
Cymatopleura el.	0.633	0.596	0.389	0.35	0.38	0.357	0.662	0.714	0.674	0.7	0.659	0.67
Cyclotella jur. nud.	7.251	6.377	4.328	3.707	4.092	4.06	7.251	7.411	7.266	7.104	7.107	7.194
Cymbella lan.	3.797	3.767	2.276	2.162	2.265	2.152	5.037	4.55	4.255	4.649	4.239	4.451
Cyclotella men.	0.894	0.888	0.524	0.5	0.532	0.514	1.198	1.06	1.044	1.102	0.976	1
Cocconeis neo.	1.533	1.522	0.956	0.978	0.959	0.991	1.604	1.637	1.728	1.793	1.642	1.614
Cyclotella oc.	20.459	16.685	10.289	7.366	10.534	7.939	21.925	20.554	19.025	18.032	18.875	18.216
Cocconeis pl.	4.292	4.457	2.386	2.323	2.489	2.422	5.459	5.166	4.833	5.147	4.568	4.644
Cocconeis pl. eug.	0.926	0.872	0.556	0.536	0.533	0.536	0.962	0.96	0.96	1.001	0.949	0.956
Cocconeis pl. li.	2.068	1.872	1.208	1.017	1.165	0.99	2.219	2.152	2.147	2.06	2.072	2.052
Caloneis sch.	0.933	0.923	0.586	0.612	0.575	0.592	0.998	1.006	1.043	1.116	1.006	1.004
Cavinula scu.	8.124	7.213	4.507	3.444	4.716	3.684	8.859	8.984	8.189	8.525	8.142	8.172
Cymbella neo.	0.54	0.533	0.327	0.303	0.325	0.294	0.583	0.613	0.557	0.599	0.567	0.58
Diatoma ang.	2.228	2.178	1.344	1.307	1.428	1.306	2.316	2.407	2.328	2.531	2.335	2.406
Diploneis mau.	2.64	2.388	1.426	1.09	1.476	1.152	2.742	2.683	2.457	2.545	2.462	2.512
Diploneis mod.	0.325	0.312	0.201	0.172	0.206	0.172	0.335	0.34	0.339	0.358	0.328	0.333
Diploneis ov.	1.37	1.24	0.765	0.66	0.795	0.654	1.391	1.382	1.334	1.402	1.312	1.346
Epithemia ad.	1.039	1.032	0.587	0.566	0.564	0.564	1.271	1.236	1.136	1.204	1.107	1.158
Encyonema cae.	0.432	0.41	0.268	0.265	0.275	0.253	0.438	0.439	0.449	0.476	0.445	0.452
Encyonema min.	0.401	0.398	0.258	0.267	0.251	0.25	0.428	0.431	0.426	0.452	0.426	0.433
Encyonopsis mic.	1.399	1.358	0.904	0.944	0.88	0.891	1.482	1.476	1.492	1.589	1.44	1.479
Encyonema sil.	0.813	0.755	0.534	0.528	0.483	0.474	0.87	0.9	0.892	0.934	0.851	0.854
Epithemia so.	1.076	1.059	0.664	0.606	0.653	0.599	1.123	1.191	1.15	1.17	1.117	1.132
Fragilaria cap.	0.777	0.719	0.52	0.445	0.485	0.421	0.81	0.852	0.842	0.859	0.82	0.819
Fragilaria cap. va.	1.093	1.052	0.66	0.656	0.646	0.609	1.139	1.152	1.161	1.203	1.126	1.147
Fallacia och.	0.779	0.709	0.458	0.41	0.479	0.406	0.808	0.858	0.828	0.868	0.802	0.837
Fragilaria par.	0.648	0.582	0.406	0.4	0.43	0.366	0.668	0.744	0.695	0.722	0.693	0.687
Frustulia vul.	0.094	0.09	0.055	0.055	0.058	0.053	0.098	0.099	0.1	0.105	0.098	0.099
Gomphonema cl.	0.229	0.22	0.145	0.143	0.142	0.143	0.237	0.242	0.25	0.267	0.242	0.247
Geissleria dec.	1.964	1.854	1.125	1.09	1.228	1.042	2.096	2.232	2.062	2.089	2.069	2.052
Gomphonema it.	0.219	0.216	0.136	0.139	0.138	0.139	0.228	0.234	0.244	0.256	0.233	0.231
Gomphonema min.	0.746	0.721	0.412	0.38	0.413	0.372	0.769	0.815	0.73	0.787	0.745	0.752
Gomphonema ol. Horn.	2.439	2.387	1.392	1.387	1.355	1.286	2.686	2.559	2.594	2.84	2.542	2.558
Gomphonema par.	0.711	0.672	0.436	0.417	0.441	0.402	0.785	0.789	0.764	0.807	0.736	0.779
Gomphonema pum.	0.512	0.499	0.308	0.254	0.309	0.253	0.547	0.546	0.54	0.548	0.533	0.528
Gomphonema ol.	0.094	0.092	0.057	0.057	0.061	0.057	0.097	0.099	0.099	0.104	0.099	0.101
Gomphonema sar.	0.147	0.143	0.099	0.097	0.096	0.099	0.156	0.156	0.156	0.161	0.155	0.154
Gomphonema ter.	0.798	0.786	0.512	0.505	0.48	0.51	0.857	0.892	0.846	0.889	0.841	0.857
Gyrosigma mac.	0.875	0.791	0.518	0.403	0.537	0.416	0.904	0.946	0.898	0.922	0.883	0.887
Hannea ar.	0.904	0.882	0.533	0.567	0.526	0.486	0.932	0.948	0.972	0.989	0.95	0.945
Hantzschia amp.	0.476	0.449	0.304	0.279	0.308	0.285	0.486	0.517	0.505	0.519	0.492	0.5
Hippodonta ros.	0.246	0.24	0.158	0.149	0.156	0.144	0.253	0.267	0.257	0.276	0.259	0.261

Table 8: (ctd) Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll* dataset, evaluated by using RMSE as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Meridion cir. con.	0.268	0.265	0.176	0.16	0.174	0.161	0.306	0.324	0.309	0.311	0.297	0.303
Meridion cir.	1.2	1.169	0.737	0.769	0.704	0.686	1.254	1.265	1.302	1.341	1.258	1.261
Martyana mar.	0.198	0.192	0.121	0.119	0.124	0.118	0.205	0.214	0.211	0.223	0.206	0.214
Nitzschia alp.	0.967	0.902	0.494	0.494	0.482	0.474	1.036	1.047	0.963	0.998	0.942	0.946
Navicula ant.	0.94	0.897	0.569	0.522	0.589	0.504	1.006	1.073	1.039	1.113	0.998	1.027
Navicula cap.	0.847	0.786	0.504	0.456	0.523	0.46	0.886	0.956	0.892	0.945	0.88	0.906
Navicula cry.	0.317	0.301	0.191	0.192	0.19	0.186	0.32	0.335	0.328	0.35	0.324	0.334
Nitzschia dis.	0.395	0.384	0.232	0.225	0.236	0.222	0.415	0.444	0.432	0.449	0.415	0.417
Neidium du.	0.163	0.151	0.1	0.1	0.1	0.101	0.167	0.168	0.171	0.18	0.17	0.171
Navicula gre.	0.701	0.672	0.43	0.441	0.404	0.392	0.735	0.742	0.752	0.773	0.725	0.723
Navicula has.	0.526	0.499	0.328	0.316	0.317	0.318	0.57	0.586	0.564	0.595	0.56	0.572
Navicula krs.	1.833	1.689	1.07	0.857	1.103	0.888	1.906	2.039	1.851	1.888	1.85	1.856
Navicula lan.	1.041	0.98	0.664	0.673	0.617	0.602	1.095	1.098	1.144	1.183	1.1	1.101
Nupela la.	0.202	0.197	0.124	0.133	0.111	0.127	0.208	0.209	0.222	0.23	0.218	0.213
Nitzschia lin.	0.46	0.415	0.294	0.277	0.283	0.26	0.48	0.513	0.5	0.519	0.491	0.494
Navicula pra.	1.266	1.177	0.747	0.608	0.749	0.629	1.366	1.378	1.314	1.385	1.29	1.316
Navicula pre.	2.71	2.402	1.522	1.238	1.59	1.36	2.768	2.73	2.656	2.655	2.659	2.734
Navicula pro.	1.018	0.993	0.609	0.501	0.594	0.505	1.071	1.18	1.042	1.093	1.035	1.057
Nitzschia rec.	0.598	0.584	0.369	0.33	0.403	0.329	0.656	0.637	0.641	0.651	0.643	0.645
Navicula rei.	1.028	0.984	0.633	0.519	0.637	0.529	1.084	1.167	1.084	1.13	1.073	1.094
Navicula rot.	3.28	2.998	1.983	1.617	2.027	1.673	3.507	3.731	3.378	3.507	3.35	3.384
Navicula subh.	1.128	1.046	0.678	0.549	0.684	0.557	1.175	1.3	1.208	1.195	1.175	1.198
Navicula subr.	4.444	3.982	2.517	2.153	2.617	2.187	4.729	5.104	4.608	4.875	4.567	4.713
Nitzschia suba.	1.665	1.452	0.907	0.733	0.911	0.766	1.772	1.642	1.609	1.641	1.573	1.615
Navicula tri.	1.515	1.488	0.909	0.848	0.912	0.867	1.618	1.687	1.634	1.722	1.602	1.658
Navicula vircl.	1.357	1.272	0.856	0.739	0.885	0.72	1.429	1.474	1.452	1.534	1.419	1.476
Navicula virdu.	1.586	1.59	0.909	0.896	0.92	0.885	2.006	2.082	1.749	1.969	1.766	1.829
Orthoseira ros.	0.525	0.521	0.309	0.28	0.327	0.286	0.639	0.657	0.601	0.655	0.582	0.61
Placoneis bal.	2.105	2.01	1.247	0.994	1.288	1.065	2.319	2.374	2.2	2.274	2.17	2.206
Pinnularia bor.	0.719	0.687	0.396	0.384	0.379	0.365	0.855	0.814	0.769	0.794	0.743	0.759
Placoneis min.	0.246	0.247	0.146	0.144	0.142	0.139	0.266	0.285	0.256	0.29	0.248	0.27
Placoneis elg.	0.613	0.58	0.359	0.363	0.375	0.353	0.675	0.69	0.654	0.678	0.653	0.654
Planothidium lan.	1.797	1.734	1.147	1.077	1.127	1.015	1.867	1.939	1.961	1.964	1.914	1.954
Planothidium ros.	0.279	0.279	0.185	0.18	0.196	0.186	0.29	0.293	0.292	0.301	0.293	0.294
Placoneis neo.	1.334	1.25	0.798	0.703	0.833	0.682	1.465	1.445	1.434	1.465	1.429	1.424
Pseudostaurosira bre.	2.018	1.793	1.149	0.939	1.18	0.988	2.07	2.214	2.048	2.088	2.003	2.032
Pinnularia subc.	0.329	0.329	0.206	0.213	0.206	0.202	0.344	0.349	0.371	0.39	0.352	0.35
Rhoicosphenia abb.	0.928	0.85	0.52	0.431	0.534	0.446	0.95	0.985	0.918	0.895	0.917	0.886
Rhopalodia gib.	0.642	0.615	0.389	0.344	0.386	0.338	0.68	0.702	0.671	0.716	0.648	0.68
Reimeria sin.	0.293	0.283	0.172	0.173	0.177	0.162	0.309	0.342	0.316	0.332	0.31	0.32
Surirella ang.	0.646	0.597	0.374	0.328	0.408	0.324	0.71	0.676	0.67	0.713	0.668	0.67
Surirella min.	0.564	0.532	0.336	0.303	0.326	0.304	0.631	0.654	0.601	0.625	0.584	0.598
Sellaphora perb.	1.21	1.103	0.706	0.573	0.724	0.579	1.265	1.304	1.263	1.273	1.237	1.236
Sellaphora pu.	1.335	1.283	0.832	0.677	0.835	0.708	1.398	1.493	1.432	1.472	1.422	1.433
Stauroneis gra.	0.471	0.448	0.297	0.31	0.293	0.299	0.486	0.503	0.495	0.521	0.482	0.493
Staurosira con. bin.	0.34	0.329	0.198	0.186	0.203	0.184	0.346	0.361	0.358	0.379	0.355	0.362
Staurosira con.	2.817	2.676	1.487	1.429	1.58	1.388	2.941	2.897	2.75	3.034	2.762	2.907
Staurosira con. ven.	0.332	0.31	0.213	0.217	0.218	0.208	0.344	0.366	0.353	0.381	0.35	0.355
Stauroneis pho.	0.634	0.591	0.389	0.387	0.389	0.364	0.674	0.702	0.661	0.696	0.654	0.665
Staurosirella pin.	2.956	2.509	1.656	1.476	1.698	1.456	3.017	2.99	2.98	3.108	2.93	2.922
Stauroneis sm.	0.207	0.205	0.132	0.126	0.137	0.129	0.213	0.225	0.218	0.23	0.218	0.221
Tryblionella ang.	0.498	0.468	0.306	0.26	0.322	0.263	0.52	0.575	0.524	0.557	0.524	0.541
Tabellaria floc.	0.412	0.409	0.234	0.22	0.234	0.232	0.53	0.489	0.455	0.514	0.445	0.481
Ulnaria ul.	0.215	0.195	0.121	0.114	0.126	0.111	0.222	0.228	0.211	0.23	0.212	0.215

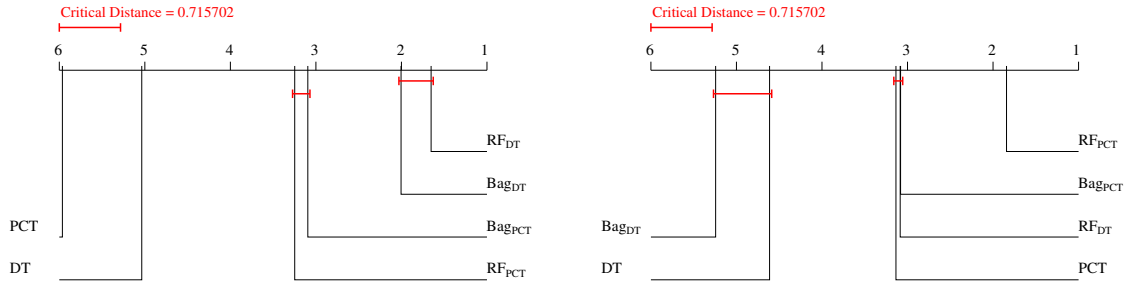
Table 9: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsTop10* dataset, evaluated by using RMSE as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Amphora ped.	2.621	2.415	1.397	1.195	1.442	1.212	2.825	2.873	2.678	2.734	2.702	2.721
Cyclotella jur. nud.	6.764	6.558	3.795	3.707	3.639	4.06	7.16	7.284	7.084	7.104	7.045	7.194
Cyclotella oc.	18.836	16.685	8.678	7.366	9.144	7.939	20.076	20.554	18.518	18.032	18.36	18.216
Cocconeis pl.	4.462	4.457	2.162	2.323	2.206	2.422	5.041	5.171	4.711	5.147	4.602	4.644
Cavinula scu.	7.932	7.289	4.034	3.444	4.247	3.684	8.393	8.909	8.189	8.525	8.091	8.172
Diploneis mau.	2.425	2.388	1.238	1.09	1.279	1.152	2.708	2.683	2.479	2.545	2.463	2.512
Navicula pre.	2.705	2.402	1.421	1.238	1.419	1.36	2.884	2.73	2.724	2.655	2.741	2.734
Navicula rot.	3.22	2.998	1.741	1.617	1.821	1.673	3.468	3.738	3.415	3.507	3.385	3.384
Navicula subr.	4.424	3.982	2.286	2.153	2.38	2.187	4.676	5.099	4.64	4.875	4.586	4.713
Staurosirella pin.	2.904	2.509	1.53	1.476	1.519	1.456	2.992	3.002	2.994	3.108	2.958	2.922

Table 10: Predictive performance of the methods (columns) on all targets (rows) of the *WaterQuality* dataset, evaluated by using RMSE as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

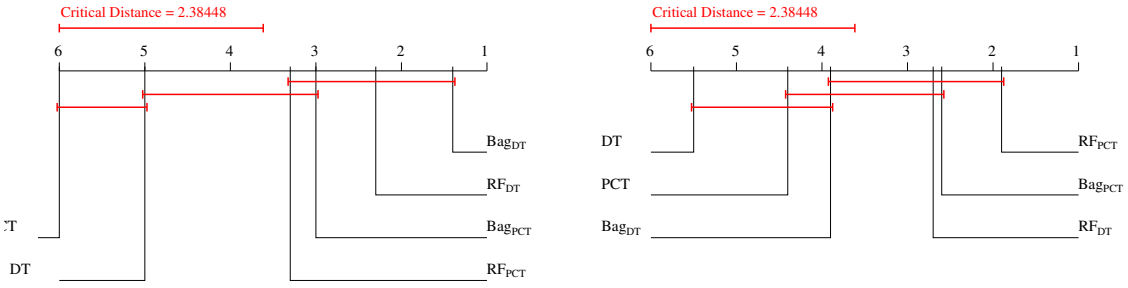
	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Cladophora sp.	1.426	1.345	0.704	0.594	0.732	0.615	1.438	1.404	1.356	1.367	1.365	1.350
Gongrosira inc.	1.452	1.419	0.749	0.655	0.764	0.669	1.459	1.475	1.422	1.460	1.419	1.448
Oedogonium sp.	0.904	0.845	0.454	0.412	0.467	0.419	0.910	0.887	0.858	0.883	0.860	0.865
Stigeoclonium ten.	0.922	0.871	0.450	0.415	0.466	0.427	0.940	0.911	0.882	0.893	0.873	0.878
Melosira var.	0.967	0.926	0.477	0.411	0.490	0.424	0.986	0.964	0.914	0.916	0.910	0.903
Nitzschia pal.	1.405	1.329	0.709	0.585	0.727	0.602	1.447	1.407	1.333	1.346	1.331	1.329
Audouinella ch.	0.769	0.753	0.397	0.358	0.406	0.367	0.779	0.793	0.771	0.787	0.768	0.776
Erpobdella oc.	1.110	1.038	0.544	0.478	0.563	0.495	1.123	1.103	1.046	1.068	1.049	1.055
Gammarus fo.	1.641	1.591	0.776	0.631	0.794	0.652	1.700	1.683	1.466	1.458	1.460	1.434
Baetis rh.	1.499	1.388	0.731	0.611	0.743	0.634	1.510	1.462	1.387	1.357	1.382	1.361
Hydropsyche sp.	1.292	1.241	0.637	0.544	0.655	0.562	1.305	1.300	1.210	1.237	1.205	1.216
Rhyacophila sp.	0.780	0.752	0.383	0.343	0.388	0.350	0.793	0.788	0.748	0.774	0.744	0.758
Simulium sp.	1.314	1.274	0.651	0.559	0.664	0.572	1.319	1.331	1.246	1.274	1.249	1.262
Tubifex sp.	1.287	1.242	0.638	0.549	0.656	0.571	1.302	1.311	1.245	1.248	1.238	1.242

3.1.4. Average rank diagrams for each dataset for the RMSE measure



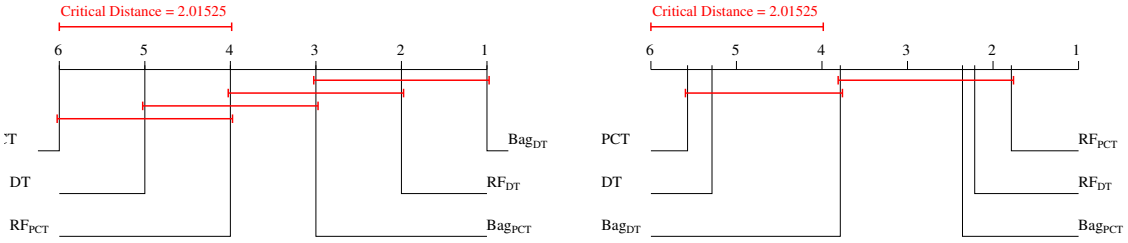
(a) Train (b) Cross-validation

Figure 4: The average rank diagrams for the RMSE evaluation measure on the dataset *DiatomsAll*.



(a) Train (b) Cross-validation

Figure 5: The average rank diagrams for the RMSE evaluation measure on the dataset *DiatomsTop10*.



(a) Train (b) Cross-validation

Figure 6: The average rank diagrams for the RMSE evaluation measure on the dataset *WaterQuality*.

3.1.5. Results for the correlation coefficient measure

Table 11: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll* dataset, evaluated by using correlation coefficient as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Amphora aeq.	0.172	0.312	0.945	0.941	0.954	0.961	0.033	-0.048	0.124	0.114	0.152	0.044
Achnanthidium cl.	0.199	0.316	0.944	0.94	0.94	0.956	-0.042	0.042	0.093	0.041	0.077	-0.009
Achnanthidium cl. bal.	0.348	0.553	0.906	0.95	0.918	0.959	0.253	0.272	0.311	0.274	0.249	0.25
Achnanthes sp.	0.205	0.422	0.941	0.927	0.958	0.952	-0.02	-0.047	-0.059	-0.07	-0.04	-0.075
Amphora cop.	0.319	0.406	0.928	0.963	0.937	0.961	-0.004	0.084	0.209	0.14	0.193	0.199
Amphora fog.	0.123	0.277	0.962	0.923	0.927	0.934	-0.054	-0.053	-0.049	-0.038	-0.037	-0.025
Achnanthes lac.	0.374	0.521	0.934	0.946	0.932	0.956	0.199	0.234	0.22	0.134	0.231	0.175
Amphora in.	0.344	0.419	0.944	0.934	0.948	0.948	0.145	0.15	0.143	0.015	0.102	0.012
Achnanthidium min.	0.267	0.464	0.975	0.973	0.98	0.962	0.067	0.292	0.244	0.048	0.373	0.45
Amphora ov.	0.191	0.227	0.931	0.886	0.947	0.953	0.023	-0.032	-0.047	-0.045	-0.03	-0.058
Amphora ped.	0.334	0.514	0.924	0.96	0.927	0.959	0.181	0.207	0.214	0.276	0.256	0.276
Amphora th.	0.203	0.34	0.952	0.919	0.953	0.944	0.068	0.018	0.186	0.077	0.151	0.112
Aulacoseira gra.	0.114	0.386	0.948	0.933	0.956	0.942	0.069	0.177	0.06	0.06	0.004	0.093
Amphora ven.	0.226	0.353	0.92	0.866	0.937	0.926	-0.042	0.113	0.029	0.027	0.123	0.048
Cymbella aff.	0.283	0.314	0.898	0.826	0.927	0.914	-0.018	0.085	0.012	0.003	0.121	0.07
Cocconeis dis.	0.251	0.375	0.95	0.875	0.952	0.933	0.026	0.017	0.151	0.023	0.106	0.071
Cymatopleura el.	0.242	0.41	0.942	0.935	0.954	0.943	0.01	-0.016	0.028	0.008	0.067	0.054
Cyclotella jur. nud.	0.213	0.512	0.922	0.939	0.936	0.916	0.235	0.242	0.227	0.297	0.29	0.261
Cymbella lan.	0.573	0.582	0.928	0.932	0.943	0.957	0.106	0.287	0.406	0.271	0.409	0.29
Cyclotella men.	0.585	0.592	0.93	0.952	0.938	0.964	0.122	0.335	0.334	0.192	0.493	0.443
Cocconeis neo.	0.22	0.25	0.922	0.853	0.947	0.956	-0.027	-0.024	-0.027	-0.024	-0.036	-0.028
Cyclotella oc.	0.297	0.627	0.947	0.968	0.946	0.967	0.106	0.374	0.472	0.542	0.502	0.537
Cocconeis pl.	0.522	0.464	0.934	0.949	0.934	0.958	0.091	0.217	0.295	0.163	0.439	0.395
Cocconeis pl. eug.	0.181	0.379	0.938	0.912	0.966	0.955	0.006	0.1	0.072	0.046	0.056	0.059
Cocconeis pl. li.	0.163	0.45	0.959	0.952	0.965	0.963	-0.114	0.135	0.01	0.222	0.154	0.213
Caloneis sch.	0.258	0.293	0.926	0.837	0.949	0.926	-0.075	0.007	-0.01	-0.028	-0.038	-0.037
Cavinula scu.	0.375	0.568	0.93	0.96	0.929	0.96	0.164	0.235	0.357	0.284	0.373	0.363
Cymbella neo.	0.297	0.334	0.925	0.944	0.942	0.964	0.048	0.007	0.204	0.007	0.122	0.03
Diatoma ang.	0.192	0.282	0.956	0.899	0.953	0.936	-0.006	-0.045	0.005	-0.031	-0.03	-0.058
Diploneis mau.	0.129	0.442	0.937	0.96	0.943	0.957	-0.047	0.212	0.393	0.316	0.396	0.337
Diploneis mod.	0.202	0.34	0.917	0.928	0.926	0.946	0.053	0.112	0.098	0.181	0.178	0.182
Diploneis ov.	0.105	0.435	0.935	0.933	0.944	0.944	0.083	0.202	0.251	0.2	0.308	0.252
Epithemia ad.	0.47	0.481	0.924	0.946	0.943	0.962	0.062	0.13	0.282	0.132	0.342	0.203
Encyonema cae.	0.162	0.351	0.935	0.886	0.937	0.927	0.098	0.177	0.041	-0.019	0.037	0.056
Encyonema min.	0.251	0.271	0.923	0.874	0.933	0.913	-0.059	-0.001	0.027	-0.043	-0.007	-0.029
Encyonopsis mic.	0.238	0.334	0.928	0.816	0.954	0.914	-0.061	0.087	0.014	0.012	0.11	0.048
Encyonema sil.	0.185	0.409	0.871	0.844	0.94	0.931	-0.056	-0.046	-0.003	-0.019	0.006	0.023
Epithemia so.	0.245	0.3	0.932	0.918	0.939	0.936	0.048	-0.066	0.044	0.086	0.111	0.092
Fragilaria cap.	0.215	0.428	0.908	0.918	0.953	0.946	-0.008	0.062	-0.037	-0.014	-0.06	0.038
Fragilaria cap. va.	0.206	0.336	0.92	0.879	0.933	0.941	0.006	0.079	0.073	0.042	0.129	0.089
Fallacia och.	0.187	0.449	0.948	0.926	0.956	0.958	0.004	0.035	-0.053	-0.009	0.046	-0.02
Fragilaria par.	0.302	0.516	0.933	0.863	0.938	0.94	0.191	0.062	0.066	0.093	0.041	0.133
Frustulia vul.	0.161	0.342	0.972	0.93	0.948	0.949	-0.055	-0.031	-0.047	-0.038	-0.052	-0.047
Gomphonema cl.	0.151	0.317	0.936	0.88	0.948	0.944	-0.044	-0.024	-0.094	-0.077	-0.1	-0.097
Geissleria dec.	0.261	0.413	0.956	0.932	0.951	0.964	-0.033	-0.017	0.066	0.071	0.018	0.088
Gomphonema it.	0.201	0.255	0.93	0.86	0.947	0.949	-0.052	-0.037	-0.043	-0.036	-0.051	-0.044
Gomphonema min.	0.282	0.372	0.953	0.932	0.945	0.961	0.165	0.087	0.344	0.166	0.285	0.26
Gomphonema ol. Horn.	0.375	0.42	0.947	0.916	0.941	0.959	0.037	0.264	0.257	0.184	0.259	0.258
Gomphonema par.	0.325	0.449	0.926	0.922	0.935	0.952	0.04	0.062	0.143	0.018	0.22	0.016
Gomphonema pum.	0.367	0.422	0.94	0.929	0.948	0.941	0.161	0.241	0.232	0.284	0.252	0.299
Gomphonema ol.	0.164	0.274	0.948	0.883	0.946	0.94	-0.058	-0.03	-0.041	-0.02	-0.042	-0.028
Gomphonema sar.	0.212	0.312	0.938	0.885	0.964	0.957	-0.047	-0.033	-0.046	-0.03	-0.05	-0.002
Gomphonema ter.	0.291	0.334	0.948	0.921	0.951	0.943	-0.023	-0.049	0.053	0.029	0.053	0.033
Gyrosigma mac.	0.272	0.493	0.92	0.949	0.926	0.951	0.188	0.157	0.196	0.199	0.239	0.251
Hannea ar.	0.103	0.243	0.895	0.84	0.925	0.974	-0.06	-0.042	-0.026	-0.022	-0.038	-0.039
Hantzschia amp.	0.104	0.346	0.914	0.915	0.958	0.946	-0.04	-0.047	-0.04	-0.042	-0.052	-0.074
Hippodonta ros.	0.198	0.283	0.932	0.906	0.94	0.959	0.01	-0.07	0	-0.058	-0.052	-0.089

Table 11: (ctd) Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll* dataset, evaluated by using correlation coefficient as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Meridion cir. con.	0.389	0.41	0.878	0.924	0.901	0.957	0.021	-0.073	0.035	0.011	0.075	-0.024
Meridion cir.	0.117	0.254	0.886	0.833	0.932	0.938	-0.051	-0.038	-0.03	-0.026	-0.048	-0.048
Martyana mar.	0.165	0.287	0.952	0.871	0.939	0.929	-0.036	-0.082	-0.088	-0.064	-0.056	-0.058
Nitzschia alp.	0.202	0.408	0.978	0.958	0.982	0.972	0.016	0.047	0.224	0.149	0.317	0.299
Navicula ant.	0.314	0.422	0.932	0.918	0.933	0.937	0.038	-0.049	0.038	-0.005	0.111	0.081
Navicula cap.	0.252	0.439	0.943	0.925	0.938	0.955	0.044	0.008	0.088	0.058	0.093	0.049
Navicula cry.	0.118	0.334	0.946	0.891	0.959	0.938	0.076	0.047	-0.02	-0.081	0.012	-0.042
Nitzschia dis.	0.215	0.316	0.939	0.905	0.947	0.942	-0.044	-0.076	-0.043	-0.014	0.044	0.045
Neidium du.	0.138	0.395	0.961	0.909	0.952	0.946	-0.05	0.102	-0.072	-0.044	-0.051	-0.03
Navicula gre.	0.12	0.306	0.899	0.856	0.941	0.959	-0.094	0.015	-0.032	-0.041	-0.003	0
Navicula has.	0.218	0.377	0.922	0.919	0.929	0.933	-0.08	-0.025	0.005	-0.069	-0.056	-0.103
Navicula krs.	0.245	0.45	0.927	0.945	0.935	0.949	0.104	0.043	0.218	0.214	0.212	0.225
Navicula lan.	0.171	0.374	0.887	0.848	0.949	0.952	-0.05	0.068	-0.034	-0.046	-0.067	-0.069
Nupela la.	0.098	0.241	0.946	0.847	0.969	0.925	-0.026	-0.018	-0.012	-0.009	-0.013	-0.016
Nitzschia lin.	0.204	0.47	0.927	0.92	0.95	0.952	-0.044	-0.016	-0.057	-0.051	-0.085	-0.033
Navicula pra.	0.346	0.49	0.916	0.939	0.93	0.948	0.121	0.215	0.259	0.204	0.298	0.266
Navicula pre.	0.288	0.529	0.926	0.935	0.932	0.939	0.238	0.323	0.348	0.4	0.345	0.296
Navicula pro.	0.335	0.393	0.925	0.95	0.933	0.953	0.185	0.051	0.283	0.201	0.29	0.245
Nitzschia rec.	0.376	0.426	0.939	0.897	0.935	0.941	0.039	0.238	0.154	0.241	0.126	0.162
Navicula rei.	0.284	0.396	0.921	0.946	0.931	0.955	0.069	0.012	0.134	0.083	0.136	0.098
Navicula rot.	0.361	0.523	0.921	0.946	0.921	0.945	0.181	0.166	0.291	0.228	0.305	0.291
Navicula subh.	0.36	0.501	0.923	0.95	0.929	0.958	0.244	0.093	0.179	0.24	0.244	0.198
Navicula subr.	0.281	0.51	0.938	0.948	0.944	0.958	0.037	0.049	0.176	0.091	0.185	0.133
Nitzschia suba.	0.272	0.544	0.928	0.949	0.929	0.948	0.085	0.34	0.371	0.363	0.425	0.366
Navicula tri.	0.334	0.379	0.952	0.934	0.955	0.939	0.086	0.04	0.051	-0.003	0.122	0.045
Navicula vircl.	0.292	0.443	0.929	0.94	0.933	0.953	0.112	0.161	0.067	-0.032	0.124	0.011
Navicula virdu.	0.513	0.51	0.939	0.934	0.946	0.959	0.082	-0.006	0.336	0.086	0.295	0.179
Orthoseira ros.	0.5	0.511	0.923	0.937	0.923	0.961	0.142	0.054	0.234	0.051	0.284	0.142
Placoneis bal.	0.354	0.451	0.921	0.953	0.918	0.952	0.11	0.115	0.242	0.191	0.272	0.233
Pinnularia bor.	0.389	0.474	0.93	0.933	0.945	0.965	0.01	0.141	0.213	0.114	0.305	0.235
Placoneis min.	0.311	0.302	0.945	0.919	0.953	0.96	0.067	-0.076	0.196	-0.045	0.298	0.011
Placoneis elg.	0.22	0.386	0.936	0.884	0.935	0.95	-0.072	-0.078	-0.009	-0.056	-0.063	-0.086
Planothidium lan.	0.172	0.31	0.908	0.876	0.932	0.944	-0.048	-0.018	-0.129	-0.066	-0.101	-0.082
Planothidium ros.	0.216	0.218	0.954	0.913	0.964	0.936	-0.042	-0.025	-0.048	-0.021	-0.039	-0.028
Placoneis neo.	0.377	0.497	0.928	0.942	0.935	0.961	0.126	0.277	0.186	0.14	0.172	0.187
Pseudostaurosira bre.	0.169	0.483	0.945	0.954	0.95	0.961	0.07	0.012	0.144	0.152	0.209	0.182
Pinnularia subc.	0.226	0.226	0.921	0.859	0.946	0.957	-0.018	-0.019	-0.023	-0.019	-0.028	-0.029
Rhoicosphenia abb.	0.174	0.432	0.953	0.949	0.949	0.952	0.075	0.154	0.233	0.328	0.234	0.343
Rhopalodia gib.	0.256	0.38	0.926	0.926	0.941	0.95	0.105	0.068	0.13	0.051	0.225	0.07
Reimeria sin.	0.249	0.355	0.944	0.887	0.95	0.945	0.005	-0.1	-0.033	0	0.009	-0.037
Surirella ang.	0.289	0.47	0.93	0.942	0.925	0.958	-0.008	0.218	0.18	0.04	0.172	0.162
Surirella min.	0.309	0.442	0.907	0.934	0.937	0.955	0.02	0.014	0.125	0.013	0.184	0.087
Sellaphora perb.	0.273	0.48	0.943	0.954	0.942	0.963	0.114	0.19	0.135	0.165	0.194	0.218
Sellaphora pu.	0.297	0.397	0.912	0.946	0.938	0.959	0.137	0.037	0.075	0.072	0.053	0.077
Stauroneis gra.	0.153	0.342	0.964	0.868	0.966	0.953	0	-0.029	-0.039	-0.029	0.018	-0.054
Staurosira con. bin.	0.224	0.332	0.941	0.913	0.949	0.948	0.154	0.084	0.068	0.025	0.053	0.018
Staurosira con.	0.204	0.368	0.938	0.921	0.95	0.954	0.026	0.172	0.297	0.132	0.282	0.164
Staurosira con. ven.	0.16	0.387	0.934	0.836	0.932	0.94	-0.056	-0.041	-0.051	-0.047	-0.066	-0.067
Stauroneis pho.	0.184	0.4	0.943	0.901	0.95	0.956	-0.061	-0.032	0	-0.005	0.02	0.005
Staurosirella pin.	0.142	0.543	0.935	0.93	0.943	0.954	0.09	0.283	0.165	0.162	0.204	0.236
Stauroneis sm.	0.223	0.264	0.959	0.932	0.948	0.964	0.052	-0.06	-0.04	-0.049	-0.049	-0.094
Tryblionella ang.	0.194	0.391	0.936	0.943	0.94	0.955	-0.057	-0.115	-0.032	-0.089	-0.074	-0.091
Tabellaria floc.	0.53	0.539	0.929	0.95	0.933	0.972	0.085	0.229	0.353	0.076	0.424	0.167
Ulnaria ul.	0.194	0.457	0.943	0.906	0.956	0.937	0.062	0.068	0.261	0.155	0.25	0.229

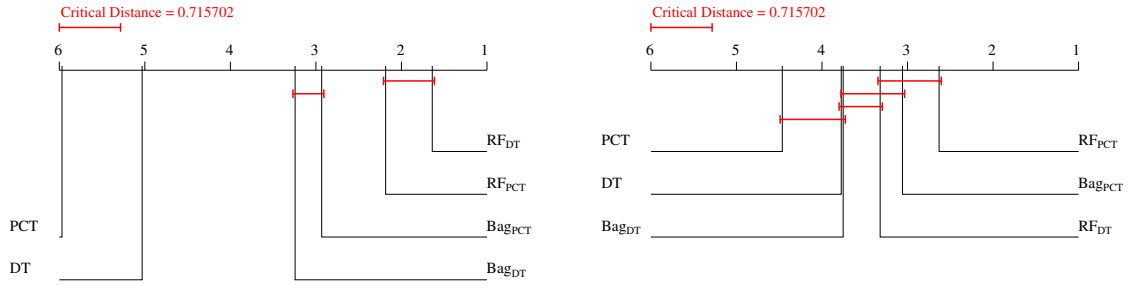
Table 12: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsTop10* dataset, evaluated by using correlation coefficient as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Amphora ped.	0.365	0.514	0.953	0.96	0.946	0.959	0.147	0.207	0.31	0.276	0.282	0.276
Cyclotella jur. nud.	0.412	0.468	0.945	0.939	0.951	0.916	0.288	0.268	0.303	0.297	0.316	0.261
Cyclotella oc.	0.477	0.627	0.961	0.968	0.956	0.967	0.376	0.374	0.509	0.542	0.532	0.537
Cocconeis pl.	0.462	0.464	0.965	0.949	0.966	0.958	0.201	0.216	0.359	0.163	0.445	0.395
Cavinula scu.	0.425	0.556	0.95	0.96	0.944	0.96	0.315	0.248	0.36	0.284	0.387	0.363
Diploneis mau.	0.413	0.442	0.957	0.96	0.958	0.957	0.127	0.212	0.368	0.316	0.396	0.337
Navicula pre.	0.294	0.529	0.935	0.935	0.946	0.939	0.119	0.323	0.298	0.4	0.26	0.296
Navicula rot.	0.403	0.523	0.95	0.946	0.942	0.945	0.231	0.162	0.26	0.228	0.277	0.291
Navicula subr.	0.295	0.51	0.949	0.948	0.954	0.958	0.112	0.05	0.173	0.091	0.187	0.133
Staurosirella pin.	0.234	0.543	0.95	0.93	0.957	0.954	0.123	0.275	0.153	0.162	0.175	0.236

Table 13: Predictive performance of the methods (columns) on all targets (rows) of the *WaterQuality* dataset, evaluated by using correlation coefficient as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

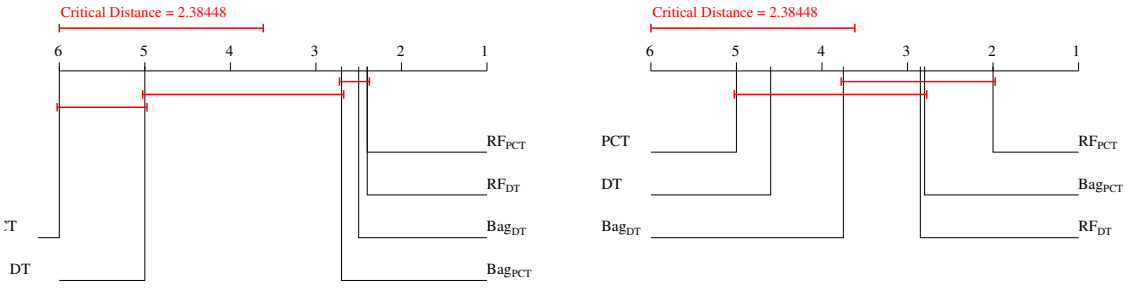
	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Cladophora sp.	0.194	0.379	0.949	0.958	0.946	0.957	0.153	0.278	0.362	0.355	0.345	0.375
Gongrosira inc.	0.134	0.248	0.954	0.960	0.958	0.961	0.098	0.091	0.245	0.191	0.250	0.200
Oedogonium sp.	0.131	0.378	0.947	0.942	0.949	0.952	0.089	0.247	0.340	0.297	0.333	0.329
Stigeoclonium ten.	0.373	0.481	0.937	0.942	0.932	0.942	0.327	0.407	0.460	0.450	0.478	0.470
Melosira var.	0.290	0.401	0.944	0.953	0.944	0.953	0.226	0.312	0.428	0.427	0.438	0.450
Nitzschia pal.	0.480	0.558	0.933	0.956	0.930	0.954	0.431	0.484	0.554	0.543	0.557	0.558
Audouinella ch.	0.258	0.326	0.942	0.945	0.945	0.948	0.215	0.187	0.269	0.244	0.271	0.263
Erpobdella oc.	0.270	0.435	0.942	0.951	0.936	0.947	0.230	0.309	0.421	0.391	0.414	0.407
Gammarus fo.	0.444	0.496	0.942	0.961	0.942	0.960	0.376	0.408	0.606	0.606	0.615	0.627
Baetis rh.	0.251	0.443	0.949	0.956	0.949	0.959	0.224	0.342	0.450	0.483	0.462	0.479
Hydropsyche sp.	0.255	0.371	0.946	0.957	0.946	0.957	0.221	0.260	0.428	0.386	0.440	0.415
Rhyacophila sp.	0.339	0.420	0.942	0.952	0.940	0.950	0.294	0.330	0.433	0.382	0.441	0.412
Simulium sp.	0.168	0.294	0.953	0.958	0.954	0.960	0.146	0.158	0.358	0.315	0.353	0.327
Tubifex sp.	0.479	0.532	0.937	0.953	0.933	0.949	0.460	0.458	0.528	0.528	0.536	0.532

3.1.6. *Average rank diagrams for each dataset for the correlation coefficient measure*



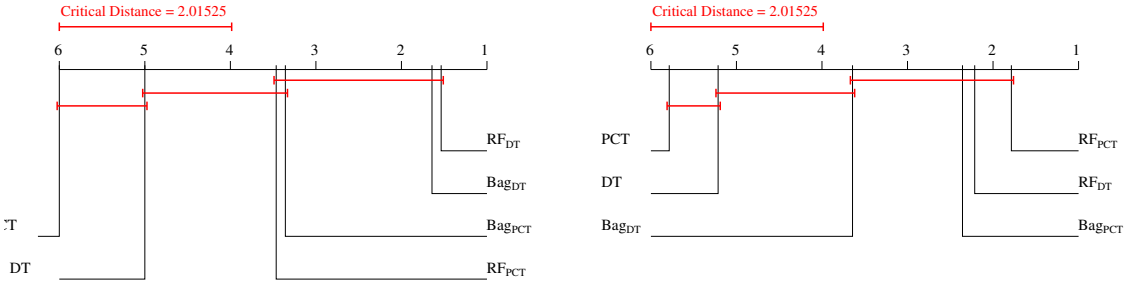
(a) Train (b) Cross-validation

Figure 7: The average rank diagrams for the correlation coefficient evaluation measure on the dataset *DiatomsAll*.



(a) Train (b) Cross-validation

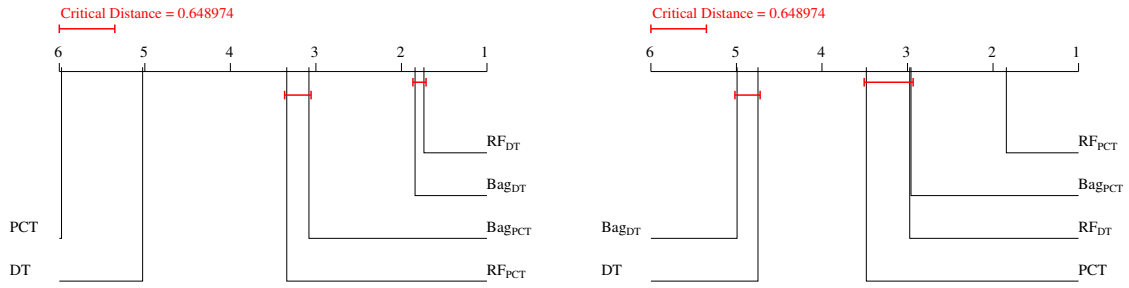
Figure 8: The average rank diagrams for the correlation coefficient evaluation measure on the dataset *DiatomsTop10*.



(a) Train (b) Cross-validation

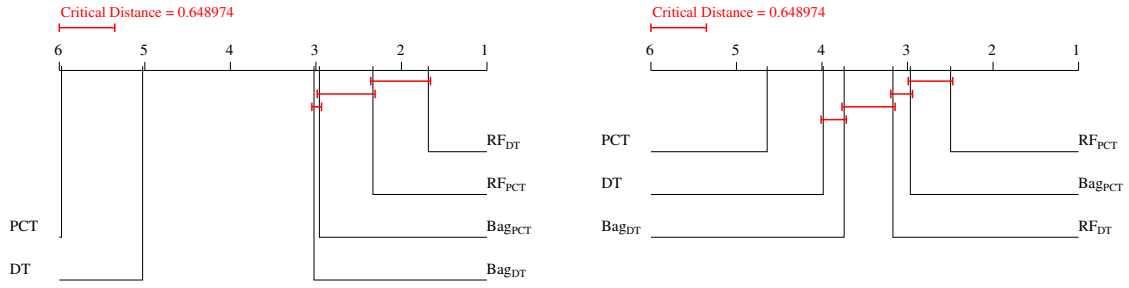
Figure 9: The average rank diagrams for the correlation coefficient evaluation measure on the dataset *WaterQuality*.

3.2. *Average rank diagrams for all multi-target regression tasks*



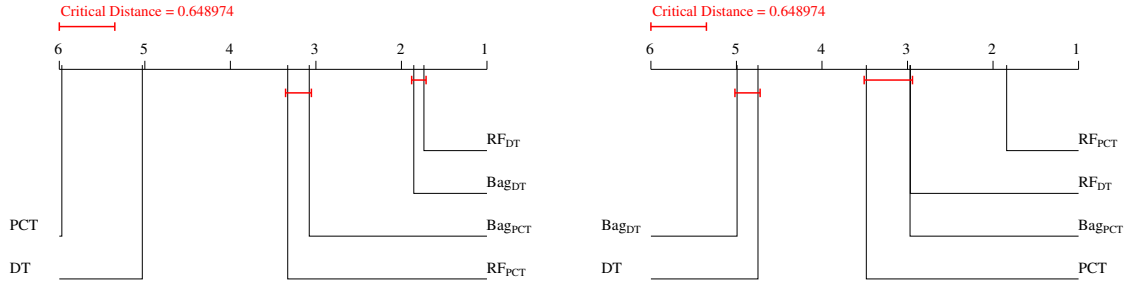
(a) Train (b) Cross-validation

Figure 10: The average rank diagrams for the RRMSE evaluation measure for all datasets that contain information about species abundance.



(a) Train (b) Cross-validation

Figure 11: The average rank diagrams for the correlation coefficient evaluation measure for all datasets that contain information about species abundance.



(a) Train (b) Cross-validation

Figure 12: The average rank diagrams for the RMSE evaluation measure for all datasets that contain information about species abundance.

3.3. Variable importance for the multi-target regression tasks

Table 14: Variable importance for the datasets that contain information about species abundance, obtained by feature ranking via random forests of multi-target trees.

	Diatoms All		DiatomsTop10		WaterQuality	
	Desc. Attributes	Importance	Desc. Attributes	Importance	Desc. Attributes	Importance
1	Conductivity	0.179	SecchiDepth	0.285	NO_3	0.256
2	N_{org}	0.172	Mg	0.275	CO_2	0.256
3	NO_3	0.167	NH_4	0.272	Hardness	0.247
4	Na	0.167	pH	0.264	O_2	0.243
5	N_{total}	0.166	Cu	0.260	pH	0.242
6	SecchiDepth	0.158	Na	0.256	SiO_2	0.239
7	pH	0.157	N_{org}	0.255	Temperature	0.238
8	SO_4	0.156	N_{total}	0.251	O_{sat}	0.236
9	Zn	0.156	P_{total}	0.251	Cl	0.234
10	Mg	0.154	Conductivity	0.251	PO_4	0.233
11	Temperature	0.154	O_{sat}	0.251	NO_2	0.230
12	Mn	0.151	K	0.248	Conductivity	0.228
13	Cu	0.138	NO_3	0.247	$KMnO_4$	0.225
14	NH_4	0.134	NO_2	0.244	NH_4	0.210
15	O_{sat}	0.134	SO_4	0.233	$K_2Cr_2O_7$	0.198
16	NO_2	0.129	Zn	0.231	BOD	0.195
17	P_{total}	0.126	Temperature	0.229		
18	K	0.121	Mn	0.228		

4. Complete results for predicting the presence/absense of species

In this section, we present the complete results for the datasets that contain information about species presence/absence. First, we give the detailed results containing the quantitative performance of the methods used in the data analysis. We then present the average rank diagrams summarizing the statistical evaluation of the performance of the methods on each of the dataset separately, for all evaluation measures. We next present such results for all of the datasets considered together. Finally, we show the variable importance for the descriptive attributes, obtained by using feature ranking via random forests of predictive clustering trees. A detailed description of the procedures used to obtain these results and explanations for all the abbreviations used can be found in the main manuscript.

4.1. Predictive performance of the methods on the multi-target classification tasks

4.1.1. Results for the micro balanced accuracy measure

Table 15: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using micro balanced accuracy as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Amphora aeq.	0.908	0.908	0.959	0.991	0.936	0.972	0.908	0.908	0.908	0.908	0.908	0.908
Achnanthidium cl.	0.766	0.775	0.954	0.995	0.945	1.000	0.761	0.711	0.757	0.720	0.761	0.757
Achnanthidium cl. bal.	0.743	0.784	0.968	0.986	0.977	0.991	0.702	0.739	0.711	0.720	0.729	0.725
Achnanthes sp.	0.982	0.982	0.982	0.982	0.982	0.991	0.982	0.982	0.982	0.982	0.982	0.982
Amphora cop.	0.656	0.716	0.991	1.000	0.995	0.995	0.587	0.615	0.661	0.624	0.638	0.628
Amphora fog.	0.968	0.968	0.968	0.982	0.968	0.968	0.968	0.968	0.968	0.968	0.968	0.968
Achnanthes lac.	0.729	0.752	0.982	0.991	0.972	0.991	0.693	0.628	0.706	0.656	0.711	0.674
Amphora in.	0.876	0.876	0.968	0.982	0.968	0.986	0.876	0.839	0.876	0.862	0.876	0.867
Achnanthidium min.	0.922	0.922	0.954	0.972	0.959	0.977	0.922	0.922	0.922	0.917	0.922	0.922
Amphora ov.	0.968	0.968	0.986	0.991	0.968	0.986	0.968	0.968	0.968	0.968	0.968	0.968
Amphora ped.	0.775	0.798	0.968	0.977	0.954	0.977	0.739	0.702	0.752	0.748	0.752	0.752
Amphora th.	0.922	0.922	0.963	0.991	0.950	0.986	0.922	0.922	0.922	0.913	0.922	0.922
Aulacoseira gra.	0.899	0.899	0.945	0.986	0.922	0.972	0.899	0.899	0.899	0.899	0.899	0.894
Amphora ven.	0.977	0.977	0.982	0.982	0.986	0.982	0.977	0.977	0.972	0.972	0.977	0.977
Cymbella aff.	0.968	0.968	0.972	0.991	0.972	0.982	0.968	0.968	0.963	0.963	0.968	0.968
Cocconeis dis.	0.894	0.894	0.950	0.991	0.940	0.972	0.894	0.894	0.894	0.876	0.894	0.899
Cymatopleura el.	0.872	0.881	0.954	0.986	0.963	0.968	0.862	0.862	0.867	0.881	0.872	0.881
Cyclotella jur. nud.	0.798	0.821	0.977	0.982	0.959	0.982	0.748	0.743	0.798	0.775	0.803	0.775
Cymbella lan.	0.936	0.927	0.982	0.986	0.982	0.986	0.894	0.872	0.917	0.917	0.917	0.927
Cyclotella men.	0.959	0.959	0.986	0.986	0.991	0.982	0.959	0.959	0.945	0.959	0.959	0.959
Cocconeis neo.	0.986	0.986	0.995	0.995	0.991	0.995	0.986	0.986	0.986	0.986	0.986	0.986
Cyclotella oc.	0.849	0.899	0.977	0.986	0.991	0.991	0.794	0.839	0.867	0.899	0.881	0.885
Cocconeis pl.	0.775	0.794	0.963	0.991	0.963	0.991	0.743	0.720	0.766	0.734	0.766	0.771
Cocconeis pl. eug.	0.950	0.950	0.972	0.977	0.963	0.972	0.950	0.950	0.950	0.950	0.950	0.950
Cocconeis pl. li.	0.780	0.812	0.982	0.995	0.959	0.995	0.780	0.743	0.780	0.761	0.780	0.766
Caloneis sch.	0.904	0.904	0.972	0.991	0.972	0.968	0.904	0.904	0.904	0.885	0.904	0.904
Cavinula scu.	0.794	0.835	0.977	0.982	0.963	0.972	0.743	0.757	0.821	0.826	0.821	0.821
Cymbella neo.	0.950	0.950	0.963	0.982	0.972	0.982	0.950	0.950	0.950	0.950	0.950	0.950
Diatoma ang.	0.904	0.904	0.950	0.977	0.927	0.968	0.904	0.904	0.904	0.890	0.904	0.899
Diploneis mau.	0.656	0.725	0.995	1.000	0.995	1.000	0.587	0.564	0.706	0.651	0.693	0.656
Diploneis mod.	0.954	0.954	0.968	0.982	0.972	0.977	0.954	0.954	0.954	0.917	0.954	0.954
Diploneis ov.	0.743	0.771	0.982	0.995	0.991	0.986	0.706	0.688	0.734	0.706	0.739	0.757
Epithemia ad.	0.936	0.936	0.968	0.977	0.972	0.968	0.936	0.936	0.931	0.931	0.936	0.936
Encyonema cae.	0.936	0.936	0.950	0.968	0.945	0.968	0.936	0.936	0.936	0.936	0.936	0.936
Encyonema min.	0.977	0.977	0.991	0.977	0.982	0.982	0.977	0.977	0.977	0.977	0.977	0.977
Encyonopsis mic.	0.913	0.913	0.959	0.968	0.963	0.977	0.913	0.913	0.908	0.899	0.908	0.908
Encyonema sil.	0.945	0.945	0.959	0.972	0.959	0.972	0.945	0.945	0.945	0.940	0.945	0.945
Epithemia so.	0.849	0.849	0.922	0.963	0.927	0.972	0.849	0.821	0.839	0.817	0.849	0.826
Fragilaria cap.	0.839	0.839	0.917	0.982	0.922	0.995	0.839	0.789	0.839	0.826	0.839	0.830
Fragilaria cap. va.	0.972	0.972	0.982	0.977	0.986	0.986	0.972	0.972	0.968	0.968	0.972	0.972
Fallacia och.	0.821	0.839	0.950	0.995	0.940	0.982	0.821	0.798	0.821	0.798	0.821	0.812
Fragilaria par.	0.917	0.922	0.950	0.972	0.954	0.982	0.917	0.908	0.917	0.917	0.917	0.917
Frustulia vul.	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991
Gomphonema cl.	0.972	0.972	0.972	0.977	0.972	0.977	0.972	0.972	0.972	0.972	0.972	0.972
Geissleria dec.	0.734	0.775	0.972	0.995	0.972	1.000	0.725	0.679	0.716	0.693	0.716	0.702
Gomphonema it.	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986
Gomphonema min.	0.890	0.890	0.959	0.986	0.922	0.986	0.890	0.862	0.890	0.881	0.890	0.890
Gomphonema ol. Horn.	0.913	0.913	0.963	0.982	0.968	0.977	0.913	0.913	0.913	0.913	0.913	0.908
Gomphonema par.	0.922	0.922	0.968	0.991	0.959	0.977	0.922	0.922	0.913	0.913	0.922	0.917
Gomphonema pum.	0.899	0.899	0.950	0.972	0.945	0.972	0.899	0.894	0.899	0.876	0.899	0.899
Gomphonema ol.	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991
Gomphonema sar.	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991
Gomphonema ter.	0.950	0.950	0.977	0.986	0.977	0.986	0.950	0.950	0.950	0.945	0.950	0.950
Gyrosigma mac.	0.711	0.789	0.977	0.995	0.986	0.991	0.674	0.679	0.670	0.665	0.688	0.688
Hannea ar.	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977
Hantzschia amp.	0.977	0.977	0.977	0.982	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977
Hippodonta ros.	0.977	0.977	0.977	0.977	0.977	0.982	0.977	0.977	0.977	0.977	0.977	0.977

Table 15: (ctd) Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using micro balanced accuracy as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Meridion cir. con.	0.968	0.968	0.986	0.982	0.968	0.977	0.968	0.968	0.963	0.968	0.968	0.968
Meridion cir.	0.986	0.986	0.986	0.986	0.986	0.991	0.986	0.986	0.986	0.986	0.986	0.986
Martyana mar.	0.972	0.972	0.982	0.986	0.977	0.972	0.972	0.972	0.972	0.972	0.972	0.972
Nitzschia alp.	0.963	0.963	0.982	0.991	0.986	0.977	0.963	0.963	0.963	0.963	0.963	0.963
Navicula ant.	0.853	0.853	0.936	0.982	0.954	0.977	0.853	0.839	0.849	0.817	0.849	0.830
Navicula cap.	0.853	0.867	0.959	0.982	0.940	0.991	0.853	0.807	0.853	0.826	0.853	0.849
Navicula cry.	0.959	0.959	0.959	0.968	0.959	0.972	0.959	0.959	0.959	0.959	0.959	0.959
Nitzschia dis.	0.959	0.959	0.972	0.982	0.968	0.977	0.959	0.959	0.954	0.954	0.959	0.959
Neidium du.	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.982	0.986	0.986
Navicula gre.	0.968	0.968	0.968	0.972	0.982	0.972	0.968	0.968	0.968	0.968	0.968	0.968
Navicula has.	0.950	0.950	0.959	0.977	0.968	0.977	0.950	0.950	0.950	0.950	0.950	0.950
Navicula krs.	0.670	0.716	0.995	1.000	0.995	0.995	0.619	0.587	0.651	0.628	0.642	0.656
Navicula lan.	0.968	0.968	0.968	0.982	0.968	0.972	0.968	0.968	0.968	0.968	0.968	0.968
Nupela la.	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995
Nitzschia lin.	0.927	0.927	0.940	0.959	0.936	0.963	0.927	0.927	0.927	0.927	0.927	0.927
Navicula pra.	0.743	0.784	0.972	1.000	0.991	1.000	0.670	0.683	0.688	0.665	0.702	0.683
Navicula pre.	0.716	0.775	0.991	0.995	0.995	0.995	0.665	0.683	0.656	0.665	0.683	0.651
Navicula pro.	0.794	0.812	0.986	1.000	0.972	1.000	0.757	0.766	0.771	0.789	0.780	0.794
Nitzschia rec.	0.913	0.913	0.963	0.986	0.940	0.968	0.913	0.913	0.913	0.913	0.913	0.913
Navicula rei.	0.803	0.835	0.968	0.986	0.959	0.991	0.766	0.794	0.766	0.761	0.775	0.766
Navicula rot.	0.706	0.757	0.982	0.986	0.982	0.986	0.697	0.656	0.697	0.702	0.702	0.716
Navicula subh.	0.784	0.803	0.982	0.995	0.986	0.995	0.734	0.734	0.739	0.734	0.752	0.752
Navicula subr.	0.716	0.775	0.977	0.977	0.963	0.977	0.674	0.683	0.702	0.725	0.706	0.734
Nitzschia suba.	0.702	0.739	0.972	0.991	0.991	0.991	0.624	0.665	0.697	0.683	0.679	0.665
Navicula tri.	0.789	0.803	0.959	0.991	0.954	0.986	0.771	0.729	0.771	0.743	0.771	0.757
Navicula vircl.	0.794	0.817	0.977	0.995	0.972	1.000	0.784	0.734	0.780	0.757	0.784	0.775
Navicula virdu.	0.917	0.908	0.968	0.977	0.963	0.977	0.885	0.872	0.904	0.908	0.908	0.913
Orthoseira ros.	0.959	0.959	0.995	0.995	0.995	1.000	0.959	0.959	0.954	0.954	0.959	0.959
Placoneis bal.	0.688	0.757	1.000	0.995	0.995	0.995	0.601	0.679	0.693	0.720	0.665	0.725
Pinnularia bor.	0.936	0.936	0.991	0.991	0.977	0.991	0.936	0.936	0.922	0.936	0.936	0.936
Placoneis min.	0.972	0.972	0.982	0.982	0.977	0.982	0.972	0.972	0.972	0.972	0.972	0.972
Placoneis elg.	0.959	0.959	0.968	0.968	0.972	0.968	0.959	0.959	0.959	0.959	0.959	0.959
Planothidium lan.	0.807	0.807	0.959	0.982	0.940	0.986	0.807	0.789	0.798	0.775	0.807	0.789
Planothidium ros.	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986
Placoneis neo.	0.775	0.807	0.972	0.995	0.972	0.995	0.734	0.729	0.734	0.734	0.752	0.739
Pseudostaurosira bre.	0.619	0.661	1.000	1.000	1.000	1.000	0.596	0.431	0.592	0.560	0.587	0.610
Pinnularia subc.	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995
Rhoicosphenia abb.	0.835	0.849	0.968	0.995	0.959	0.991	0.835	0.771	0.830	0.821	0.830	0.821
Rhopalodia gib.	0.885	0.885	0.954	0.963	0.950	0.977	0.885	0.885	0.885	0.885	0.881	0.881
Reimeria sin.	0.945	0.945	0.977	0.977	0.963	0.986	0.945	0.945	0.945	0.940	0.945	0.945
Surirella ang.	0.927	0.927	0.963	0.982	0.959	0.982	0.927	0.927	0.927	0.922	0.927	0.927
Surirella min.	0.931	0.931	0.959	0.982	0.963	0.977	0.931	0.931	0.927	0.931	0.931	0.931
Sellaphora perb.	0.716	0.780	0.972	1.000	0.982	0.995	0.688	0.670	0.651	0.661	0.683	0.688
Sellaphora pu.	0.693	0.734	0.982	0.995	0.977	0.995	0.656	0.628	0.656	0.656	0.651	0.656
Stauroneis gra.	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991
Staurosira con. bin.	0.940	0.940	0.977	0.982	0.968	0.972	0.940	0.940	0.940	0.931	0.940	0.940
Staurosira con.	0.624	0.706	1.000	1.000	0.991	0.995	0.555	0.610	0.592	0.615	0.606	0.624
Staurosira con. ven.	0.982	0.982	0.982	0.986	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982
Stauroneis pho.	0.959	0.959	0.963	0.977	0.968	0.972	0.959	0.959	0.959	0.959	0.959	0.959
Staurosirella pin.	0.610	0.697	0.995	0.991	0.986	1.000	0.537	0.523	0.569	0.601	0.592	0.587
Stauroneis sm.	0.982	0.982	0.982	0.986	0.986	0.982	0.982	0.982	0.982	0.982	0.982	0.982
Tryblionella ang.	0.835	0.835	0.936	0.995	0.927	0.991	0.835	0.798	0.835	0.812	0.835	0.835
Tabellaria floc.	0.959	0.959	0.995	0.995	0.995	0.995	0.959	0.959	0.959	0.954	0.959	0.959
Ulnaria ul.	0.950	0.950	0.968	0.991	0.972	0.977	0.950	0.950	0.950	0.945	0.950	0.954

Table 16: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsTop10-nom* dataset, evaluated by using micro balanced accuracy as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Amphora ped.	0.752	0.798	0.963	0.977	0.972	0.977	0.729	0.706	0.775	0.748	0.766	0.752
Cyclotella jur. nud.	0.780	0.821	0.982	0.982	0.968	0.982	0.725	0.739	0.798	0.775	0.807	0.775
Cyclotella oc.	0.876	0.894	0.991	0.986	0.995	0.991	0.812	0.862	0.899	0.899	0.894	0.885
Cocconeis pl.	0.766	0.798	0.991	0.991	0.991	0.991	0.752	0.739	0.771	0.734	0.761	0.771
Cavinula scu.	0.803	0.826	0.977	0.982	0.968	0.972	0.748	0.743	0.858	0.826	0.826	0.821
Diploneis mau.	0.665	0.725	0.995	1.000	1.000	1.000	0.647	0.564	0.679	0.651	0.679	0.656
Navicula pre.	0.693	0.775	0.995	0.995	0.995	0.995	0.665	0.683	0.651	0.665	0.647	0.651
Navicula rot.	0.716	0.752	0.986	0.986	0.995	0.986	0.697	0.651	0.720	0.702	0.706	0.716
Navicula subr.	0.725	0.775	0.986	0.977	0.968	0.977	0.702	0.683	0.748	0.725	0.739	0.734
Staurosirella pin.	0.619	0.697	0.991	0.991	1.000	1.000	0.528	0.541	0.583	0.601	0.555	0.587

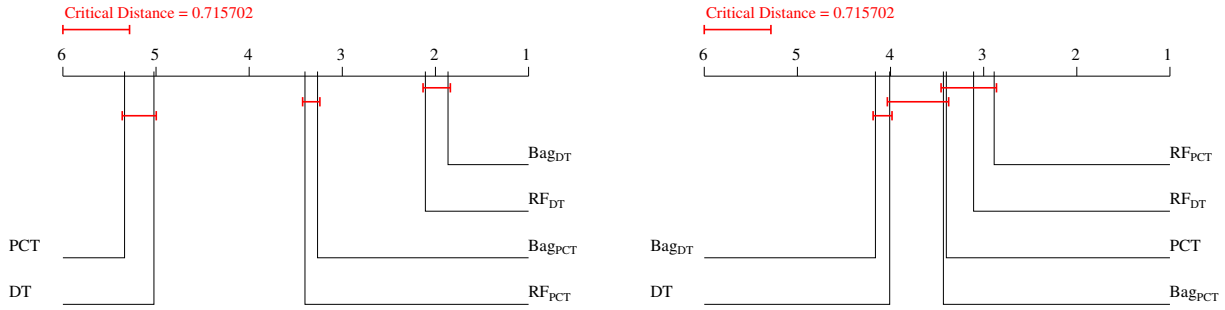
Table 17: Predictive performance of the methods (columns) on all targets (rows) of the *WaterQuality-nom* dataset, evaluated by using micro balanced accuracy as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Cladophora sp.	0.577	0.675	0.993	0.996	0.995	0.998	0.585	0.639	0.674	0.666	0.665	0.676
Gongrosira inc.	0.733	0.743	0.991	1.000	0.991	1.000	0.733	0.720	0.738	0.708	0.743	0.728
Oedogonium sp.	0.712	0.748	0.988	0.997	0.983	0.992	0.708	0.709	0.751	0.731	0.746	0.745
Stigeoclonium ten.	0.794	0.814	0.982	0.992	0.981	0.992	0.792	0.798	0.815	0.815	0.811	0.813
Melosira var.	0.617	0.695	0.995	0.995	0.994	0.993	0.590	0.643	0.691	0.686	0.692	0.691
Nitzschia pal.	0.724	0.755	0.987	0.991	0.985	0.991	0.720	0.725	0.746	0.743	0.745	0.749
Audouinella ch.	0.758	0.769	0.977	0.993	0.984	0.994	0.759	0.748	0.771	0.763	0.767	0.772
Erpobdella oc.	0.718	0.757	0.988	0.994	0.980	0.992	0.708	0.737	0.733	0.727	0.741	0.731
Gammarus fo.	0.679	0.738	0.994	0.996	0.994	0.997	0.671	0.717	0.719	0.732	0.721	0.740
Baetis rh.	0.690	0.741	0.995	0.998	0.994	0.997	0.681	0.705	0.751	0.762	0.745	0.756
Hydropsyche sp.	0.620	0.674	0.995	0.995	0.991	0.998	0.617	0.647	0.692	0.677	0.701	0.693
Rhyacophila sp.	0.722	0.730	0.990	0.998	0.990	0.998	0.725	0.711	0.744	0.728	0.759	0.735
Simulium sp.	0.633	0.668	0.995	0.998	0.995	0.997	0.633	0.650	0.673	0.675	0.692	0.675
Tubifex sp.	0.749	0.775	0.983	0.996	0.979	0.989	0.747	0.742	0.745	0.748	0.753	0.761

Table 18: Predictive performance of the methods (columns) on all targets (rows) of the *SoilQuality-nom* dataset, evaluated by using micro balanced accuracy as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

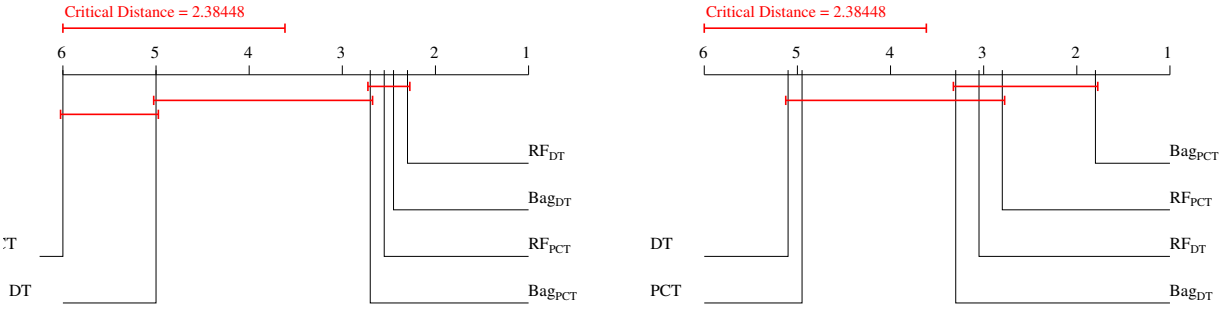
	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Anurida pyg.	0.863	0.876	0.896	0.896	0.891	0.891	0.863	0.867	0.870	0.873	0.876	0.874
Brachystomelle par.	0.814	0.861	0.902	0.902	0.898	0.901	0.813	0.858	0.885	0.883	0.878	0.885
Ceratophysella den.	0.925	0.954	0.957	0.957	0.956	0.956	0.925	0.951	0.951	0.951	0.951	0.953
Ceratophysella suc.	0.924	0.927	0.942	0.942	0.941	0.941	0.924	0.917	0.919	0.920	0.921	0.919
Entomobrya sp.	0.858	0.886	0.908	0.908	0.903	0.907	0.857	0.871	0.882	0.884	0.891	0.887
Folsomia fim.	0.612	0.696	0.810	0.810	0.800	0.804	0.612	0.689	0.756	0.758	0.759	0.755
Folsomia quad.	0.866	0.884	0.931	0.931	0.928	0.927	0.866	0.877	0.910	0.912	0.902	0.902
Folsomia spi.	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.973	0.974	0.975	0.977
Friesea mir.	0.921	0.944	0.960	0.960	0.960	0.960	0.921	0.939	0.956	0.955	0.958	0.958
Heteromurus nit.	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.965	0.965	0.966	0.969
Hypogastrua sp.	0.932	0.943	0.953	0.953	0.952	0.952	0.932	0.944	0.942	0.943	0.949	0.950
Isotoma ang.	0.592	0.747	0.841	0.841	0.832	0.836	0.592	0.735	0.798	0.798	0.794	0.795
Isotoma not.	0.602	0.754	0.842	0.842	0.828	0.836	0.586	0.732	0.801	0.800	0.801	0.805
Isotoma tig.	0.874	0.922	0.941	0.941	0.939	0.939	0.874	0.918	0.929	0.935	0.937	0.938
Isotomiella min.	0.904	0.921	0.934	0.934	0.931	0.930	0.905	0.915	0.919	0.921	0.921	0.918
Isotomodes arm.	0.982	0.982	0.984	0.984	0.982	0.982	0.982	0.982	0.976	0.975	0.981	0.981
Isotomodes bis.	0.974	0.974	0.978	0.978	0.978	0.978	0.974	0.974	0.970	0.973	0.972	0.974
Isotomodes prod.	0.861	0.882	0.912	0.912	0.907	0.910	0.861	0.873	0.889	0.892	0.886	0.892
Isotomurus pal.	0.826	0.886	0.927	0.927	0.921	0.922	0.826	0.872	0.903	0.908	0.903	0.903
Isotomurus sp.	0.986	0.990	0.990	0.989	0.990	0.989	0.986	0.984	0.990	0.988	0.989	0.989
Lepidocyrtus cy.	0.870	0.927	0.937	0.937	0.934	0.936	0.870	0.923	0.924	0.925	0.926	0.926
Lepidocyrtus lan.	0.955	0.966	0.977	0.977	0.977	0.977	0.955	0.967	0.973	0.973	0.976	0.976
Mesaphorura sp.	0.856	0.864	0.904	0.903	0.902	0.902	0.856	0.861	0.881	0.886	0.883	0.885
Neanura fam.	0.978	0.982	0.986	0.986	0.983	0.983	0.972	0.974	0.979	0.980	0.976	0.978
Neelus min.	0.801	0.842	0.878	0.878	0.874	0.874	0.801	0.833	0.855	0.856	0.857	0.856
Orchesella cin.	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
Orchesella vil.	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998
Protaphorura sp.	0.829	0.868	0.894	0.894	0.887	0.888	0.830	0.867	0.870	0.870	0.872	0.872
Pseudosinella al.	0.857	0.885	0.912	0.912	0.909	0.912	0.852	0.875	0.889	0.890	0.885	0.890
Pseudosinella sex.	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
Smint sp.	0.655	0.723	0.810	0.810	0.805	0.806	0.640	0.700	0.758	0.760	0.763	0.763
Sminthurinus au.	0.823	0.884	0.924	0.924	0.923	0.922	0.824	0.877	0.895	0.891	0.891	0.901
Sminthurinus el.	0.758	0.776	0.833	0.832	0.829	0.829	0.758	0.767	0.789	0.789	0.800	0.798
Sminthurus vir.	0.949	0.949	0.949	0.949	0.949	0.949	0.949	0.949	0.944	0.945	0.949	0.949
Stenaphorura quad.	0.953	0.953	0.956	0.956	0.956	0.956	0.953	0.953	0.952	0.953	0.954	0.952
Tomocerus fl.	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997
Tomocerus min.	0.996	0.996	0.999	0.999	0.999	0.999	0.996	0.996	0.999	0.999	0.999	0.999
Tomocerus sp.	0.996	0.996	0.998	0.998	0.998	0.998	0.996	0.996	0.998	0.998	0.998	0.997
Willemia sp.	0.740	0.774	0.828	0.828	0.824	0.823	0.740	0.761	0.775	0.776	0.787	0.787

4.1.2. Average rank diagrams for each dataset for the micro balanced accuracy measure



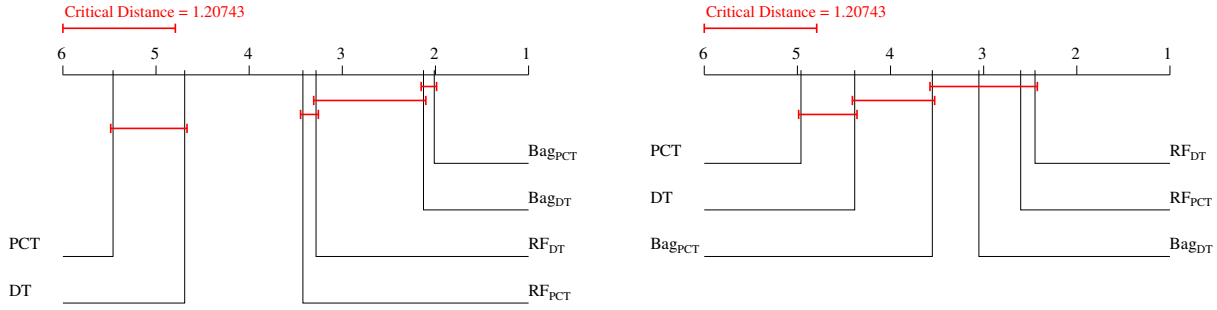
(a) Train (b) Cross-validation

Figure 13: The average rank diagrams for the micro balanced accuracy evaluation measure on the dataset *DiatomsAll-nom*.



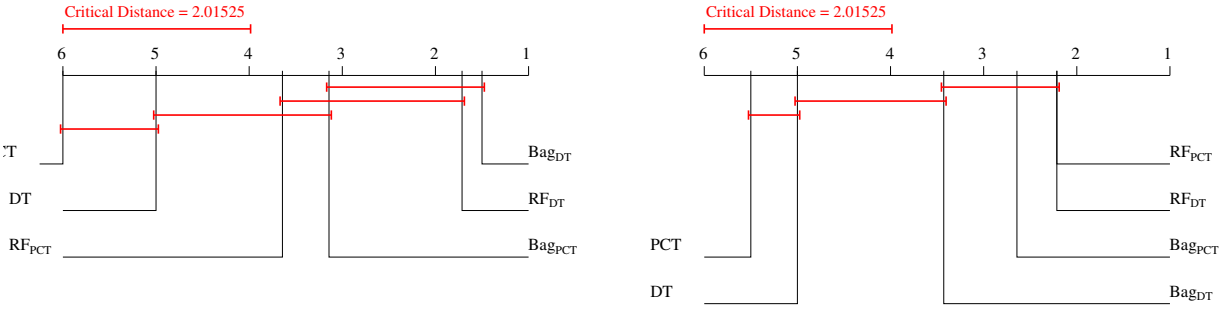
(a) Train (b) Cross-validation

Figure 14: The average rank diagrams for the micro balanced accuracy evaluation measure on the dataset *DiatomsTop10-nom*.



(a) Train (b) Cross-validation

Figure 15: The average rank diagrams for the micro balanced accuracy evaluation measure on the dataset *SoilQuality-nom*.



(a) Train (b) Cross-validation

Figure 16: The average rank diagrams for the micro averaged balanced accuracy evaluation measure on the dataset *WaterQuality-nom*.

4.1.3. Results for the micro precision measure

Table 19: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using micro precision as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	DT	Bag_{PCT}	Bag_{DT}	RF_{PCT}	RF_{DT}	PCT	DT	Bag_{PCT}	Bag_{DT}	RF_{PCT}	RF_{DT}
Amphora aeq.	0.908	0.908	0.959	0.991	0.936	0.972	0.908	0.908	0.908	0.908	0.908	0.908
Achnanthidium cl.	0.766	0.775	0.954	0.995	0.945	1.000	0.761	0.711	0.757	0.720	0.761	0.757
Achnanthidium cl. bal.	0.743	0.784	0.968	0.986	0.977	0.991	0.702	0.739	0.711	0.720	0.729	0.725
Achnanthes sp.	0.982	0.982	0.982	0.982	0.982	0.991	0.982	0.982	0.982	0.982	0.982	0.982
Amphora cop.	0.656	0.716	0.991	1.000	0.995	0.995	0.587	0.615	0.661	0.624	0.638	0.628
Amphora fog.	0.968	0.968	0.968	0.982	0.968	0.968	0.968	0.968	0.968	0.968	0.968	0.968
Achnanthes lac.	0.729	0.752	0.982	0.991	0.972	0.991	0.693	0.628	0.706	0.656	0.711	0.674
Amphora in.	0.876	0.876	0.968	0.982	0.968	0.986	0.876	0.839	0.876	0.862	0.876	0.867
Achnanthidium min.	0.922	0.922	0.954	0.972	0.959	0.977	0.922	0.922	0.922	0.917	0.922	0.922
Amphora ov.	0.968	0.968	0.986	0.991	0.968	0.986	0.968	0.968	0.968	0.968	0.968	0.968
Amphora ped.	0.775	0.798	0.968	0.977	0.954	0.977	0.739	0.702	0.752	0.748	0.752	0.752
Amphora th.	0.922	0.922	0.963	0.991	0.950	0.986	0.922	0.922	0.922	0.913	0.922	0.922
Aulacoseira gra.	0.899	0.899	0.945	0.986	0.922	0.972	0.899	0.899	0.899	0.899	0.899	0.894
Amphora ven.	0.977	0.977	0.982	0.982	0.986	0.982	0.977	0.977	0.972	0.972	0.977	0.977
Cymbella aff.	0.968	0.968	0.972	0.991	0.972	0.982	0.968	0.968	0.963	0.963	0.968	0.968
Cocconeis dis.	0.894	0.894	0.950	0.991	0.940	0.972	0.894	0.894	0.894	0.876	0.894	0.899
Cymatopleura el.	0.872	0.881	0.954	0.986	0.963	0.968	0.862	0.862	0.867	0.881	0.872	0.881
Cyclotella jur. nud.	0.798	0.821	0.977	0.982	0.959	0.982	0.748	0.743	0.798	0.775	0.803	0.775
Cymbella lan.	0.936	0.927	0.982	0.986	0.982	0.986	0.894	0.872	0.917	0.917	0.917	0.927
Cyclotella men.	0.959	0.959	0.986	0.986	0.991	0.982	0.959	0.959	0.945	0.959	0.959	0.959
Cocconeis neo.	0.986	0.986	0.995	0.995	0.991	0.995	0.986	0.986	0.986	0.986	0.986	0.986
Cyclotella oc.	0.849	0.899	0.977	0.986	0.991	0.991	0.794	0.839	0.867	0.899	0.881	0.885
Cocconeis pl.	0.775	0.794	0.963	0.991	0.963	0.991	0.743	0.720	0.766	0.734	0.766	0.771
Cocconeis pl. eug.	0.950	0.950	0.972	0.977	0.963	0.972	0.950	0.950	0.950	0.950	0.950	0.950
Cocconeis pl. li.	0.780	0.812	0.982	0.995	0.959	0.995	0.780	0.743	0.780	0.761	0.780	0.766
Caloneis sch.	0.904	0.904	0.972	0.991	0.972	0.968	0.904	0.904	0.904	0.885	0.904	0.904
Cavinula scu.	0.794	0.835	0.977	0.982	0.963	0.972	0.743	0.757	0.821	0.826	0.821	0.821
Cymbella neo.	0.950	0.950	0.963	0.982	0.972	0.982	0.950	0.950	0.950	0.950	0.950	0.950
Diatoma ang.	0.904	0.904	0.950	0.977	0.927	0.968	0.904	0.904	0.904	0.890	0.904	0.899
Diploneis mau.	0.656	0.725	0.995	1.000	0.995	1.000	0.587	0.564	0.706	0.651	0.693	0.656
Diploneis mod.	0.954	0.954	0.968	0.982	0.972	0.977	0.954	0.954	0.954	0.917	0.954	0.954
Diploneis ov.	0.743	0.771	0.982	0.995	0.991	0.986	0.706	0.688	0.734	0.706	0.739	0.757
Epithemia ad.	0.936	0.936	0.968	0.977	0.972	0.968	0.936	0.936	0.931	0.931	0.936	0.936
Encyonema cae.	0.936	0.936	0.950	0.968	0.945	0.968	0.936	0.936	0.936	0.936	0.936	0.936
Encyonema min.	0.977	0.977	0.991	0.977	0.982	0.982	0.977	0.977	0.977	0.977	0.977	0.977
Encyonopsis mic.	0.913	0.913	0.959	0.968	0.963	0.977	0.913	0.913	0.908	0.899	0.908	0.908
Encyonema sil.	0.945	0.945	0.959	0.972	0.959	0.972	0.945	0.945	0.945	0.940	0.945	0.945
Epithemia so.	0.849	0.849	0.922	0.963	0.927	0.972	0.849	0.821	0.839	0.817	0.849	0.826
Fragilaria cap.	0.839	0.839	0.917	0.982	0.922	0.995	0.839	0.789	0.839	0.826	0.839	0.830
Fragilaria cap. va.	0.972	0.972	0.982	0.977	0.986	0.986	0.972	0.972	0.968	0.968	0.972	0.972
Fallacia och.	0.821	0.839	0.950	0.995	0.940	0.982	0.821	0.798	0.821	0.798	0.821	0.812
Fragilaria par.	0.917	0.922	0.950	0.972	0.954	0.982	0.917	0.908	0.917	0.917	0.917	0.917
Frustulia vul.	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991
Gomphonema cl.	0.972	0.972	0.972	0.977	0.972	0.977	0.972	0.972	0.972	0.972	0.972	0.972
Geissleria dec.	0.734	0.775	0.972	0.995	0.972	1.000	0.725	0.679	0.716	0.693	0.716	0.702
Gomphonema it.	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986
Gomphonema min.	0.890	0.890	0.959	0.986	0.922	0.986	0.890	0.862	0.890	0.881	0.890	0.890
Gomphonema ol. Horn.	0.913	0.913	0.963	0.982	0.968	0.977	0.913	0.913	0.913	0.913	0.913	0.908
Gomphonema par.	0.922	0.922	0.968	0.991	0.959	0.977	0.922	0.922	0.913	0.913	0.922	0.917
Gomphonema pum.	0.899	0.899	0.950	0.972	0.945	0.972	0.899	0.894	0.899	0.876	0.899	0.899
Gomphonema ol.	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991
Gomphonema sar.	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991
Gomphonema ter.	0.950	0.950	0.977	0.986	0.977	0.986	0.950	0.950	0.950	0.945	0.950	0.950
Gyrosigma mac.	0.711	0.789	0.977	0.995	0.986	0.991	0.674	0.679	0.670	0.665	0.688	0.688
Hannea ar.	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977
Hantzschia amp.	0.977	0.977	0.977	0.982	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977
Hippodonta ros.	0.977	0.977	0.977	0.977	0.977	0.982	0.977	0.977	0.977	0.977	0.977	0.977

Table 19: (ctd) Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using micro precision as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Meridion cir. con.	0.968	0.968	0.986	0.982	0.968	0.977	0.968	0.968	0.963	0.968	0.968	0.968
Meridion cir.	0.986	0.986	0.986	0.986	0.986	0.991	0.986	0.986	0.986	0.986	0.986	0.986
Martyana mar.	0.972	0.972	0.982	0.986	0.977	0.972	0.972	0.972	0.972	0.972	0.972	0.972
Nitzschia alp.	0.963	0.963	0.982	0.991	0.986	0.977	0.963	0.963	0.963	0.963	0.963	0.963
Navicula ant.	0.853	0.853	0.936	0.982	0.954	0.977	0.853	0.839	0.849	0.817	0.849	0.830
Navicula cap.	0.853	0.867	0.959	0.982	0.940	0.991	0.853	0.807	0.853	0.826	0.853	0.849
Navicula cry.	0.959	0.959	0.959	0.968	0.959	0.972	0.959	0.959	0.959	0.959	0.959	0.959
Nitzschia dis.	0.959	0.959	0.972	0.982	0.968	0.977	0.959	0.959	0.954	0.954	0.959	0.959
Neidium du.	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.982	0.986	0.986
Navicula gre.	0.968	0.968	0.968	0.972	0.982	0.972	0.968	0.968	0.968	0.968	0.968	0.968
Navicula has.	0.950	0.950	0.959	0.977	0.968	0.977	0.950	0.950	0.950	0.950	0.950	0.950
Navicula krs.	0.670	0.716	0.995	1.000	0.995	0.995	0.619	0.587	0.651	0.628	0.642	0.656
Navicula lan.	0.968	0.968	0.968	0.982	0.968	0.972	0.968	0.968	0.968	0.968	0.968	0.968
Nupela la.	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995
Nitzschia lin.	0.927	0.927	0.940	0.959	0.936	0.963	0.927	0.927	0.927	0.927	0.927	0.927
Navicula pra.	0.743	0.784	0.972	1.000	0.991	1.000	0.670	0.683	0.688	0.665	0.702	0.683
Navicula pre.	0.716	0.775	0.991	0.995	0.995	0.995	0.665	0.683	0.656	0.665	0.683	0.651
Navicula pro.	0.794	0.812	0.986	1.000	0.972	1.000	0.757	0.766	0.771	0.789	0.780	0.794
Nitzschia rec.	0.913	0.913	0.963	0.986	0.940	0.968	0.913	0.913	0.913	0.913	0.913	0.913
Navicula rei.	0.803	0.835	0.968	0.986	0.959	0.991	0.766	0.794	0.766	0.761	0.775	0.766
Navicula rot.	0.706	0.757	0.982	0.986	0.982	0.986	0.697	0.656	0.697	0.702	0.702	0.716
Navicula subh.	0.784	0.803	0.982	0.995	0.986	0.995	0.734	0.734	0.739	0.734	0.752	0.752
Navicula subr.	0.716	0.775	0.977	0.977	0.963	0.977	0.674	0.683	0.702	0.725	0.706	0.734
Nitzschia suba.	0.702	0.739	0.972	0.991	0.991	0.991	0.624	0.665	0.697	0.683	0.679	0.665
Navicula tri.	0.789	0.803	0.959	0.991	0.954	0.986	0.771	0.729	0.771	0.743	0.771	0.757
Navicula vircl.	0.794	0.817	0.977	0.995	0.972	1.000	0.784	0.734	0.780	0.757	0.784	0.775
Navicula virdu.	0.917	0.908	0.968	0.977	0.963	0.977	0.885	0.872	0.904	0.908	0.908	0.913
Orthoseira ros.	0.959	0.959	0.995	0.995	0.995	1.000	0.959	0.959	0.954	0.954	0.959	0.959
Placoneis bal.	0.688	0.757	1.000	0.995	0.995	0.995	0.601	0.679	0.693	0.720	0.665	0.725
Pinnularia bor.	0.936	0.936	0.991	0.991	0.977	0.991	0.936	0.936	0.922	0.936	0.936	0.936
Placoneis min.	0.972	0.972	0.982	0.982	0.977	0.982	0.972	0.972	0.972	0.972	0.972	0.972
Placoneis elg.	0.959	0.959	0.968	0.968	0.972	0.968	0.959	0.959	0.959	0.959	0.959	0.959
Planothidium lan.	0.807	0.807	0.959	0.982	0.940	0.986	0.807	0.789	0.798	0.775	0.807	0.789
Planothidium ros.	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986
Placoneis neo.	0.775	0.807	0.972	0.995	0.972	0.995	0.734	0.729	0.734	0.734	0.752	0.739
Pseudostaurosira bre.	0.619	0.661	1.000	1.000	1.000	1.000	0.596	0.431	0.592	0.560	0.587	0.610
Pinnularia subc.	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995
Rhoicosphenia abb.	0.835	0.849	0.968	0.995	0.959	0.991	0.835	0.771	0.830	0.821	0.830	0.821
Rhopalodia gib.	0.885	0.885	0.954	0.963	0.950	0.977	0.885	0.885	0.885	0.885	0.881	0.881
Reimeria sin.	0.945	0.945	0.977	0.977	0.963	0.986	0.945	0.945	0.945	0.940	0.945	0.945
Surirella ang.	0.927	0.927	0.963	0.982	0.959	0.982	0.927	0.927	0.927	0.922	0.927	0.927
Surirella min.	0.931	0.931	0.959	0.982	0.963	0.977	0.931	0.931	0.927	0.931	0.931	0.931
Sellaphora perb.	0.716	0.780	0.972	1.000	0.982	0.995	0.688	0.670	0.651	0.661	0.683	0.688
Sellaphora pu.	0.693	0.734	0.982	0.995	0.977	0.995	0.656	0.628	0.656	0.656	0.651	0.656
Stauroneis gra.	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991
Staurosira con. bin.	0.940	0.940	0.977	0.982	0.968	0.972	0.940	0.940	0.940	0.931	0.940	0.940
Staurosira con.	0.624	0.706	1.000	1.000	0.991	0.995	0.555	0.610	0.592	0.615	0.606	0.624
Staurosira con. ven.	0.982	0.982	0.982	0.986	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982
Stauroneis pho.	0.959	0.959	0.963	0.977	0.968	0.972	0.959	0.959	0.959	0.959	0.959	0.959
Staurosirella pin.	0.610	0.697	0.995	0.991	0.986	1.000	0.537	0.523	0.569	0.601	0.592	0.587
Stauroneis sm.	0.982	0.982	0.982	0.986	0.986	0.982	0.982	0.982	0.982	0.982	0.982	0.982
Tryblionella ang.	0.835	0.835	0.936	0.995	0.927	0.991	0.835	0.798	0.835	0.812	0.835	0.835
Tabellaria floc.	0.959	0.959	0.995	0.995	0.995	0.995	0.959	0.959	0.959	0.954	0.959	0.959
Ulnaria ul.	0.950	0.950	0.968	0.991	0.972	0.977	0.950	0.950	0.950	0.945	0.950	0.954

Table 20: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsTop10-nom* dataset, evaluated by using micro precision as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Amphora ped.	0.752	0.798	0.963	0.977	0.972	0.977	0.729	0.706	0.775	0.748	0.766	0.752
Cyclotella jur. nud.	0.780	0.821	0.982	0.982	0.968	0.982	0.725	0.739	0.798	0.775	0.807	0.775
Cyclotella oc.	0.876	0.894	0.991	0.986	0.995	0.991	0.812	0.862	0.899	0.899	0.894	0.885
Cocconeis pl.	0.766	0.798	0.991	0.991	0.991	0.991	0.752	0.739	0.771	0.734	0.761	0.771
Cavinula scu.	0.803	0.826	0.977	0.982	0.968	0.972	0.748	0.743	0.858	0.826	0.826	0.821
Diploneis mau.	0.665	0.725	0.995	1.000	1.000	1.000	0.647	0.564	0.679	0.651	0.679	0.656
Navicula pre.	0.693	0.775	0.995	0.995	0.995	0.995	0.665	0.683	0.651	0.665	0.647	0.651
Navicula rot.	0.716	0.752	0.986	0.986	0.995	0.986	0.697	0.651	0.720	0.702	0.706	0.716
Navicula subr.	0.725	0.775	0.986	0.977	0.968	0.977	0.702	0.683	0.748	0.725	0.739	0.734
Staurosirella pin.	0.619	0.697	0.991	0.991	1.000	1.000	0.528	0.541	0.583	0.601	0.555	0.587

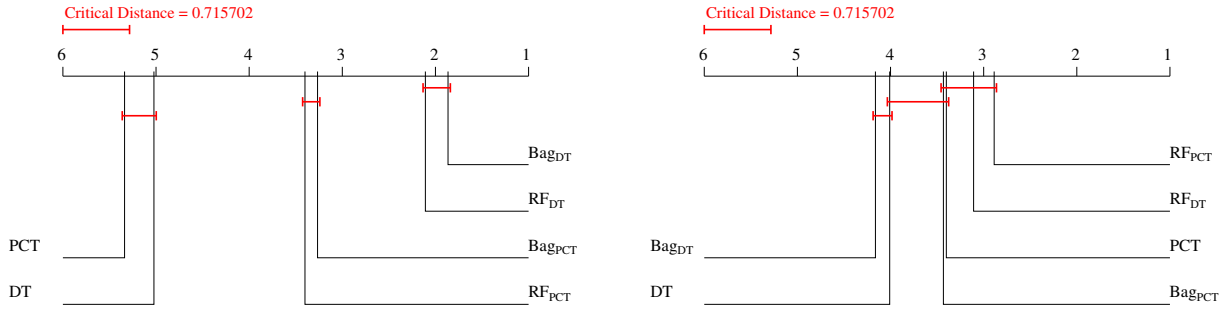
Table 21: Predictive performance of the methods (columns) on all targets (rows) of the *WaterQuality-nom* dataset, evaluated by using micro precision as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Cladophora sp.	0.577	0.675	0.993	0.996	0.995	0.998	0.585	0.639	0.674	0.666	0.665	0.676
Gongrosira inc.	0.733	0.743	0.991	1.000	0.991	1.000	0.733	0.720	0.738	0.708	0.743	0.728
Oedogonium sp.	0.712	0.748	0.988	0.997	0.983	0.992	0.708	0.709	0.751	0.731	0.746	0.745
Stigeoclonium ten.	0.794	0.814	0.982	0.992	0.981	0.992	0.792	0.798	0.815	0.815	0.811	0.813
Melosira var.	0.617	0.695	0.995	0.995	0.994	0.993	0.590	0.643	0.691	0.686	0.692	0.691
Nitzschia pal.	0.724	0.755	0.987	0.991	0.985	0.991	0.720	0.725	0.746	0.743	0.745	0.749
Audouinella ch.	0.758	0.769	0.977	0.993	0.984	0.994	0.759	0.748	0.771	0.763	0.767	0.772
Erpobdella oc.	0.718	0.757	0.988	0.994	0.980	0.992	0.708	0.737	0.733	0.727	0.741	0.731
Gammarus fo.	0.679	0.738	0.994	0.996	0.994	0.997	0.671	0.717	0.719	0.732	0.721	0.740
Baetis rh.	0.690	0.741	0.995	0.998	0.994	0.997	0.681	0.705	0.751	0.762	0.745	0.756
Hydropsyche sp.	0.620	0.674	0.995	0.995	0.991	0.998	0.617	0.647	0.692	0.677	0.701	0.693
Rhyacophila sp.	0.722	0.730	0.990	0.998	0.990	0.998	0.725	0.711	0.744	0.728	0.759	0.735
Simulium sp.	0.633	0.668	0.995	0.998	0.995	0.997	0.633	0.650	0.673	0.675	0.692	0.675
Tubifex sp.	0.749	0.775	0.983	0.996	0.979	0.989	0.747	0.742	0.745	0.748	0.753	0.761

Table 22: Predictive performance of the methods (columns) on all targets (rows) of the *SoilQuality-nom* dataset, evaluated by using micro precision as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

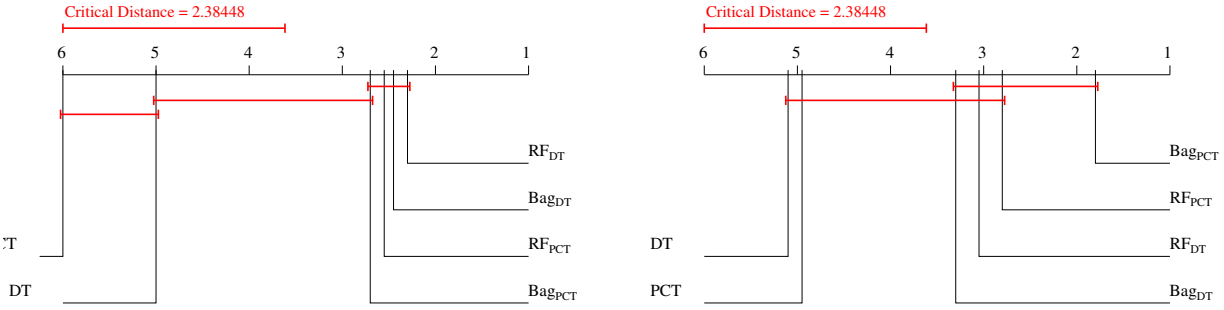
	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Anurida pyg.	0.863	0.876	0.896	0.896	0.891	0.891	0.863	0.867	0.870	0.873	0.876	0.874
Brachystomelle par.	0.814	0.861	0.902	0.902	0.898	0.901	0.813	0.858	0.885	0.883	0.878	0.885
Ceratophysella den.	0.925	0.954	0.957	0.957	0.956	0.956	0.925	0.951	0.951	0.951	0.951	0.953
Ceratophysella suc.	0.924	0.927	0.942	0.942	0.941	0.941	0.924	0.917	0.919	0.920	0.921	0.919
Entomobrya sp.	0.858	0.886	0.908	0.908	0.903	0.907	0.857	0.871	0.882	0.884	0.891	0.887
Folsomia fim.	0.612	0.696	0.810	0.810	0.800	0.804	0.612	0.689	0.756	0.758	0.759	0.755
Folsomia quad.	0.866	0.884	0.931	0.931	0.928	0.927	0.866	0.877	0.910	0.912	0.902	0.902
Folsomia spi.	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.973	0.974	0.975	0.977
Friesea mir.	0.921	0.944	0.960	0.960	0.960	0.960	0.921	0.939	0.956	0.955	0.958	0.958
Heteromurus nit.	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.965	0.965	0.966	0.969
Hypogastrua sp.	0.932	0.943	0.953	0.953	0.952	0.952	0.932	0.944	0.942	0.943	0.949	0.950
Isotoma ang.	0.592	0.747	0.841	0.841	0.832	0.836	0.592	0.735	0.798	0.798	0.794	0.795
Isotoma not.	0.602	0.754	0.842	0.842	0.828	0.836	0.586	0.732	0.801	0.800	0.801	0.805
Isotoma tig.	0.874	0.922	0.941	0.941	0.939	0.939	0.874	0.918	0.929	0.935	0.937	0.938
Isotomiella min.	0.904	0.921	0.934	0.934	0.931	0.930	0.905	0.915	0.919	0.921	0.921	0.918
Isotomodes arm.	0.982	0.982	0.984	0.984	0.982	0.982	0.982	0.982	0.976	0.975	0.981	0.981
Isotomodes bis.	0.974	0.974	0.978	0.978	0.978	0.978	0.974	0.974	0.970	0.973	0.972	0.974
Isotomodes prod.	0.861	0.882	0.912	0.912	0.907	0.910	0.861	0.873	0.889	0.892	0.886	0.892
Isotomurus pal.	0.826	0.886	0.927	0.927	0.921	0.922	0.826	0.872	0.903	0.908	0.903	0.903
Isotomurus sp.	0.986	0.990	0.990	0.989	0.990	0.989	0.986	0.984	0.990	0.988	0.989	0.989
Lepidocyrtus cy.	0.870	0.927	0.937	0.937	0.934	0.936	0.870	0.923	0.924	0.925	0.926	0.926
Lepidocyrtus lan.	0.955	0.966	0.977	0.977	0.977	0.977	0.955	0.967	0.973	0.973	0.976	0.976
Mesaphorura sp.	0.856	0.864	0.904	0.903	0.902	0.902	0.856	0.861	0.881	0.886	0.883	0.885
Neanura fam.	0.978	0.982	0.986	0.986	0.983	0.983	0.972	0.974	0.979	0.980	0.976	0.978
Neelus min.	0.801	0.842	0.878	0.878	0.874	0.874	0.801	0.833	0.855	0.856	0.857	0.856
Orchesella cin.	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
Orchesella vil.	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998
Protaphorura sp.	0.829	0.868	0.894	0.894	0.887	0.888	0.830	0.867	0.870	0.870	0.872	0.872
Pseudosinella al.	0.857	0.885	0.912	0.912	0.909	0.912	0.852	0.875	0.889	0.890	0.885	0.890
Pseudosinella sex.	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
Smint sp.	0.655	0.723	0.810	0.810	0.805	0.806	0.640	0.700	0.758	0.760	0.763	0.763
Sminthurinus au.	0.823	0.884	0.924	0.924	0.923	0.922	0.824	0.877	0.895	0.891	0.891	0.901
Sminthurinus el.	0.758	0.776	0.833	0.832	0.829	0.829	0.758	0.767	0.789	0.789	0.800	0.798
Sminthurus vir.	0.949	0.949	0.949	0.949	0.949	0.949	0.949	0.949	0.944	0.945	0.949	0.949
Stenaphorura quad.	0.953	0.953	0.956	0.956	0.956	0.956	0.953	0.953	0.952	0.953	0.954	0.952
Tomocerus fl.	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997
Tomocerus min.	0.996	0.996	0.999	0.999	0.999	0.999	0.996	0.996	0.999	0.999	0.999	0.999
Tomocerus sp.	0.996	0.996	0.998	0.998	0.998	0.998	0.996	0.996	0.998	0.998	0.998	0.997
Willemia sp.	0.740	0.774	0.828	0.828	0.824	0.823	0.740	0.761	0.775	0.776	0.787	0.787

4.1.4. Average rank diagrams for each dataset for the micro precision measure



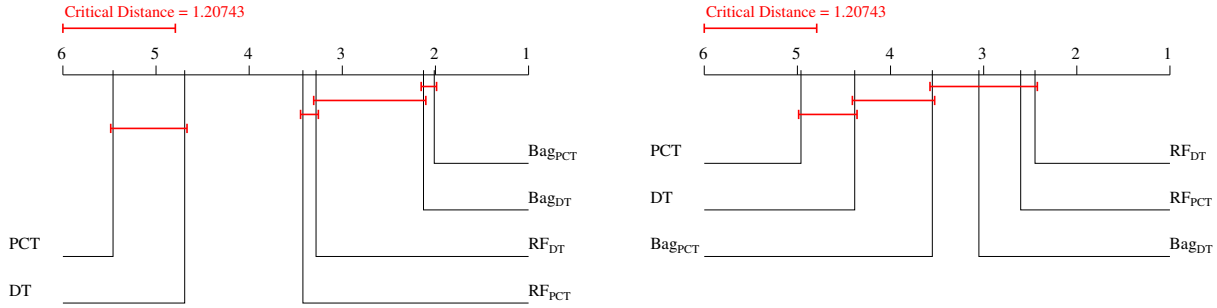
(a) Train (b) Cross-validation

Figure 17: The average rank diagrams for the micro precision evaluation measure on the dataset *DiatomsAll-nom*.



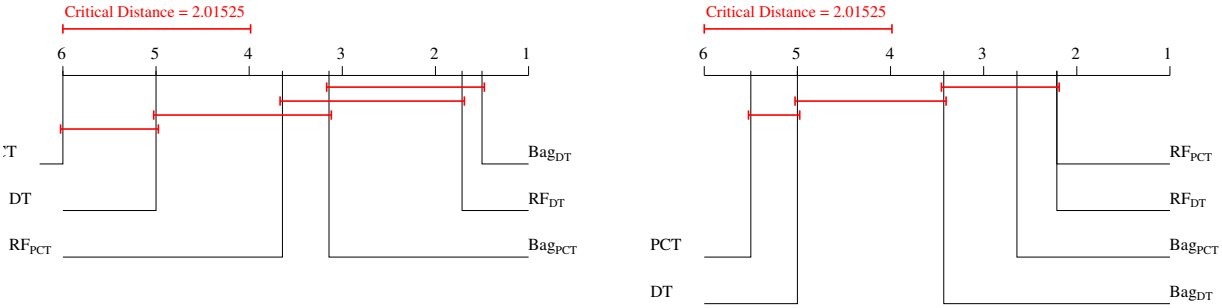
(a) Train (b) Cross-validation

Figure 18: The average rank diagrams for the micro precision evaluation measure on the dataset *DiatomsTop10-nom*.



(a) Train (b) Cross-validation

Figure 19: The average rank diagrams for the micro precision evaluation measure on the dataset *SoilQuality-nom*.



(a) Train (b) Cross-validation

Figure 20: The average rank diagrams for the micro precision evaluation measure on the dataset *WaterQuality-nom*.

4.1.5. Results for the micro recall measure

Table 23: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using micro recall as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Amphora aeq.	0.908	0.908	0.959	0.991	0.936	0.972	0.908	0.908	0.908	0.908	0.908	0.908
Achnanthidium cl.	0.766	0.775	0.954	0.995	0.945	1.000	0.761	0.711	0.757	0.720	0.761	0.757
Achnanthidium cl. bal.	0.743	0.784	0.968	0.986	0.977	0.991	0.702	0.739	0.711	0.720	0.729	0.725
Achnanthes sp.	0.982	0.982	0.982	0.982	0.982	0.991	0.982	0.982	0.982	0.982	0.982	0.982
Amphora cop.	0.656	0.716	0.991	1.000	0.995	0.995	0.587	0.615	0.661	0.624	0.638	0.628
Amphora fog.	0.968	0.968	0.968	0.982	0.968	0.968	0.968	0.968	0.968	0.968	0.968	0.968
Achnanthes lac.	0.729	0.752	0.982	0.991	0.972	0.991	0.693	0.628	0.706	0.656	0.711	0.674
Amphora in.	0.876	0.876	0.968	0.982	0.968	0.986	0.876	0.839	0.876	0.862	0.876	0.867
Achnanthidium min.	0.922	0.922	0.954	0.972	0.959	0.977	0.922	0.922	0.922	0.917	0.922	0.922
Amphora ov.	0.968	0.968	0.986	0.991	0.968	0.986	0.968	0.968	0.968	0.968	0.968	0.968
Amphora ped.	0.775	0.798	0.968	0.977	0.954	0.977	0.739	0.702	0.752	0.748	0.752	0.752
Amphora th.	0.922	0.922	0.963	0.991	0.950	0.986	0.922	0.922	0.922	0.913	0.922	0.922
Aulacoseira gra.	0.899	0.899	0.945	0.986	0.922	0.972	0.899	0.899	0.899	0.899	0.899	0.894
Amphora ven.	0.977	0.977	0.982	0.982	0.986	0.982	0.977	0.977	0.972	0.972	0.977	0.977
Cymbella aff.	0.968	0.968	0.972	0.991	0.972	0.982	0.968	0.968	0.963	0.963	0.968	0.968
Cocconeis dis.	0.894	0.894	0.950	0.991	0.940	0.972	0.894	0.894	0.894	0.876	0.894	0.899
Cymatopleura el.	0.872	0.881	0.954	0.986	0.963	0.968	0.862	0.862	0.867	0.881	0.872	0.881
Cyclotella jur. nud.	0.798	0.821	0.977	0.982	0.959	0.982	0.748	0.743	0.798	0.775	0.803	0.775
Cymbella lan.	0.936	0.927	0.982	0.986	0.982	0.986	0.894	0.872	0.917	0.917	0.917	0.927
Cyclotella men.	0.959	0.959	0.986	0.986	0.991	0.982	0.959	0.959	0.945	0.959	0.959	0.959
Cocconeis neo.	0.986	0.986	0.995	0.995	0.991	0.995	0.986	0.986	0.986	0.986	0.986	0.986
Cyclotella oc.	0.849	0.899	0.977	0.986	0.991	0.991	0.794	0.839	0.867	0.899	0.881	0.885
Cocconeis pl.	0.775	0.794	0.963	0.991	0.963	0.991	0.743	0.720	0.766	0.734	0.766	0.771
Cocconeis pl. eug.	0.950	0.950	0.972	0.977	0.963	0.972	0.950	0.950	0.950	0.950	0.950	0.950
Cocconeis pl. li.	0.780	0.812	0.982	0.995	0.959	0.995	0.780	0.743	0.780	0.761	0.780	0.766
Caloneis sch.	0.904	0.904	0.972	0.991	0.972	0.968	0.904	0.904	0.904	0.885	0.904	0.904
Cavinula scu.	0.794	0.835	0.977	0.982	0.963	0.972	0.743	0.757	0.821	0.826	0.821	0.821
Cymbella neo.	0.950	0.950	0.963	0.982	0.972	0.982	0.950	0.950	0.950	0.950	0.950	0.950
Diatoma ang.	0.904	0.904	0.950	0.977	0.927	0.968	0.904	0.904	0.904	0.890	0.904	0.899
Diploneis mau.	0.656	0.725	0.995	1.000	0.995	1.000	0.587	0.564	0.706	0.651	0.693	0.656
Diploneis mod.	0.954	0.954	0.968	0.982	0.972	0.977	0.954	0.954	0.954	0.917	0.954	0.954
Diploneis ov.	0.743	0.771	0.982	0.995	0.991	0.986	0.706	0.688	0.734	0.706	0.739	0.757
Epithemia ad.	0.936	0.936	0.968	0.977	0.972	0.968	0.936	0.936	0.931	0.931	0.936	0.936
Encyonema cae.	0.936	0.936	0.950	0.968	0.945	0.968	0.936	0.936	0.936	0.936	0.936	0.936
Encyonema min.	0.977	0.977	0.991	0.977	0.982	0.982	0.977	0.977	0.977	0.977	0.977	0.977
Encyonopsis mic.	0.913	0.913	0.959	0.968	0.963	0.977	0.913	0.913	0.908	0.899	0.908	0.908
Encyonema sil.	0.945	0.945	0.959	0.972	0.959	0.972	0.945	0.945	0.945	0.940	0.945	0.945
Epithemia so.	0.849	0.849	0.922	0.963	0.927	0.972	0.849	0.821	0.839	0.817	0.849	0.826
Fragilaria cap.	0.839	0.839	0.917	0.982	0.922	0.995	0.839	0.789	0.839	0.826	0.839	0.830
Fragilaria cap. va.	0.972	0.972	0.982	0.977	0.986	0.986	0.972	0.972	0.968	0.968	0.972	0.972
Fallacia och.	0.821	0.839	0.950	0.995	0.940	0.982	0.821	0.798	0.821	0.798	0.821	0.812
Fragilaria par.	0.917	0.922	0.950	0.972	0.954	0.982	0.917	0.908	0.917	0.917	0.917	0.917
Frustulia vul.	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991
Gomphonema cl.	0.972	0.972	0.972	0.977	0.972	0.977	0.972	0.972	0.972	0.972	0.972	0.972
Geissleria dec.	0.734	0.775	0.972	0.995	0.972	1.000	0.725	0.679	0.716	0.693	0.716	0.702
Gomphonema it.	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986
Gomphonema min.	0.890	0.890	0.959	0.986	0.922	0.986	0.890	0.862	0.890	0.881	0.890	0.890
Gomphonema ol. Horn.	0.913	0.913	0.963	0.982	0.968	0.977	0.913	0.913	0.913	0.913	0.913	0.908
Gomphonema par.	0.922	0.922	0.968	0.991	0.959	0.977	0.922	0.922	0.913	0.913	0.922	0.917
Gomphonema pum.	0.899	0.899	0.950	0.972	0.945	0.972	0.899	0.894	0.899	0.876	0.899	0.899
Gomphonema ol.	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991
Gomphonema sar.	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991
Gomphonema ter.	0.950	0.950	0.977	0.986	0.977	0.986	0.950	0.950	0.950	0.945	0.950	0.950
Gyrosigma mac.	0.711	0.789	0.977	0.995	0.986	0.991	0.674	0.679	0.670	0.665	0.688	0.688
Hannea ar.	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977
Hantzschia amp.	0.977	0.977	0.977	0.982	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977
Hippodonta ros.	0.977	0.977	0.977	0.977	0.977	0.982	0.977	0.977	0.977	0.977	0.977	0.977

Table 23: (ctd) Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using micro recall as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Meridion cir. con.	0.968	0.968	0.986	0.982	0.968	0.977	0.968	0.968	0.963	0.968	0.968	0.968
Meridion cir.	0.986	0.986	0.986	0.986	0.986	0.991	0.986	0.986	0.986	0.986	0.986	0.986
Martyana mar.	0.972	0.972	0.982	0.986	0.977	0.972	0.972	0.972	0.972	0.972	0.972	0.972
Nitzschia alp.	0.963	0.963	0.982	0.991	0.986	0.977	0.963	0.963	0.963	0.963	0.963	0.963
Navicula ant.	0.853	0.853	0.936	0.982	0.954	0.977	0.853	0.839	0.849	0.817	0.849	0.830
Navicula cap.	0.853	0.867	0.959	0.982	0.940	0.991	0.853	0.807	0.853	0.826	0.853	0.849
Navicula cry.	0.959	0.959	0.959	0.968	0.959	0.972	0.959	0.959	0.959	0.959	0.959	0.959
Nitzschia dis.	0.959	0.959	0.972	0.982	0.968	0.977	0.959	0.959	0.954	0.954	0.959	0.959
Neidium du.	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.982	0.986	0.986
Navicula gre.	0.968	0.968	0.968	0.972	0.982	0.972	0.968	0.968	0.968	0.968	0.968	0.968
Navicula has.	0.950	0.950	0.959	0.977	0.968	0.977	0.950	0.950	0.950	0.950	0.950	0.950
Navicula krs.	0.670	0.716	0.995	1.000	0.995	0.995	0.619	0.587	0.651	0.628	0.642	0.656
Navicula lan.	0.968	0.968	0.968	0.982	0.968	0.972	0.968	0.968	0.968	0.968	0.968	0.968
Nupela la.	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995
Nitzschia lin.	0.927	0.927	0.940	0.959	0.936	0.963	0.927	0.927	0.927	0.927	0.927	0.927
Navicula pra.	0.743	0.784	0.972	1.000	0.991	1.000	0.670	0.683	0.688	0.665	0.702	0.683
Navicula pre.	0.716	0.775	0.991	0.995	0.995	0.995	0.665	0.683	0.656	0.665	0.683	0.651
Navicula pro.	0.794	0.812	0.986	1.000	0.972	1.000	0.757	0.766	0.771	0.789	0.780	0.794
Nitzschia rec.	0.913	0.913	0.963	0.986	0.940	0.968	0.913	0.913	0.913	0.913	0.913	0.913
Navicula rei.	0.803	0.835	0.968	0.986	0.959	0.991	0.766	0.794	0.766	0.761	0.775	0.766
Navicula rot.	0.706	0.757	0.982	0.986	0.982	0.986	0.697	0.656	0.697	0.702	0.702	0.716
Navicula subh.	0.784	0.803	0.982	0.995	0.986	0.995	0.734	0.734	0.739	0.734	0.752	0.752
Navicula subr.	0.716	0.775	0.977	0.977	0.963	0.977	0.674	0.683	0.702	0.725	0.706	0.734
Nitzschia suba.	0.702	0.739	0.972	0.991	0.991	0.991	0.624	0.665	0.697	0.683	0.679	0.665
Navicula tri.	0.789	0.803	0.959	0.991	0.954	0.986	0.771	0.729	0.771	0.743	0.771	0.757
Navicula vircl.	0.794	0.817	0.977	0.995	0.972	1.000	0.784	0.734	0.780	0.757	0.784	0.775
Navicula virdu.	0.917	0.908	0.968	0.977	0.963	0.977	0.885	0.872	0.904	0.908	0.908	0.913
Orthoseira ros.	0.959	0.959	0.995	0.995	0.995	1.000	0.959	0.959	0.954	0.954	0.959	0.959
Placoneis bal.	0.688	0.757	1.000	0.995	0.995	0.995	0.601	0.679	0.693	0.720	0.665	0.725
Pinnularia bor.	0.936	0.936	0.991	0.991	0.977	0.991	0.936	0.936	0.922	0.936	0.936	0.936
Placoneis min.	0.972	0.972	0.982	0.982	0.977	0.982	0.972	0.972	0.972	0.972	0.972	0.972
Placoneis elg.	0.959	0.959	0.968	0.968	0.972	0.968	0.959	0.959	0.959	0.959	0.959	0.959
Planothidium lan.	0.807	0.807	0.959	0.982	0.940	0.986	0.807	0.789	0.798	0.775	0.807	0.789
Planothidium ros.	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986
Placoneis neo.	0.775	0.807	0.972	0.995	0.972	0.995	0.734	0.729	0.734	0.734	0.752	0.739
Pseudostaurosira bre.	0.619	0.661	1.000	1.000	1.000	1.000	0.596	0.431	0.592	0.560	0.587	0.610
Pinnularia subc.	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995
Rhoicosphenia abb.	0.835	0.849	0.968	0.995	0.959	0.991	0.835	0.771	0.830	0.821	0.830	0.821
Rhopalodia gib.	0.885	0.885	0.954	0.963	0.950	0.977	0.885	0.885	0.885	0.885	0.881	0.881
Reimeria sin.	0.945	0.945	0.977	0.977	0.963	0.986	0.945	0.945	0.945	0.940	0.945	0.945
Surirella ang.	0.927	0.927	0.963	0.982	0.959	0.982	0.927	0.927	0.927	0.922	0.927	0.927
Surirella min.	0.931	0.931	0.959	0.982	0.963	0.977	0.931	0.931	0.927	0.931	0.931	0.931
Sellaphora perb.	0.716	0.780	0.972	1.000	0.982	0.995	0.688	0.670	0.651	0.661	0.683	0.688
Sellaphora pu.	0.693	0.734	0.982	0.995	0.977	0.995	0.656	0.628	0.656	0.656	0.651	0.656
Stauroneis gra.	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991
Staurosira con. bin.	0.940	0.940	0.977	0.982	0.968	0.972	0.940	0.940	0.940	0.931	0.940	0.940
Staurosira con.	0.624	0.706	1.000	1.000	0.991	0.995	0.555	0.610	0.592	0.615	0.606	0.624
Staurosira con. ven.	0.982	0.982	0.982	0.986	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982
Stauroneis pho.	0.959	0.959	0.963	0.977	0.968	0.972	0.959	0.959	0.959	0.959	0.959	0.959
Staurosirella pin.	0.610	0.697	0.995	0.991	0.986	1.000	0.537	0.523	0.569	0.601	0.592	0.587
Stauroneis sm.	0.982	0.982	0.982	0.986	0.986	0.982	0.982	0.982	0.982	0.982	0.982	0.982
Tryblionella ang.	0.835	0.835	0.936	0.995	0.927	0.991	0.835	0.798	0.835	0.812	0.835	0.835
Tabellaria floc.	0.959	0.959	0.995	0.995	0.995	0.995	0.959	0.959	0.959	0.954	0.959	0.959
Ulnaria ul.	0.950	0.950	0.968	0.991	0.972	0.977	0.950	0.950	0.950	0.945	0.950	0.954

Table 24: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsTop10-nom* dataset, evaluated by using micro recall as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Amphora ped.	0.752	0.798	0.963	0.977	0.972	0.977	0.729	0.706	0.775	0.748	0.766	0.752
Cyclotella jur. nud.	0.780	0.821	0.982	0.982	0.968	0.982	0.725	0.739	0.798	0.775	0.807	0.775
Cyclotella oc.	0.876	0.894	0.991	0.986	0.995	0.991	0.812	0.862	0.899	0.899	0.894	0.885
Cocconeis pl.	0.766	0.798	0.991	0.991	0.991	0.991	0.752	0.739	0.771	0.734	0.761	0.771
Cavinula scu.	0.803	0.826	0.977	0.982	0.968	0.972	0.748	0.743	0.858	0.826	0.826	0.821
Diploneis mau.	0.665	0.725	0.995	1.000	1.000	1.000	0.647	0.564	0.679	0.651	0.679	0.656
Navicula pre.	0.693	0.775	0.995	0.995	0.995	0.995	0.665	0.683	0.651	0.665	0.647	0.651
Navicula rot.	0.716	0.752	0.986	0.986	0.995	0.986	0.697	0.651	0.720	0.702	0.706	0.716
Navicula subr.	0.725	0.775	0.986	0.977	0.968	0.977	0.702	0.683	0.748	0.725	0.739	0.734
Staurosirella pin.	0.619	0.697	0.991	0.991	1.000	1.000	0.528	0.541	0.583	0.601	0.555	0.587

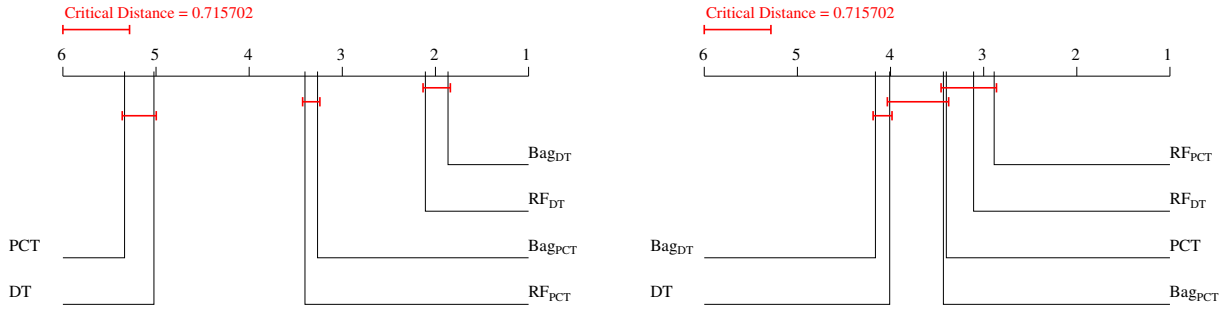
Table 25: Predictive performance of the methods (columns) on all targets (rows) of the *WaterQuality-nom* dataset, evaluated by using micro recall as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Cladophora sp.	0.577	0.675	0.993	0.996	0.995	0.998	0.585	0.639	0.674	0.666	0.665	0.676
Gongrosira inc.	0.733	0.743	0.991	1.000	0.991	1.000	0.733	0.720	0.738	0.708	0.743	0.728
Oedogonium sp.	0.712	0.748	0.988	0.997	0.983	0.992	0.708	0.709	0.751	0.731	0.746	0.745
Stigeoclonium ten.	0.794	0.814	0.982	0.992	0.981	0.992	0.792	0.798	0.815	0.815	0.811	0.813
Melosira var.	0.617	0.695	0.995	0.995	0.994	0.993	0.590	0.643	0.691	0.686	0.692	0.691
Nitzschia pal.	0.724	0.755	0.987	0.991	0.985	0.991	0.720	0.725	0.746	0.743	0.745	0.749
Audouinella ch.	0.758	0.769	0.977	0.993	0.984	0.994	0.759	0.748	0.771	0.763	0.767	0.772
Erpobdella oc.	0.718	0.757	0.988	0.994	0.980	0.992	0.708	0.737	0.733	0.727	0.741	0.731
Gammarus fo.	0.679	0.738	0.994	0.996	0.994	0.997	0.671	0.717	0.719	0.732	0.721	0.740
Baetis rh.	0.690	0.741	0.995	0.998	0.994	0.997	0.681	0.705	0.751	0.762	0.745	0.756
Hydropsyche sp.	0.620	0.674	0.995	0.995	0.991	0.998	0.617	0.647	0.692	0.677	0.701	0.693
Rhyacophila sp.	0.722	0.730	0.990	0.998	0.990	0.998	0.725	0.711	0.744	0.728	0.759	0.735
Simulium sp.	0.633	0.668	0.995	0.998	0.995	0.997	0.633	0.650	0.673	0.675	0.692	0.675
Tubifex sp.	0.749	0.775	0.983	0.996	0.979	0.989	0.747	0.742	0.745	0.748	0.753	0.761

Table 26: Predictive performance of the methods (columns) on all targets (rows) of the *SoilQuality-nom* dataset, evaluated by using micro recall as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

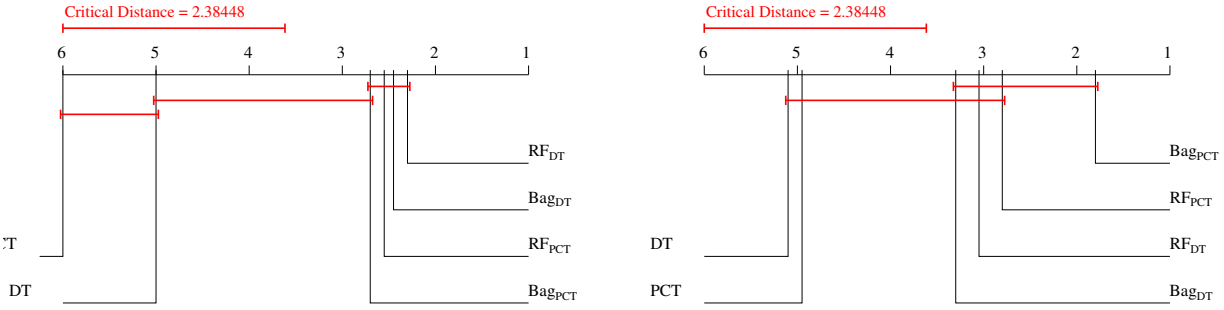
	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Anurida pyg.	0.863	0.876	0.896	0.896	0.891	0.891	0.863	0.867	0.870	0.873	0.876	0.874
Brachystomelle par.	0.814	0.861	0.902	0.902	0.898	0.901	0.813	0.858	0.885	0.883	0.878	0.885
Ceratophysella den.	0.925	0.954	0.957	0.957	0.956	0.956	0.925	0.951	0.951	0.951	0.951	0.953
Ceratophysella suc.	0.924	0.927	0.942	0.942	0.941	0.941	0.924	0.917	0.919	0.920	0.921	0.919
Entomobrya sp.	0.858	0.886	0.908	0.908	0.903	0.907	0.857	0.871	0.882	0.884	0.891	0.887
Folsomia fim.	0.612	0.696	0.810	0.810	0.800	0.804	0.612	0.689	0.756	0.758	0.759	0.755
Folsomia quad.	0.866	0.884	0.931	0.931	0.928	0.927	0.866	0.877	0.910	0.912	0.902	0.902
Folsomia spi.	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.973	0.974	0.975	0.977
Friesea mir.	0.921	0.944	0.960	0.960	0.960	0.960	0.921	0.939	0.956	0.955	0.958	0.958
Heteromurus nit.	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.965	0.965	0.966	0.969
Hypogastrua sp.	0.932	0.943	0.953	0.953	0.952	0.952	0.932	0.944	0.942	0.943	0.949	0.950
Isotoma ang.	0.592	0.747	0.841	0.841	0.832	0.836	0.592	0.735	0.798	0.798	0.794	0.795
Isotoma not.	0.602	0.754	0.842	0.842	0.828	0.836	0.586	0.732	0.801	0.800	0.801	0.805
Isotoma tig.	0.874	0.922	0.941	0.941	0.939	0.939	0.874	0.918	0.929	0.935	0.937	0.938
Isotomiella min.	0.904	0.921	0.934	0.934	0.931	0.930	0.905	0.915	0.919	0.921	0.921	0.918
Isotomodes arm.	0.982	0.982	0.984	0.984	0.982	0.982	0.982	0.982	0.976	0.975	0.981	0.981
Isotomodes bis.	0.974	0.974	0.978	0.978	0.978	0.978	0.974	0.974	0.970	0.973	0.972	0.974
Isotomodes prod.	0.861	0.882	0.912	0.912	0.907	0.910	0.861	0.873	0.889	0.892	0.886	0.892
Isotomurus pal.	0.826	0.886	0.927	0.927	0.921	0.922	0.826	0.872	0.903	0.908	0.903	0.903
Isotomurus sp.	0.986	0.990	0.990	0.989	0.990	0.989	0.986	0.984	0.990	0.988	0.989	0.989
Lepidocyrtus cy.	0.870	0.927	0.937	0.937	0.934	0.936	0.870	0.923	0.924	0.925	0.926	0.926
Lepidocyrtus lan.	0.955	0.966	0.977	0.977	0.977	0.977	0.955	0.967	0.973	0.973	0.976	0.976
Mesaphorura sp.	0.856	0.864	0.904	0.903	0.902	0.902	0.856	0.861	0.881	0.886	0.883	0.885
Neanura fam.	0.978	0.982	0.986	0.986	0.983	0.983	0.972	0.974	0.979	0.980	0.976	0.978
Neelus min.	0.801	0.842	0.878	0.878	0.874	0.874	0.801	0.833	0.855	0.856	0.857	0.856
Orchesella cin.	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
Orchesella vil.	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998
Protaphorura sp.	0.829	0.868	0.894	0.894	0.887	0.888	0.830	0.867	0.870	0.870	0.872	0.872
Pseudosinella al.	0.857	0.885	0.912	0.912	0.909	0.912	0.852	0.875	0.889	0.890	0.885	0.890
Pseudosinella sex.	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
Smint sp.	0.655	0.723	0.810	0.810	0.805	0.806	0.640	0.700	0.758	0.760	0.763	0.763
Sminthurinus au.	0.823	0.884	0.924	0.924	0.923	0.922	0.824	0.877	0.895	0.891	0.891	0.901
Sminthurinus el.	0.758	0.776	0.833	0.832	0.829	0.829	0.758	0.767	0.789	0.789	0.800	0.798
Sminthurus vir.	0.949	0.949	0.949	0.949	0.949	0.949	0.949	0.949	0.944	0.945	0.949	0.949
Stenaphorura quad.	0.953	0.953	0.956	0.956	0.956	0.956	0.953	0.953	0.952	0.953	0.954	0.952
Tomocerus fl.	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997
Tomocerus min.	0.996	0.996	0.999	0.999	0.999	0.999	0.996	0.996	0.999	0.999	0.999	0.999
Tomocerus sp.	0.996	0.996	0.998	0.998	0.998	0.998	0.996	0.996	0.998	0.998	0.998	0.997
Willemia sp.	0.740	0.774	0.828	0.828	0.824	0.823	0.740	0.761	0.775	0.776	0.787	0.787

4.1.6. Average rank diagrams for each dataset for the micro recall measure



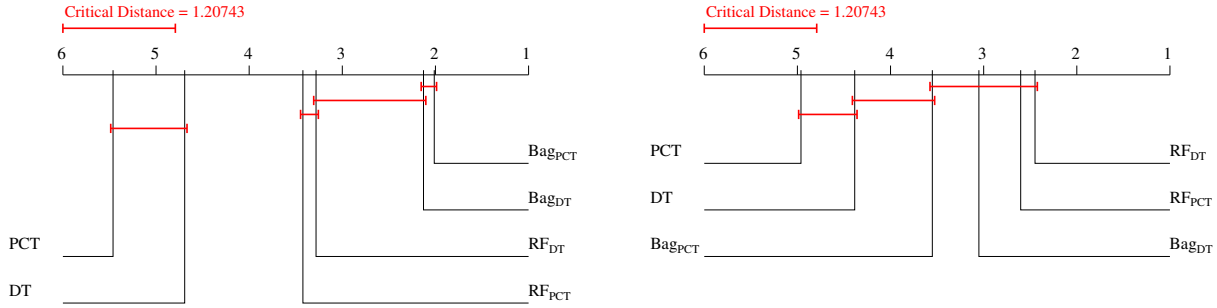
(a) Train (b) Cross-validation

Figure 21: The average rank diagrams for the micro recall evaluation measure on the dataset *DiatomsAll-nom*.



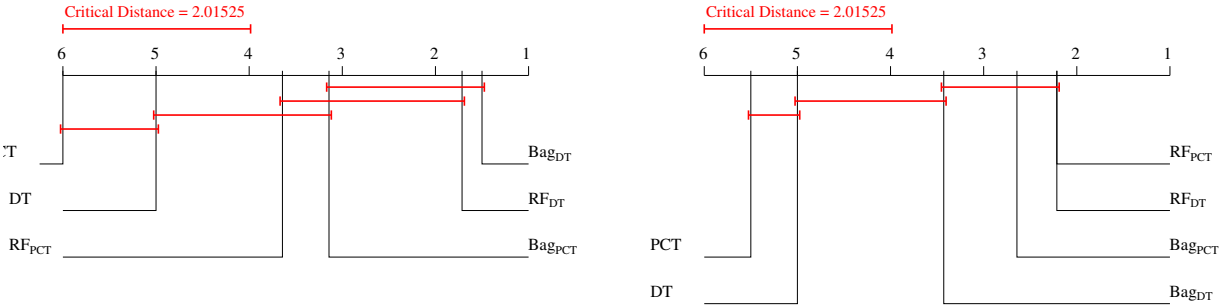
(a) Train (b) Cross-validation

Figure 22: The average rank diagrams for the micro recall evaluation measure on the dataset *DiatomsTop10-nom*.



(a) Train (b) Cross-validation

Figure 23: The average rank diagrams for the micro recall evaluation measure on the dataset *SoilQuality-nom*.



(a) Train (b) Cross-validation

Figure 24: The average rank diagrams for the micro recall evaluation measure on the dataset *WaterQuality-nom*.

4.1.7. Results for the micro F measure

Table 27: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using micro F as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	DT	Bag_{PCT}	Bag_{DT}	RF_{PCT}	RF_{DT}	PCT	DT	Bag_{PCT}	Bag_{DT}	RF_{PCT}	RF_{DT}
Amphora aeq.	0.908	0.908	0.959	0.991	0.936	0.972	0.908	0.908	0.908	0.908	0.908	0.908
Achnanthidium cl.	0.766	0.775	0.954	0.995	0.945	1.000	0.761	0.711	0.757	0.720	0.761	0.757
Achnanthidium cl. bal.	0.743	0.784	0.968	0.986	0.977	0.991	0.702	0.739	0.711	0.720	0.729	0.725
Achnanthes sp.	0.982	0.982	0.982	0.982	0.982	0.991	0.982	0.982	0.982	0.982	0.982	0.982
Amphora cop.	0.656	0.716	0.991	1.000	0.995	0.995	0.587	0.615	0.661	0.624	0.638	0.628
Amphora fog.	0.968	0.968	0.968	0.982	0.968	0.968	0.968	0.968	0.968	0.968	0.968	0.968
Achnanthes lac.	0.729	0.752	0.982	0.991	0.972	0.991	0.693	0.628	0.706	0.656	0.711	0.674
Amphora in.	0.876	0.876	0.968	0.982	0.968	0.986	0.876	0.839	0.876	0.862	0.876	0.867
Achnanthidium min.	0.922	0.922	0.954	0.972	0.959	0.977	0.922	0.922	0.922	0.917	0.922	0.922
Amphora ov.	0.968	0.968	0.986	0.991	0.968	0.986	0.968	0.968	0.968	0.968	0.968	0.968
Amphora ped.	0.775	0.798	0.968	0.977	0.954	0.977	0.739	0.702	0.752	0.748	0.752	0.752
Amphora th.	0.922	0.922	0.963	0.991	0.950	0.986	0.922	0.922	0.922	0.913	0.922	0.922
Aulacoseira gra.	0.899	0.899	0.945	0.986	0.922	0.972	0.899	0.899	0.899	0.899	0.899	0.894
Amphora ven.	0.977	0.977	0.982	0.982	0.986	0.982	0.977	0.977	0.972	0.972	0.977	0.977
Cymbella aff.	0.968	0.968	0.972	0.991	0.972	0.982	0.968	0.968	0.963	0.963	0.968	0.968
Cocconeis dis.	0.894	0.894	0.950	0.991	0.940	0.972	0.894	0.894	0.894	0.876	0.894	0.899
Cymatopleura el.	0.872	0.881	0.954	0.986	0.963	0.968	0.862	0.862	0.867	0.881	0.872	0.881
Cyclotella jur. nud.	0.798	0.821	0.977	0.982	0.959	0.982	0.748	0.743	0.798	0.775	0.803	0.775
Cymbella lan.	0.936	0.927	0.982	0.986	0.982	0.986	0.894	0.872	0.917	0.917	0.917	0.927
Cyclotella men.	0.959	0.959	0.986	0.986	0.991	0.982	0.959	0.959	0.945	0.959	0.959	0.959
Cocconeis neo.	0.986	0.986	0.995	0.995	0.991	0.995	0.986	0.986	0.986	0.986	0.986	0.986
Cyclotella oc.	0.849	0.899	0.977	0.986	0.991	0.991	0.794	0.839	0.867	0.899	0.881	0.885
Cocconeis pl.	0.775	0.794	0.963	0.991	0.963	0.991	0.743	0.720	0.766	0.734	0.766	0.771
Cocconeis pl. eug.	0.950	0.950	0.972	0.977	0.963	0.972	0.950	0.950	0.950	0.950	0.950	0.950
Cocconeis pl. li.	0.780	0.812	0.982	0.995	0.959	0.995	0.780	0.743	0.780	0.761	0.780	0.766
Caloneis sch.	0.904	0.904	0.972	0.991	0.972	0.968	0.904	0.904	0.904	0.885	0.904	0.904
Cavinula scu.	0.794	0.835	0.977	0.982	0.963	0.972	0.743	0.757	0.821	0.826	0.821	0.821
Cymbella neo.	0.950	0.950	0.963	0.982	0.972	0.982	0.950	0.950	0.950	0.950	0.950	0.950
Diatoma ang.	0.904	0.904	0.950	0.977	0.927	0.968	0.904	0.904	0.904	0.890	0.904	0.899
Diploneis mau.	0.656	0.725	0.995	1.000	0.995	1.000	0.587	0.564	0.706	0.651	0.693	0.656
Diploneis mod.	0.954	0.954	0.968	0.982	0.972	0.977	0.954	0.954	0.954	0.917	0.954	0.954
Diploneis ov.	0.743	0.771	0.982	0.995	0.991	0.986	0.706	0.688	0.734	0.706	0.739	0.757
Epithemia ad.	0.936	0.936	0.968	0.977	0.972	0.968	0.936	0.936	0.931	0.931	0.936	0.936
Encyonema cae.	0.936	0.936	0.950	0.968	0.945	0.968	0.936	0.936	0.936	0.936	0.936	0.936
Encyonema min.	0.977	0.977	0.991	0.977	0.982	0.982	0.977	0.977	0.977	0.977	0.977	0.977
Encyonopsis mic.	0.913	0.913	0.959	0.968	0.963	0.977	0.913	0.913	0.908	0.899	0.908	0.908
Encyonema sil.	0.945	0.945	0.959	0.972	0.959	0.972	0.945	0.945	0.945	0.940	0.945	0.945
Epithemia so.	0.849	0.849	0.922	0.963	0.927	0.972	0.849	0.821	0.839	0.817	0.849	0.826
Fragilaria cap.	0.839	0.839	0.917	0.982	0.922	0.995	0.839	0.789	0.839	0.826	0.839	0.830
Fragilaria cap. va.	0.972	0.972	0.982	0.977	0.986	0.986	0.972	0.972	0.968	0.968	0.972	0.972
Fallacia och.	0.821	0.839	0.950	0.995	0.940	0.982	0.821	0.798	0.821	0.798	0.821	0.812
Fragilaria par.	0.917	0.922	0.950	0.972	0.954	0.982	0.917	0.908	0.917	0.917	0.917	0.917
Frustulia vul.	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991
Gomphonema cl.	0.972	0.972	0.972	0.977	0.972	0.977	0.972	0.972	0.972	0.972	0.972	0.972
Geissleria dec.	0.734	0.775	0.972	0.995	0.972	1.000	0.725	0.679	0.716	0.693	0.716	0.702
Gomphonema it.	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986
Gomphonema min.	0.890	0.890	0.959	0.986	0.922	0.986	0.890	0.862	0.890	0.881	0.890	0.890
Gomphonema ol. Horn.	0.913	0.913	0.963	0.982	0.968	0.977	0.913	0.913	0.913	0.913	0.913	0.908
Gomphonema par.	0.922	0.922	0.968	0.991	0.959	0.977	0.922	0.922	0.913	0.913	0.922	0.917
Gomphonema pum.	0.899	0.899	0.950	0.972	0.945	0.972	0.899	0.894	0.899	0.876	0.899	0.899
Gomphonema ol.	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991
Gomphonema sar.	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991
Gomphonema ter.	0.950	0.950	0.977	0.986	0.977	0.986	0.950	0.950	0.950	0.945	0.950	0.950
Gyrosigma mac.	0.711	0.789	0.977	0.995	0.986	0.991	0.674	0.679	0.670	0.665	0.688	0.688
Hannea ar.	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977
Hantzschia amp.	0.977	0.977	0.977	0.982	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977
Hippodonta ros.	0.977	0.977	0.977	0.977	0.977	0.982	0.977	0.977	0.977	0.977	0.977	0.977

Table 27: (ctd) Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using micro F as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Meridion cir. con.	0.968	0.968	0.986	0.982	0.968	0.977	0.968	0.968	0.963	0.968	0.968	0.968
Meridion cir.	0.986	0.986	0.986	0.986	0.986	0.991	0.986	0.986	0.986	0.986	0.986	0.986
Martyana mar.	0.972	0.972	0.982	0.986	0.977	0.972	0.972	0.972	0.972	0.972	0.972	0.972
Nitzschia alp.	0.963	0.963	0.982	0.991	0.986	0.977	0.963	0.963	0.963	0.963	0.963	0.963
Navicula ant.	0.853	0.853	0.936	0.982	0.954	0.977	0.853	0.839	0.849	0.817	0.849	0.830
Navicula cap.	0.853	0.867	0.959	0.982	0.940	0.991	0.853	0.807	0.853	0.826	0.853	0.849
Navicula cry.	0.959	0.959	0.959	0.968	0.959	0.972	0.959	0.959	0.959	0.959	0.959	0.959
Nitzschia dis.	0.959	0.959	0.972	0.982	0.968	0.977	0.959	0.959	0.954	0.954	0.959	0.959
Neidium du.	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.982	0.986	0.986
Navicula gre.	0.968	0.968	0.968	0.972	0.982	0.972	0.968	0.968	0.968	0.968	0.968	0.968
Navicula has.	0.950	0.950	0.959	0.977	0.968	0.977	0.950	0.950	0.950	0.950	0.950	0.950
Navicula krs.	0.670	0.716	0.995	1.000	0.995	0.995	0.619	0.587	0.651	0.628	0.642	0.656
Navicula lan.	0.968	0.968	0.968	0.982	0.968	0.972	0.968	0.968	0.968	0.968	0.968	0.968
Nupela la.	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995
Nitzschia lin.	0.927	0.927	0.940	0.959	0.936	0.963	0.927	0.927	0.927	0.927	0.927	0.927
Navicula pra.	0.743	0.784	0.972	1.000	0.991	1.000	0.670	0.683	0.688	0.665	0.702	0.683
Navicula pre.	0.716	0.775	0.991	0.995	0.995	0.995	0.665	0.683	0.656	0.665	0.683	0.651
Navicula pro.	0.794	0.812	0.986	1.000	0.972	1.000	0.757	0.766	0.771	0.789	0.780	0.794
Nitzschia rec.	0.913	0.913	0.963	0.986	0.940	0.968	0.913	0.913	0.913	0.913	0.913	0.913
Navicula rei.	0.803	0.835	0.968	0.986	0.959	0.991	0.766	0.794	0.766	0.761	0.775	0.766
Navicula rot.	0.706	0.757	0.982	0.986	0.982	0.986	0.697	0.656	0.697	0.702	0.702	0.716
Navicula subh.	0.784	0.803	0.982	0.995	0.986	0.995	0.734	0.734	0.739	0.734	0.752	0.752
Navicula subr.	0.716	0.775	0.977	0.977	0.963	0.977	0.674	0.683	0.702	0.725	0.706	0.734
Nitzschia suba.	0.702	0.739	0.972	0.991	0.991	0.991	0.624	0.665	0.697	0.683	0.679	0.665
Navicula tri.	0.789	0.803	0.959	0.991	0.954	0.986	0.771	0.729	0.771	0.743	0.771	0.757
Navicula vircl.	0.794	0.817	0.977	0.995	0.972	1.000	0.784	0.734	0.780	0.757	0.784	0.775
Navicula virdu.	0.917	0.908	0.968	0.977	0.963	0.977	0.885	0.872	0.904	0.908	0.908	0.913
Orthoseira ros.	0.959	0.959	0.995	0.995	0.995	1.000	0.959	0.959	0.954	0.954	0.959	0.959
Placoneis bal.	0.688	0.757	1.000	0.995	0.995	0.995	0.601	0.679	0.693	0.720	0.665	0.725
Pinnularia bor.	0.936	0.936	0.991	0.991	0.977	0.991	0.936	0.936	0.922	0.936	0.936	0.936
Placoneis min.	0.972	0.972	0.982	0.982	0.977	0.982	0.972	0.972	0.972	0.972	0.972	0.972
Placoneis elg.	0.959	0.959	0.968	0.968	0.972	0.968	0.959	0.959	0.959	0.959	0.959	0.959
Planothidium lan.	0.807	0.807	0.959	0.982	0.940	0.986	0.807	0.789	0.798	0.775	0.807	0.789
Planothidium ros.	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986	0.986
Placoneis neo.	0.775	0.807	0.972	0.995	0.972	0.995	0.734	0.729	0.734	0.734	0.752	0.739
Pseudostaurosira bre.	0.619	0.661	1.000	1.000	1.000	1.000	0.596	0.431	0.592	0.560	0.587	0.610
Pinnularia subc.	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995
Rhoicosphenia abb.	0.835	0.849	0.968	0.995	0.959	0.991	0.835	0.771	0.830	0.821	0.830	0.821
Rhopalodia gib.	0.885	0.885	0.954	0.963	0.950	0.977	0.885	0.885	0.885	0.885	0.881	0.881
Reimeria sin.	0.945	0.945	0.977	0.977	0.963	0.986	0.945	0.945	0.945	0.940	0.945	0.945
Surirella ang.	0.927	0.927	0.963	0.982	0.959	0.982	0.927	0.927	0.927	0.922	0.927	0.927
Surirella min.	0.931	0.931	0.959	0.982	0.963	0.977	0.931	0.931	0.927	0.931	0.931	0.931
Sellaphora perb.	0.716	0.780	0.972	1.000	0.982	0.995	0.688	0.670	0.651	0.661	0.683	0.688
Sellaphora pu.	0.693	0.734	0.982	0.995	0.977	0.995	0.656	0.628	0.656	0.656	0.651	0.656
Stauroneis gra.	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991
Staurosira con. bin.	0.940	0.940	0.977	0.982	0.968	0.972	0.940	0.940	0.940	0.931	0.940	0.940
Staurosira con.	0.624	0.706	1.000	1.000	0.991	0.995	0.555	0.610	0.592	0.615	0.606	0.624
Staurosira con. ven.	0.982	0.982	0.982	0.986	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982
Stauroneis pho.	0.959	0.959	0.963	0.977	0.968	0.972	0.959	0.959	0.959	0.959	0.959	0.959
Staurosirella pin.	0.610	0.697	0.995	0.991	0.986	1.000	0.537	0.523	0.569	0.601	0.592	0.587
Stauroneis sm.	0.982	0.982	0.982	0.986	0.986	0.982	0.982	0.982	0.982	0.982	0.982	0.982
Tryblionella ang.	0.835	0.835	0.936	0.995	0.927	0.991	0.835	0.798	0.835	0.812	0.835	0.835
Tabellaria floc.	0.959	0.959	0.995	0.995	0.995	0.995	0.959	0.959	0.959	0.954	0.959	0.959
Ulnaria ul.	0.950	0.950	0.968	0.991	0.972	0.977	0.950	0.950	0.950	0.945	0.950	0.954

Table 28: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsTop10-nom* dataset, evaluated by using micro F as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Amphora ped.	0.752	0.798	0.963	0.977	0.972	0.977	0.729	0.706	0.775	0.748	0.766	0.752
Cyclotella jur. nud.	0.780	0.821	0.982	0.982	0.968	0.982	0.725	0.739	0.798	0.775	0.807	0.775
Cyclotella oc.	0.876	0.894	0.991	0.986	0.995	0.991	0.812	0.862	0.899	0.899	0.894	0.885
Cocconeis pl.	0.766	0.798	0.991	0.991	0.991	0.991	0.752	0.739	0.771	0.734	0.761	0.771
Cavinula scu.	0.803	0.826	0.977	0.982	0.968	0.972	0.748	0.743	0.858	0.826	0.826	0.821
Diploneis mau.	0.665	0.725	0.995	1.000	1.000	1.000	0.647	0.564	0.679	0.651	0.679	0.656
Navicula pre.	0.693	0.775	0.995	0.995	0.995	0.995	0.665	0.683	0.651	0.665	0.647	0.651
Navicula rot.	0.716	0.752	0.986	0.986	0.995	0.986	0.697	0.651	0.720	0.702	0.706	0.716
Navicula subr.	0.725	0.775	0.986	0.977	0.968	0.977	0.702	0.683	0.748	0.725	0.739	0.734
Staurosirella pin.	0.619	0.697	0.991	0.991	1.000	1.000	0.528	0.541	0.583	0.601	0.555	0.587

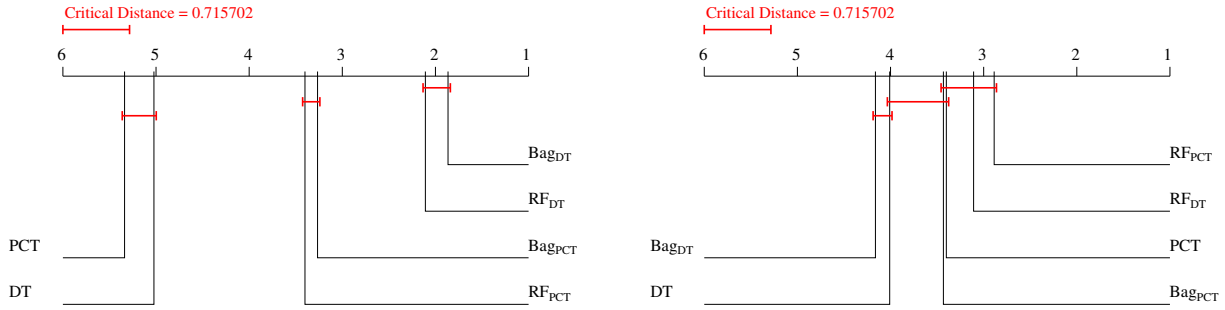
Table 29: Predictive performance of the methods (columns) on all targets (rows) of the *WaterQuality-nom* dataset, evaluated by using micro F as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Cladophora sp.	0.577	0.675	0.993	0.996	0.995	0.998	0.585	0.639	0.674	0.666	0.665	0.676
Gongrosira inc.	0.733	0.743	0.991	1.000	0.991	1.000	0.733	0.720	0.738	0.708	0.743	0.728
Oedogonium sp.	0.712	0.748	0.988	0.997	0.983	0.992	0.708	0.709	0.751	0.731	0.746	0.745
Stigeoclonium ten.	0.794	0.814	0.982	0.992	0.981	0.992	0.792	0.798	0.815	0.815	0.811	0.813
Melosira var.	0.617	0.695	0.995	0.995	0.994	0.993	0.590	0.643	0.691	0.686	0.692	0.691
Nitzschia pal.	0.724	0.755	0.987	0.991	0.985	0.991	0.720	0.725	0.746	0.743	0.745	0.749
Audouinella ch.	0.758	0.769	0.977	0.993	0.984	0.994	0.759	0.748	0.771	0.763	0.767	0.772
Erpobdella oc.	0.718	0.757	0.988	0.994	0.980	0.992	0.708	0.737	0.733	0.727	0.741	0.731
Gammarus fo.	0.679	0.738	0.994	0.996	0.994	0.997	0.671	0.717	0.719	0.732	0.721	0.740
Baetis rh.	0.690	0.741	0.995	0.998	0.994	0.997	0.681	0.705	0.751	0.762	0.745	0.756
Hydropsyche sp.	0.620	0.674	0.995	0.995	0.991	0.998	0.617	0.647	0.692	0.677	0.701	0.693
Rhyacophila sp.	0.722	0.730	0.990	0.998	0.990	0.998	0.725	0.711	0.744	0.728	0.759	0.735
Simulium sp.	0.633	0.668	0.995	0.998	0.995	0.997	0.633	0.650	0.673	0.675	0.692	0.675
Tubifex sp.	0.749	0.775	0.983	0.996	0.979	0.989	0.747	0.742	0.745	0.748	0.753	0.761

Table 30: Predictive performance of the methods (columns) on all targets (rows) of the *SoilQuality-nom* dataset, evaluated by using micro F as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

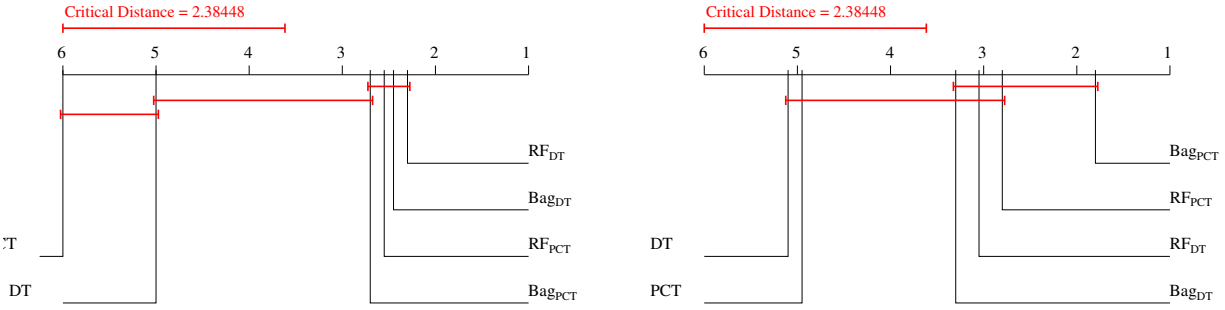
	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Anurida pyg.	0.863	0.876	0.896	0.896	0.891	0.891	0.863	0.867	0.870	0.873	0.876	0.874
Brachystomelle par.	0.814	0.861	0.902	0.902	0.898	0.901	0.813	0.858	0.885	0.883	0.878	0.885
Ceratophysella den.	0.925	0.954	0.957	0.957	0.956	0.956	0.925	0.951	0.951	0.951	0.951	0.953
Ceratophysella suc.	0.924	0.927	0.942	0.942	0.941	0.941	0.924	0.917	0.919	0.920	0.921	0.919
Entomobrya sp.	0.858	0.886	0.908	0.908	0.903	0.907	0.857	0.871	0.882	0.884	0.891	0.887
Folsomia fim.	0.612	0.696	0.810	0.810	0.800	0.804	0.612	0.689	0.756	0.758	0.759	0.755
Folsomia quad.	0.866	0.884	0.931	0.931	0.928	0.927	0.866	0.877	0.910	0.912	0.902	0.902
Folsomia spi.	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.973	0.974	0.975	0.977
Friesea mir.	0.921	0.944	0.960	0.960	0.960	0.960	0.921	0.939	0.956	0.955	0.958	0.958
Heteromurus nit.	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.965	0.965	0.966	0.969
Hypogastrua sp.	0.932	0.943	0.953	0.953	0.952	0.952	0.932	0.944	0.942	0.943	0.949	0.950
Isotoma ang.	0.592	0.747	0.841	0.841	0.832	0.836	0.592	0.735	0.798	0.798	0.794	0.795
Isotoma not.	0.602	0.754	0.842	0.842	0.828	0.836	0.586	0.732	0.801	0.800	0.801	0.805
Isotoma tig.	0.874	0.922	0.941	0.941	0.939	0.939	0.874	0.918	0.929	0.935	0.937	0.938
Isotomiella min.	0.904	0.921	0.934	0.934	0.931	0.930	0.905	0.915	0.919	0.921	0.921	0.918
Isotomodes arm.	0.982	0.982	0.984	0.984	0.982	0.982	0.982	0.982	0.976	0.975	0.981	0.981
Isotomodes bis.	0.974	0.974	0.978	0.978	0.978	0.978	0.974	0.974	0.970	0.973	0.972	0.974
Isotomodes prod.	0.861	0.882	0.912	0.912	0.907	0.910	0.861	0.873	0.889	0.892	0.886	0.892
Isotomurus pal.	0.826	0.886	0.927	0.927	0.921	0.922	0.826	0.872	0.903	0.908	0.903	0.903
Isotomurus sp.	0.986	0.990	0.990	0.989	0.990	0.989	0.986	0.984	0.990	0.988	0.989	0.989
Lepidocyrtus cy.	0.870	0.927	0.937	0.937	0.934	0.936	0.870	0.923	0.924	0.925	0.926	0.926
Lepidocyrtus lan.	0.955	0.966	0.977	0.977	0.977	0.977	0.955	0.967	0.973	0.973	0.976	0.976
Mesaphorura sp.	0.856	0.864	0.904	0.903	0.902	0.902	0.856	0.861	0.881	0.886	0.883	0.885
Neanura fam.	0.978	0.982	0.986	0.986	0.983	0.983	0.972	0.974	0.979	0.980	0.976	0.978
Neelus min.	0.801	0.842	0.878	0.878	0.874	0.874	0.801	0.833	0.855	0.856	0.857	0.856
Orchesella cin.	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
Orchesella vil.	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998
Protaphorura sp.	0.829	0.868	0.894	0.894	0.887	0.888	0.830	0.867	0.870	0.870	0.872	0.872
Pseudosinella al.	0.857	0.885	0.912	0.912	0.909	0.912	0.852	0.875	0.889	0.890	0.885	0.890
Pseudosinella sex.	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
Smint sp.	0.655	0.723	0.810	0.810	0.805	0.806	0.640	0.700	0.758	0.760	0.763	0.763
Sminthurinus au.	0.823	0.884	0.924	0.924	0.923	0.922	0.824	0.877	0.895	0.891	0.891	0.901
Sminthurinus el.	0.758	0.776	0.833	0.832	0.829	0.829	0.758	0.767	0.789	0.789	0.800	0.798
Sminthurus vir.	0.949	0.949	0.949	0.949	0.949	0.949	0.949	0.949	0.944	0.945	0.949	0.949
Stenaphorura quad.	0.953	0.953	0.956	0.956	0.956	0.956	0.953	0.953	0.952	0.953	0.954	0.952
Tomocerus fl.	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997
Tomocerus min.	0.996	0.996	0.999	0.999	0.999	0.999	0.996	0.996	0.999	0.999	0.999	0.999
Tomocerus sp.	0.996	0.996	0.998	0.998	0.998	0.998	0.996	0.996	0.998	0.998	0.998	0.997
Willemia sp.	0.740	0.774	0.828	0.828	0.824	0.823	0.740	0.761	0.775	0.776	0.787	0.787

4.1.8. *Average rank diagrams for each dataset for the micro F measure*



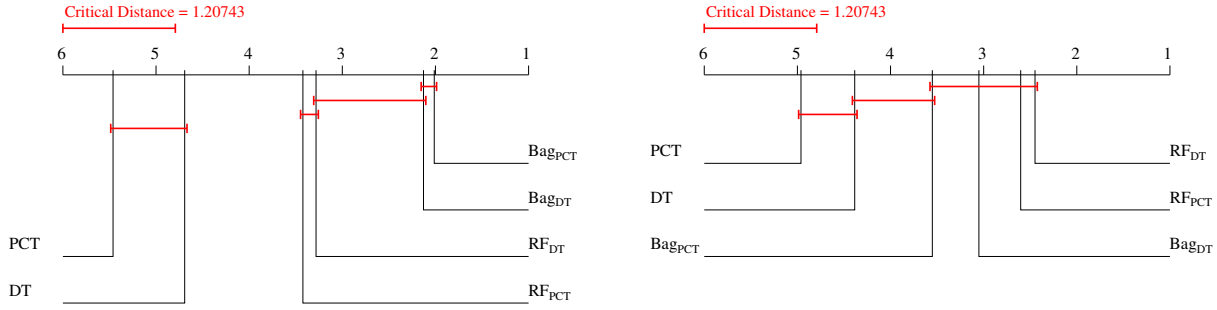
(a) Train (b) Cross-validation

Figure 25: The average rank diagrams for the micro F measure evaluation measure on the dataset *DiatomsAll-nom*.



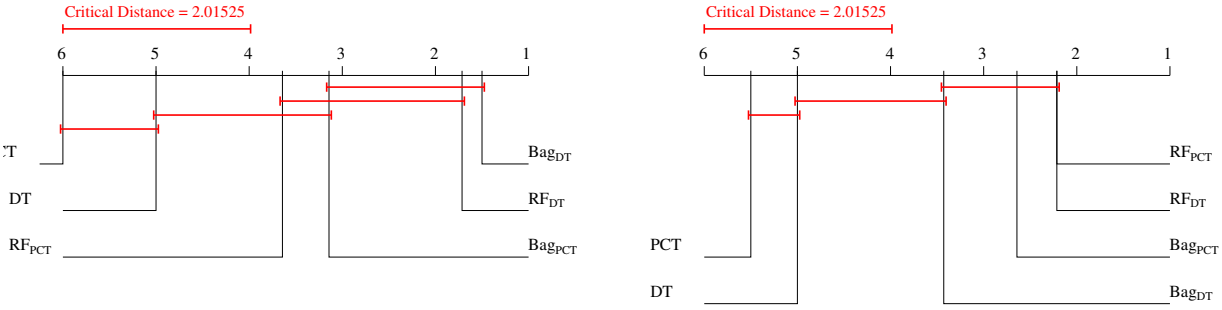
(a) Train (b) Cross-validation

Figure 26: The average rank diagrams for the micro F measure evaluation measure on the dataset *DiatomsTop10-nom*.



(a) Train (b) Cross-validation

Figure 27: The average rank diagrams for the micro F measure evaluation measure on the dataset *SoilQuality-nom*.



(a) Train (b) Cross-validation

Figure 28: The average rank diagrams for the micro F measure evaluation measure on the dataset *WaterQuality-nom*.

4.1.9. Results for the micro Matthews correlation coefficient measure

Table 31: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using micro Matthews correlation coefficient as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	DT	Bag_{PCT}	Bag_{DT}	RF_{PCT}	RF_{DT}	PCT	DT	Bag_{PCT}	Bag_{DT}	RF_{PCT}	RF_{DT}
Amphora aeq.	0.817	0.817	0.917	0.982	0.872	0.945	0.817	0.817	0.817	0.817	0.817	0.817
Achnanthidium cl.	0.532	0.550	0.908	0.991	0.890	1.000	0.523	0.422	0.514	0.440	0.523	0.514
Achnanthidium cl. bal.	0.486	0.569	0.936	0.972	0.954	0.982	0.404	0.477	0.422	0.440	0.459	0.450
Achnanthes sp.	0.963	0.963	0.963	0.963	0.963	0.982	0.963	0.963	0.963	0.963	0.963	0.963
Amphora cop.	0.312	0.431	0.982	1.000	0.991	0.991	0.174	0.229	0.321	0.248	0.275	0.257
Amphora fog.	0.936	0.936	0.936	0.963	0.936	0.936	0.936	0.936	0.936	0.936	0.936	0.936
Achnanthes lac.	0.459	0.505	0.963	0.982	0.945	0.982	0.385	0.257	0.413	0.312	0.422	0.349
Amphora in.	0.752	0.752	0.936	0.963	0.936	0.972	0.752	0.679	0.752	0.725	0.752	0.734
Achnanthidium min.	0.844	0.844	0.908	0.945	0.917	0.954	0.844	0.844	0.844	0.835	0.844	0.844
Amphora ov.	0.936	0.936	0.972	0.982	0.936	0.972	0.936	0.936	0.936	0.936	0.936	0.936
Amphora ped.	0.550	0.596	0.936	0.954	0.908	0.954	0.477	0.404	0.505	0.495	0.505	0.505
Amphora th.	0.844	0.844	0.927	0.982	0.899	0.972	0.844	0.844	0.844	0.826	0.844	0.844
Aulacoseira gra.	0.798	0.798	0.890	0.972	0.844	0.945	0.798	0.798	0.798	0.798	0.798	0.789
Amphora ven.	0.954	0.954	0.963	0.963	0.972	0.963	0.954	0.954	0.945	0.945	0.954	0.954
Cymbella aff.	0.936	0.936	0.945	0.982	0.945	0.963	0.936	0.936	0.927	0.927	0.936	0.936
Cocconeis dis.	0.789	0.789	0.899	0.982	0.881	0.945	0.789	0.789	0.789	0.752	0.789	0.798
Cymatopleura el.	0.743	0.761	0.908	0.972	0.927	0.936	0.725	0.725	0.734	0.761	0.743	0.761
Cyclotella jur. nud.	0.596	0.642	0.954	0.963	0.917	0.963	0.495	0.486	0.596	0.550	0.606	0.550
Cymbella lan.	0.872	0.853	0.963	0.972	0.963	0.972	0.789	0.743	0.835	0.835	0.835	0.853
Cyclotella men.	0.917	0.917	0.972	0.972	0.982	0.963	0.917	0.917	0.890	0.917	0.917	0.917
Cocconeis neo.	0.972	0.972	0.991	0.991	0.982	0.991	0.972	0.972	0.972	0.972	0.972	0.972
Cyclotella oc.	0.697	0.798	0.954	0.972	0.982	0.982	0.587	0.679	0.734	0.798	0.761	0.771
Cocconeis pl.	0.550	0.587	0.927	0.982	0.927	0.982	0.486	0.440	0.532	0.468	0.532	0.541
Cocconeis pl. eug.	0.899	0.899	0.945	0.954	0.927	0.945	0.899	0.899	0.899	0.899	0.899	0.899
Cocconeis pl. li.	0.560	0.624	0.963	0.991	0.917	0.991	0.560	0.486	0.560	0.523	0.560	0.532
Caloneis sch.	0.807	0.807	0.945	0.982	0.945	0.936	0.807	0.807	0.807	0.771	0.807	0.807
Cavinula scu.	0.587	0.670	0.954	0.963	0.927	0.945	0.486	0.514	0.642	0.651	0.642	0.642
Cymbella neo.	0.899	0.899	0.927	0.963	0.945	0.963	0.899	0.899	0.899	0.899	0.899	0.899
Diatoma ang.	0.807	0.807	0.899	0.954	0.853	0.936	0.807	0.807	0.807	0.780	0.807	0.798
Diploneis mau.	0.312	0.450	0.991	1.000	0.991	1.000	0.174	0.128	0.413	0.303	0.385	0.312
Diploneis mod.	0.908	0.908	0.936	0.963	0.945	0.954	0.908	0.908	0.908	0.835	0.908	0.908
Diploneis ov.	0.486	0.541	0.963	0.991	0.982	0.972	0.413	0.376	0.468	0.413	0.477	0.514
Epithemia ad.	0.872	0.872	0.936	0.954	0.945	0.936	0.872	0.872	0.862	0.862	0.872	0.872
Encyonema cae.	0.872	0.872	0.899	0.936	0.890	0.936	0.872	0.872	0.872	0.872	0.872	0.872
Encyonema min.	0.954	0.954	0.982	0.954	0.963	0.963	0.954	0.954	0.954	0.954	0.954	0.954
Encyonopsis mic.	0.826	0.826	0.917	0.936	0.927	0.954	0.826	0.826	0.817	0.798	0.817	0.817
Encyonema sil.	0.890	0.890	0.917	0.945	0.917	0.945	0.890	0.890	0.890	0.881	0.890	0.890
Epithemia so.	0.697	0.697	0.844	0.927	0.853	0.945	0.697	0.642	0.679	0.633	0.697	0.651
Fragilaria cap.	0.679	0.679	0.835	0.963	0.844	0.991	0.679	0.578	0.679	0.651	0.679	0.661
Fragilaria cap. va.	0.945	0.945	0.963	0.954	0.972	0.972	0.945	0.945	0.936	0.936	0.945	0.945
Fallacia och.	0.642	0.679	0.899	0.991	0.881	0.963	0.642	0.596	0.642	0.596	0.642	0.624
Fragilaria par.	0.835	0.844	0.899	0.945	0.908	0.963	0.835	0.817	0.835	0.835	0.835	0.835
Frustulia vul.	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982
Gomphonema cl.	0.945	0.945	0.945	0.954	0.945	0.954	0.945	0.945	0.945	0.945	0.945	0.945
Geissleria dec.	0.468	0.550	0.945	0.991	0.945	1.000	0.450	0.358	0.431	0.385	0.431	0.404
Gomphonema it.	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972
Gomphonema min.	0.780	0.780	0.917	0.972	0.844	0.972	0.780	0.725	0.780	0.761	0.780	0.780
Gomphonema ol. Horn.	0.826	0.826	0.927	0.963	0.936	0.954	0.826	0.826	0.826	0.826	0.826	0.817
Gomphonema par.	0.844	0.844	0.936	0.982	0.917	0.954	0.844	0.844	0.826	0.826	0.844	0.835
Gomphonema pum.	0.798	0.798	0.899	0.945	0.890	0.945	0.798	0.789	0.798	0.752	0.798	0.798
Gomphonema ol.	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982
Gomphonema sar.	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982
Gomphonema ter.	0.899	0.899	0.954	0.972	0.954	0.972	0.899	0.899	0.899	0.890	0.899	0.899
Gyrosigma mac.	0.422	0.578	0.954	0.991	0.972	0.982	0.349	0.358	0.339	0.330	0.376	0.376
Hannea ar.	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954
Hantzschia amp.	0.954	0.954	0.954	0.963	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954
Hippodonta ros.	0.954	0.954	0.954	0.954	0.954	0.963	0.954	0.954	0.954	0.954	0.954	0.954

Table 31: (ctd) Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using micro Matthews correlation coefficient as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Meridion cir. con.	0.936	0.936	0.972	0.963	0.936	0.954	0.936	0.936	0.927	0.936	0.936	0.936
Meridion cir.	0.972	0.972	0.972	0.972	0.972	0.982	0.972	0.972	0.972	0.972	0.972	0.972
Martyana mar.	0.945	0.945	0.963	0.972	0.954	0.945	0.945	0.945	0.945	0.945	0.945	0.945
Nitzschia alp.	0.927	0.927	0.963	0.982	0.972	0.954	0.927	0.927	0.927	0.927	0.927	0.927
Navicula ant.	0.706	0.706	0.872	0.963	0.908	0.954	0.706	0.679	0.697	0.633	0.697	0.661
Navicula cap.	0.706	0.734	0.917	0.963	0.881	0.982	0.706	0.615	0.706	0.651	0.706	0.697
Navicula cry.	0.917	0.917	0.917	0.936	0.917	0.945	0.917	0.917	0.917	0.917	0.917	0.917
Nitzschia dis.	0.917	0.917	0.945	0.963	0.936	0.954	0.917	0.917	0.908	0.908	0.917	0.917
Neidium du.	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.963	0.972	0.972
Navicula gre.	0.936	0.936	0.936	0.945	0.963	0.945	0.936	0.936	0.936	0.936	0.936	0.936
Navicula has.	0.899	0.899	0.917	0.954	0.936	0.954	0.899	0.899	0.899	0.899	0.899	0.899
Navicula krs.	0.339	0.431	0.991	1.000	0.991	0.991	0.239	0.174	0.303	0.257	0.284	0.312
Navicula lan.	0.936	0.936	0.936	0.963	0.936	0.945	0.936	0.936	0.936	0.936	0.936	0.936
Nupela la.	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991
Nitzschia lin.	0.853	0.853	0.881	0.917	0.872	0.927	0.853	0.853	0.853	0.853	0.853	0.853
Navicula pra.	0.486	0.569	0.945	1.000	0.982	1.000	0.339	0.367	0.376	0.330	0.404	0.367
Navicula pre.	0.431	0.550	0.982	0.991	0.991	0.991	0.330	0.367	0.312	0.330	0.367	0.303
Navicula pro.	0.587	0.624	0.972	1.000	0.945	1.000	0.514	0.532	0.541	0.578	0.560	0.587
Nitzschia rec.	0.826	0.826	0.927	0.972	0.881	0.936	0.826	0.826	0.826	0.826	0.826	0.826
Navicula rei.	0.606	0.670	0.936	0.972	0.917	0.982	0.532	0.587	0.532	0.523	0.550	0.532
Navicula rot.	0.413	0.514	0.963	0.972	0.963	0.972	0.394	0.312	0.394	0.404	0.404	0.431
Navicula subh.	0.569	0.606	0.963	0.991	0.972	0.991	0.468	0.468	0.477	0.468	0.505	0.505
Navicula subr.	0.431	0.550	0.954	0.954	0.927	0.954	0.349	0.367	0.404	0.450	0.413	0.468
Nitzschia suba.	0.404	0.477	0.945	0.982	0.982	0.982	0.248	0.330	0.394	0.367	0.358	0.330
Navicula tri.	0.578	0.606	0.917	0.982	0.908	0.972	0.541	0.459	0.541	0.486	0.541	0.514
Navicula vircl.	0.587	0.633	0.954	0.991	0.945	1.000	0.569	0.468	0.560	0.514	0.569	0.550
Navicula virdu.	0.835	0.817	0.936	0.954	0.927	0.954	0.771	0.743	0.807	0.817	0.817	0.826
Orthoseira ros.	0.917	0.917	0.991	0.991	0.991	1.000	0.917	0.917	0.908	0.908	0.917	0.917
Placoneis bal.	0.376	0.514	1.000	0.991	0.991	0.991	0.202	0.358	0.385	0.440	0.330	0.450
Pinnularia bor.	0.872	0.872	0.982	0.982	0.954	0.982	0.872	0.872	0.844	0.872	0.872	0.872
Placoneis min.	0.945	0.945	0.963	0.963	0.954	0.963	0.945	0.945	0.945	0.945	0.945	0.945
Placoneis elg.	0.917	0.917	0.936	0.936	0.945	0.936	0.917	0.917	0.917	0.917	0.917	0.917
Planothidium lan.	0.615	0.615	0.917	0.963	0.881	0.972	0.615	0.578	0.596	0.550	0.615	0.578
Planothidium ros.	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972
Placoneis neo.	0.550	0.615	0.945	0.991	0.945	0.991	0.468	0.459	0.468	0.468	0.505	0.477
Pseudostaurosira bre.	0.239	0.321	1.000	1.000	1.000	1.000	0.193	-0.138	0.183	0.119	0.174	0.220
Pinnularia subc.	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991
Rhoicosphenia abb.	0.670	0.697	0.936	0.991	0.917	0.982	0.670	0.541	0.661	0.642	0.661	0.642
Rhopalodia gib.	0.771	0.771	0.908	0.927	0.899	0.954	0.771	0.771	0.771	0.771	0.761	0.761
Reimeria sin.	0.890	0.890	0.954	0.954	0.927	0.972	0.890	0.890	0.890	0.881	0.890	0.890
Surirella ang.	0.853	0.853	0.927	0.963	0.917	0.963	0.853	0.853	0.853	0.844	0.853	0.853
Surirella min.	0.862	0.862	0.917	0.963	0.927	0.954	0.862	0.862	0.853	0.862	0.862	0.862
Sellaphora perb.	0.431	0.560	0.945	1.000	0.963	0.991	0.376	0.339	0.303	0.321	0.367	0.376
Sellaphora pu.	0.385	0.468	0.963	0.991	0.954	0.991	0.312	0.257	0.312	0.312	0.303	0.312
Stauroneis gra.	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982
Staurosira con. bin.	0.881	0.881	0.954	0.963	0.936	0.945	0.881	0.881	0.881	0.862	0.881	0.881
Staurosira con.	0.248	0.413	1.000	1.000	0.982	0.991	0.110	0.220	0.183	0.229	0.211	0.248
Staurosira con. ven.	0.963	0.963	0.963	0.972	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963
Stauroneis pho.	0.917	0.917	0.927	0.954	0.936	0.945	0.917	0.917	0.917	0.917	0.917	0.917
Staurosirella pin.	0.220	0.394	0.991	0.982	0.972	1.000	0.073	0.046	0.138	0.202	0.183	0.174
Stauroneis sm.	0.963	0.963	0.963	0.972	0.972	0.963	0.963	0.963	0.963	0.963	0.963	0.963
Tryblionella ang.	0.670	0.670	0.872	0.991	0.853	0.982	0.670	0.596	0.670	0.624	0.670	0.670
Tabellaria floc.	0.917	0.917	0.991	0.991	0.991	0.991	0.917	0.917	0.917	0.908	0.917	0.917
Ulnaria ul.	0.899	0.899	0.936	0.982	0.945	0.954	0.899	0.899	0.899	0.890	0.899	0.908

Table 32: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsTop10-nom* dataset, evaluated by using micro Matthews correlation coefficient as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Amphora ped.	0.505	0.596	0.927	0.954	0.945	0.954	0.459	0.413	0.550	0.495	0.532	0.505
Cyclotella jur. nud.	0.560	0.642	0.963	0.963	0.936	0.963	0.450	0.477	0.596	0.550	0.615	0.550
Cyclotella oc.	0.752	0.789	0.982	0.972	0.991	0.982	0.624	0.725	0.798	0.798	0.789	0.771
Cocconeis pl.	0.532	0.596	0.982	0.982	0.982	0.982	0.505	0.477	0.541	0.468	0.523	0.541
Cavinula scu.	0.606	0.651	0.954	0.963	0.936	0.945	0.495	0.486	0.716	0.651	0.651	0.642
Diploneis mau.	0.330	0.450	0.991	1.000	1.000	1.000	0.294	0.128	0.358	0.303	0.358	0.312
Navicula pre.	0.385	0.550	0.991	0.991	0.991	0.991	0.330	0.367	0.303	0.330	0.294	0.303
Navicula rot.	0.431	0.505	0.972	0.972	0.991	0.972	0.394	0.303	0.440	0.404	0.413	0.431
Navicula subr.	0.450	0.550	0.972	0.954	0.936	0.954	0.404	0.367	0.495	0.450	0.477	0.468
Staurosirella pin.	0.239	0.394	0.982	0.982	1.000	1.000	0.055	0.083	0.165	0.202	0.110	0.174

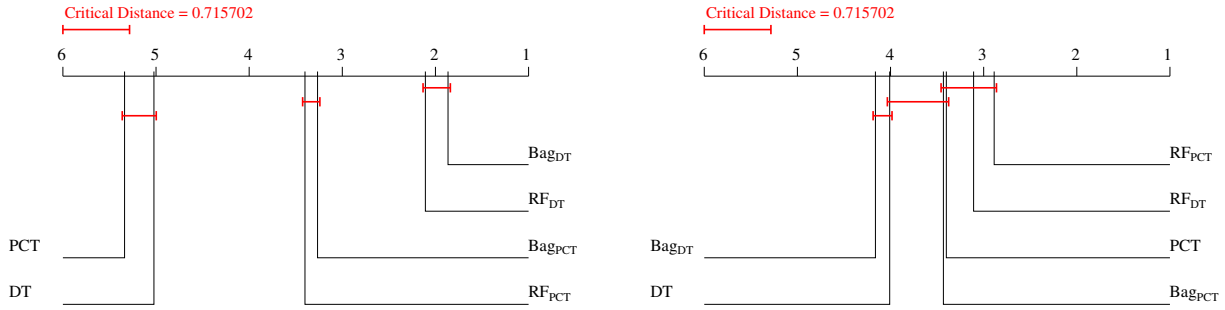
Table 33: Predictive performance of the methods (columns) on all targets (rows) of the *WaterQuality-nom* dataset, evaluated by using micro Matthews correlation coefficient as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Cladophora sp.	0.155	0.349	0.987	0.992	0.991	0.996	0.170	0.277	0.347	0.332	0.330	0.353
Gongrosira inc.	0.466	0.487	0.981	1.000	0.981	1.000	0.466	0.440	0.475	0.417	0.487	0.457
Oedogonium sp.	0.425	0.496	0.975	0.994	0.966	0.985	0.417	0.419	0.502	0.462	0.492	0.491
Stigeoclonium ten.	0.589	0.628	0.964	0.983	0.962	0.983	0.585	0.596	0.630	0.630	0.623	0.626
Melosira var.	0.234	0.391	0.991	0.991	0.989	0.987	0.179	0.287	0.381	0.372	0.385	0.381
Nitzschia pal.	0.447	0.509	0.974	0.981	0.970	0.981	0.440	0.451	0.492	0.487	0.491	0.498
Audouinella ch.	0.517	0.538	0.955	0.987	0.968	0.989	0.519	0.496	0.542	0.526	0.534	0.543
Erpobdella oc.	0.436	0.513	0.975	0.989	0.960	0.985	0.417	0.474	0.466	0.455	0.481	0.462
Gammarus fo.	0.358	0.475	0.989	0.992	0.989	0.994	0.342	0.434	0.438	0.464	0.442	0.479
Baetis rh.	0.379	0.481	0.991	0.996	0.989	0.994	0.362	0.409	0.502	0.525	0.491	0.511
Hydropsyche sp.	0.240	0.347	0.991	0.991	0.981	0.996	0.234	0.294	0.383	0.355	0.402	0.387
Rhyacophila sp.	0.443	0.460	0.979	0.996	0.979	0.996	0.451	0.423	0.489	0.457	0.519	0.470
Simulium sp.	0.266	0.336	0.991	0.996	0.991	0.994	0.266	0.300	0.345	0.351	0.385	0.349
Tubifex sp.	0.498	0.551	0.966	0.992	0.958	0.977	0.494	0.483	0.491	0.496	0.506	0.523

Table 34: Predictive performance of the methods (columns) on all targets (rows) of the *SoilQuality-nom* dataset, evaluated by using micro Matthews correlation coefficient as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

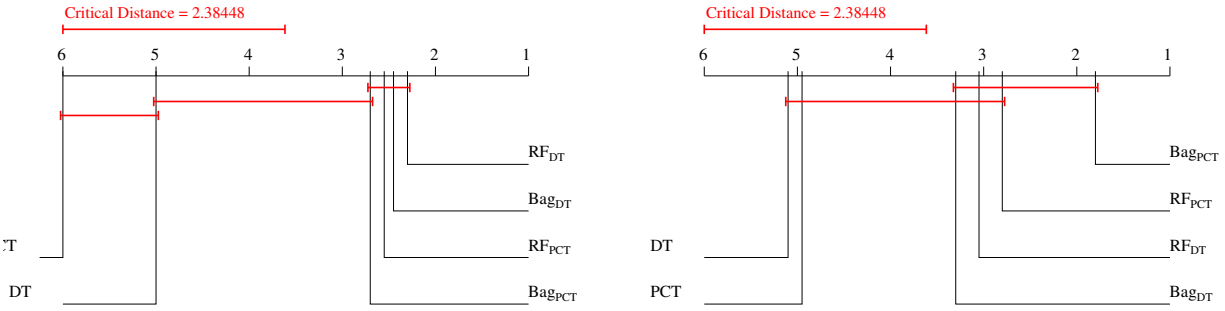
	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Anurida pyg.	0.726	0.751	0.791	0.791	0.783	0.783	0.726	0.735	0.741	0.747	0.752	0.749
Brachystomelle par.	0.629	0.721	0.805	0.805	0.796	0.802	0.627	0.716	0.770	0.765	0.755	0.770
Ceratophysella den.	0.851	0.908	0.915	0.915	0.913	0.912	0.851	0.901	0.901	0.901	0.902	0.905
Ceratophysella suc.	0.849	0.855	0.885	0.885	0.883	0.883	0.849	0.834	0.838	0.841	0.843	0.838
Entomobrya sp.	0.716	0.772	0.817	0.817	0.806	0.814	0.714	0.743	0.764	0.767	0.783	0.775
Folsomia fim.	0.223	0.392	0.620	0.620	0.600	0.608	0.224	0.378	0.511	0.515	0.519	0.510
Folsomia quad.	0.731	0.767	0.861	0.862	0.856	0.855	0.731	0.754	0.820	0.824	0.803	0.803
Folsomia spi.	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.945	0.949	0.951	0.954
Friesea mir.	0.842	0.889	0.920	0.920	0.920	0.920	0.842	0.878	0.913	0.909	0.917	0.916
Heteromurus nit.	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.929	0.930	0.932	0.938
Hypogastrua sp.	0.864	0.887	0.905	0.905	0.903	0.903	0.864	0.889	0.884	0.886	0.897	0.900
Isotoma ang.	0.184	0.494	0.682	0.682	0.664	0.672	0.183	0.469	0.597	0.596	0.587	0.590
Isotoma not.	0.205	0.507	0.683	0.684	0.655	0.672	0.172	0.464	0.603	0.600	0.602	0.609
Isotoma tig.	0.749	0.845	0.882	0.882	0.878	0.878	0.748	0.836	0.858	0.869	0.873	0.876
Isotomiella min.	0.809	0.842	0.867	0.867	0.862	0.859	0.811	0.830	0.838	0.843	0.842	0.835
Isotomodes arm.	0.964	0.964	0.967	0.967	0.964	0.964	0.964	0.964	0.952	0.951	0.962	0.963
Isotomodes bis.	0.949	0.949	0.957	0.957	0.957	0.957	0.949	0.949	0.940	0.947	0.944	0.948
Isotomodes prod.	0.721	0.764	0.824	0.823	0.814	0.821	0.721	0.747	0.779	0.785	0.773	0.784
Isotomurus pal.	0.652	0.772	0.854	0.854	0.842	0.844	0.652	0.744	0.807	0.816	0.807	0.806
Isotomurus sp.	0.972	0.979	0.979	0.977	0.979	0.977	0.972	0.968	0.979	0.976	0.978	0.977
Lepidocyrtus cy.	0.740	0.855	0.874	0.874	0.867	0.872	0.740	0.846	0.849	0.850	0.852	0.852
Lepidocyrtus lan.	0.909	0.932	0.955	0.955	0.955	0.955	0.909	0.933	0.945	0.947	0.953	0.952
Mesaphorura sp.	0.712	0.728	0.808	0.807	0.805	0.805	0.712	0.721	0.761	0.773	0.765	0.770
Neanura fam.	0.956	0.964	0.971	0.971	0.965	0.966	0.943	0.949	0.959	0.960	0.952	0.956
Neelus min.	0.602	0.684	0.755	0.755	0.749	0.749	0.602	0.667	0.710	0.712	0.714	0.713
Orchesella cin.	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998
Orchesella vil.	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997
Protaphorura sp.	0.658	0.736	0.787	0.787	0.774	0.776	0.660	0.735	0.741	0.740	0.745	0.745
Pseudosinella al.	0.714	0.770	0.824	0.824	0.819	0.824	0.704	0.750	0.779	0.780	0.771	0.781
Pseudosinella sex.	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998
Smint sp.	0.310	0.445	0.620	0.619	0.609	0.611	0.281	0.399	0.516	0.520	0.526	0.527
Sminthurinus au.	0.646	0.769	0.849	0.848	0.846	0.844	0.647	0.754	0.789	0.782	0.783	0.802
Sminthurinus el.	0.515	0.552	0.666	0.665	0.657	0.657	0.515	0.535	0.578	0.578	0.601	0.597
Sminthurus vir.	0.897	0.897	0.897	0.897	0.897	0.897	0.897	0.897	0.888	0.891	0.897	0.897
Stenaphorura quad.	0.906	0.906	0.913	0.913	0.913	0.913	0.906	0.906	0.903	0.906	0.907	0.904
Tomocerus fl.	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995
Tomocerus min.	0.992	0.992	0.998	0.998	0.998	0.998	0.992	0.992	0.998	0.998	0.998	0.998
Tomocerus sp.	0.992	0.992	0.996	0.996	0.996	0.996	0.992	0.992	0.996	0.996	0.996	0.994
Willemia sp.	0.479	0.547	0.656	0.656	0.648	0.646	0.479	0.522	0.549	0.552	0.574	0.573

4.1.10. Average rank diagrams for each dataset for the micro Matthews correlation coefficient measure



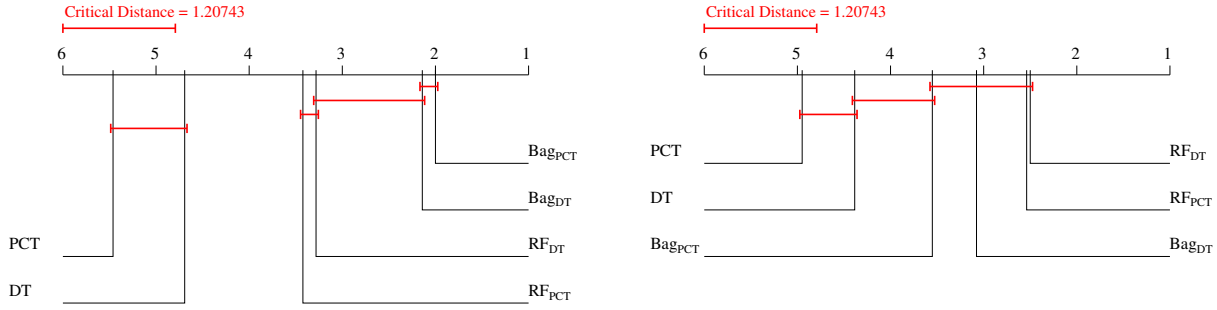
(a) Train (b) Cross-validation

Figure 29: The average rank diagrams for the micro Matthews correlation coefficient evaluation measure on the dataset *DiatomsAll-nom*.



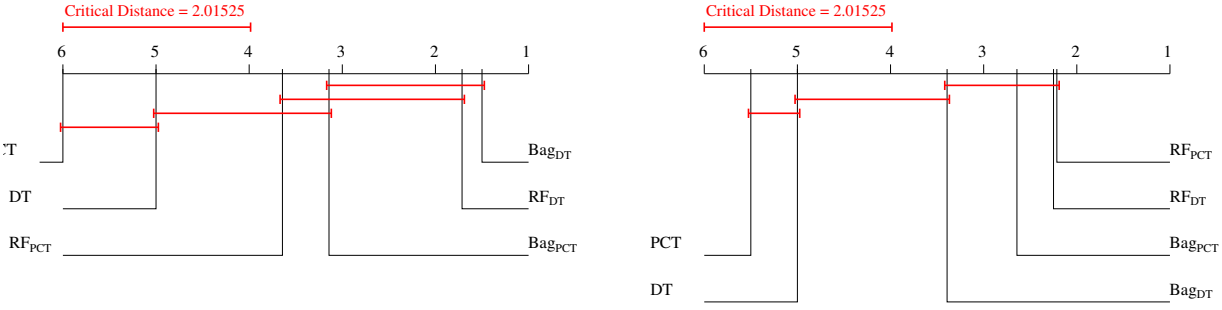
(a) Train (b) Cross-validation

Figure 30: The average rank diagrams for the micro Matthews correlation coefficient evaluation measure on the dataset *DiatomsTop10-nom*.



(a) Train (b) Cross-validation

Figure 31: The average rank diagrams for the micro Matthews correlation coefficient evaluation measure on the dataset *SoilQuality-nom*.



(a) Train (b) Cross-validation

Figure 32: The average rank diagrams for the micro Matthews correlation coefficient evaluation measure on the dataset *WaterQuality-nom*.

4.1.11. Results for the macro balanced accuracy measure

Table 35: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using macro balanced accuracy as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Amphora aeq.	0.500	0.500	0.775	0.950	0.650	0.850	0.500	0.500	0.500	0.500	0.500	0.500
Achnanthidium cl.	0.500	0.567	0.902	0.990	0.882	1.000	0.497	0.464	0.494	0.504	0.497	0.508
Achnanthidium cl. bal.	0.705	0.753	0.952	0.979	0.966	0.993	0.653	0.691	0.650	0.647	0.647	0.654
Achnanthes sp.	0.500	0.500	0.500	0.500	0.500	0.750	0.500	0.500	0.500	0.500	0.500	0.500
Amphora cop.	0.525	0.656	0.987	1.000	0.993	0.993	0.467	0.538	0.554	0.514	0.511	0.514
Amphora fog.	0.500	0.500	0.500	0.714	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Achnanthes lac.	0.500	0.729	0.966	0.983	0.949	0.983	0.496	0.500	0.516	0.487	0.493	0.489
Amphora in.	0.500	0.723	0.870	0.926	0.870	0.944	0.500	0.527	0.500	0.492	0.500	0.495
Achnanthidium min.	0.500	0.500	0.706	0.850	0.735	0.853	0.500	0.500	0.500	0.498	0.500	0.500
Amphora ov.	0.500	0.500	0.786	0.857	0.500	0.786	0.500	0.500	0.500	0.500	0.500	0.500
Amphora ped.	0.673	0.757	0.950	0.964	0.929	0.964	0.638	0.645	0.641	0.660	0.641	0.656
Amphora th.	0.500	0.500	0.765	0.941	0.676	0.912	0.500	0.500	0.500	0.495	0.500	0.500
Aulacoseira gra.	0.500	0.500	0.727	0.932	0.614	0.864	0.500	0.500	0.500	0.520	0.500	0.497
Amphora ven.	0.500	0.500	0.600	0.600	0.700	0.600	0.500	0.500	0.498	0.498	0.500	0.500
Cymbella aff.	0.500	0.500	0.571	0.857	0.571	0.714	0.500	0.500	0.498	0.498	0.500	0.500
Cocconeis dis.	0.500	0.500	0.761	0.957	0.717	0.870	0.500	0.500	0.500	0.528	0.500	0.522
Cymatopleura el.	0.622	0.642	0.821	0.946	0.857	0.875	0.495	0.510	0.497	0.566	0.500	0.536
Cyclotella jur. nud.	0.728	0.776	0.964	0.971	0.935	0.971	0.679	0.672	0.712	0.707	0.712	0.703
Cymbella lan.	0.763	0.732	0.889	0.917	0.889	0.917	0.538	0.551	0.601	0.551	0.500	0.556
Cyclotella men.	0.500	0.500	0.833	0.833	0.889	0.778	0.500	0.500	0.493	0.500	0.500	0.500
Cocconeis neo.	0.500	0.500	0.833	0.833	0.667	0.833	0.500	0.500	0.500	0.500	0.500	0.500
Cyclotella oc.	0.785	0.848	0.946	0.967	0.978	0.978	0.702	0.731	0.748	0.809	0.749	0.760
Cocconeis pl.	0.567	0.702	0.922	0.980	0.922	0.980	0.499	0.565	0.527	0.520	0.507	0.530
Cocconeis pl. eug.	0.500	0.500	0.727	0.773	0.636	0.727	0.500	0.500	0.500	0.500	0.500	0.500
Cocconeis pl. li.	0.500	0.670	0.958	0.990	0.906	0.990	0.500	0.529	0.500	0.526	0.500	0.491
Caloneis sch.	0.500	0.500	0.857	0.952	0.857	0.833	0.500	0.500	0.500	0.490	0.500	0.500
Cavinula scu.	0.713	0.767	0.958	0.967	0.933	0.950	0.657	0.667	0.722	0.720	0.701	0.701
Cymbella neo.	0.500	0.500	0.636	0.818	0.727	0.818	0.500	0.500	0.500	0.500	0.500	0.500
Diatoma ang.	0.500	0.500	0.738	0.881	0.619	0.833	0.500	0.500	0.500	0.492	0.500	0.497
Diploneis mau.	0.660	0.724	0.996	1.000	0.995	1.000	0.590	0.565	0.706	0.651	0.692	0.654
Diploneis mod.	0.500	0.500	0.650	0.800	0.700	0.750	0.500	0.500	0.500	0.481	0.500	0.500
Diploneis ov.	0.590	0.682	0.967	0.992	0.983	0.975	0.539	0.568	0.563	0.549	0.551	0.595
Epithemia ad.	0.500	0.500	0.750	0.821	0.786	0.750	0.500	0.500	0.564	0.498	0.500	0.500
Encyonema cae.	0.500	0.500	0.607	0.750	0.571	0.750	0.500	0.500	0.500	0.500	0.500	0.500
Encyonema min.	0.500	0.500	0.800	0.500	0.600	0.600	0.500	0.500	0.500	0.500	0.500	0.500
Encyonopsis mic.	0.500	0.500	0.763	0.816	0.789	0.868	0.500	0.500	0.497	0.492	0.497	0.497
Encyonema sil.	0.500	0.500	0.625	0.750	0.625	0.750	0.500	0.500	0.500	0.498	0.500	0.500
Epithemia so.	0.500	0.500	0.742	0.879	0.758	0.909	0.500	0.484	0.495	0.481	0.500	0.486
Fragilaria cap.	0.500	0.500	0.743	0.943	0.757	0.986	0.500	0.470	0.500	0.526	0.500	0.518
Fragilaria cap. va.	0.500	0.500	0.667	0.583	0.750	0.750	0.500	0.500	0.498	0.498	0.500	0.500
Fallacia och.	0.500	0.702	0.859	0.987	0.833	0.949	0.500	0.526	0.500	0.506	0.500	0.494
Fragilaria par.	0.500	0.730	0.694	0.833	0.722	0.889	0.500	0.495	0.500	0.576	0.500	0.525
Frustulia vul.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Gomphonema cl.	0.500	0.500	0.500	0.583	0.500	0.583	0.500	0.500	0.500	0.500	0.500	0.500
Geissleria dec.	0.500	0.649	0.948	0.991	0.948	1.000	0.494	0.517	0.498	0.494	0.493	0.500
Gomphonema it.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Gomphonema min.	0.500	0.500	0.812	0.938	0.646	0.938	0.500	0.485	0.500	0.495	0.500	0.500
Gomphonema ol. Horn.	0.500	0.500	0.789	0.895	0.816	0.868	0.500	0.500	0.500	0.500	0.500	0.497
Gomphonema par.	0.500	0.500	0.794	0.941	0.735	0.853	0.500	0.500	0.495	0.495	0.500	0.498
Gomphonema pum.	0.500	0.500	0.750	0.864	0.727	0.864	0.500	0.497	0.500	0.528	0.500	0.540
Gomphonema ol.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Gomphonema sar.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Gomphonema ter.	0.500	0.500	0.773	0.864	0.773	0.864	0.500	0.500	0.500	0.498	0.500	0.500
Gyrosigma mac.	0.614	0.698	0.964	0.997	0.978	0.986	0.571	0.594	0.544	0.564	0.558	0.562
Hannea ar.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Hantzschia amp.	0.500	0.500	0.500	0.600	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Hippodonta ros.	0.500	0.500	0.500	0.500	0.500	0.600	0.500	0.500	0.500	0.500	0.500	0.500

Table 35: (ctd) Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using macro balanced accuracy as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Meridion cir. con.	0.500	0.500	0.786	0.714	0.500	0.643	0.500	0.500	0.498	0.500	0.500	0.500
Meridion cir.	0.500	0.500	0.500	0.500	0.500	0.667	0.500	0.500	0.500	0.500	0.500	0.500
Martyana mar.	0.500	0.500	0.667	0.750	0.583	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Nitzschia alp.	0.500	0.500	0.750	0.875	0.812	0.688	0.500	0.500	0.500	0.500	0.500	0.500
Navicula ant.	0.500	0.603	0.781	0.938	0.844	0.922	0.500	0.492	0.497	0.478	0.497	0.487
Navicula cap.	0.500	0.637	0.859	0.938	0.797	0.969	0.500	0.486	0.500	0.510	0.500	0.510
Navicula cry.	0.500	0.500	0.500	0.611	0.500	0.667	0.500	0.500	0.500	0.500	0.500	0.500
Nitzschia dis.	0.500	0.500	0.667	0.778	0.611	0.722	0.500	0.500	0.498	0.498	0.500	0.500
Neidium du.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.498	0.500	0.500
Navicula gre.	0.500	0.500	0.500	0.571	0.714	0.571	0.500	0.500	0.500	0.500	0.500	0.500
Navicula has.	0.500	0.500	0.591	0.773	0.682	0.773	0.500	0.500	0.500	0.500	0.500	0.500
Navicula krs.	0.648	0.659	0.994	1.000	0.994	0.994	0.565	0.545	0.602	0.583	0.592	0.611
Navicula lan.	0.500	0.500	0.500	0.714	0.500	0.571	0.500	0.500	0.500	0.500	0.500	0.500
Nupela la.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Nitzschia lin.	0.500	0.500	0.594	0.719	0.562	0.750	0.500	0.500	0.500	0.500	0.500	0.500
Navicula pra.	0.685	0.666	0.949	1.000	0.983	1.000	0.512	0.527	0.509	0.547	0.508	0.506
Navicula pre.	0.696	0.751	0.989	0.994	0.994	0.994	0.642	0.656	0.637	0.644	0.654	0.619
Navicula pro.	0.575	0.602	0.968	1.000	0.936	1.000	0.498	0.612	0.507	0.572	0.497	0.552
Nitzschia rec.	0.500	0.500	0.789	0.921	0.658	0.816	0.500	0.500	0.500	0.524	0.500	0.524
Navicula rei.	0.634	0.654	0.929	0.969	0.908	0.980	0.559	0.621	0.538	0.542	0.522	0.538
Navicula rot.	0.712	0.756	0.980	0.985	0.980	0.985	0.703	0.653	0.696	0.701	0.699	0.713
Navicula subh.	0.629	0.764	0.959	0.990	0.969	0.990	0.481	0.618	0.476	0.517	0.492	0.507
Navicula subr.	0.618	0.724	0.967	0.967	0.947	0.967	0.584	0.597	0.608	0.660	0.608	0.658
Nitzschia suba.	0.711	0.724	0.968	0.989	0.989	0.989	0.609	0.659	0.693	0.667	0.670	0.646
Navicula tri.	0.500	0.636	0.902	0.978	0.891	0.967	0.488	0.494	0.488	0.487	0.488	0.488
Navicula vircl.	0.607	0.613	0.944	0.989	0.933	1.000	0.511	0.520	0.508	0.502	0.494	0.497
Navicula virdu.	0.707	0.500	0.825	0.875	0.800	0.875	0.532	0.480	0.587	0.522	0.500	0.525
Orthoseira ros.	0.500	0.500	0.944	0.944	0.944	1.000	0.500	0.500	0.498	0.498	0.500	0.500
Placoneis bal.	0.683	0.774	1.000	0.996	0.996	0.995	0.596	0.683	0.692	0.723	0.663	0.724
Pinnularia bor.	0.500	0.500	0.929	0.929	0.821	0.929	0.500	0.500	0.493	0.500	0.500	0.500
Placoneis min.	0.500	0.500	0.667	0.667	0.583	0.667	0.500	0.500	0.500	0.500	0.500	0.500
Placoneis elg.	0.500	0.500	0.611	0.611	0.667	0.611	0.500	0.500	0.500	0.500	0.500	0.500
Planothidium lan.	0.500	0.500	0.893	0.952	0.845	0.964	0.500	0.489	0.494	0.480	0.500	0.489
Planothidium ros.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Placoneis neo.	0.576	0.681	0.950	0.991	0.943	0.991	0.523	0.546	0.530	0.523	0.510	0.507
Pseudostaurosira bre.	0.560	0.615	1.000	1.000	1.000	1.000	0.537	0.405	0.544	0.514	0.529	0.567
Pinnularia subc.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Rhoicosphenia abb.	0.500	0.620	0.903	0.986	0.875	0.972	0.500	0.484	0.497	0.514	0.497	0.503
Rhopalodia gib.	0.500	0.500	0.800	0.840	0.780	0.900	0.500	0.500	0.517	0.517	0.497	0.497
Reimeria sin.	0.500	0.500	0.792	0.792	0.667	0.875	0.500	0.500	0.500	0.498	0.500	0.500
Surirella ang.	0.500	0.500	0.750	0.875	0.719	0.875	0.500	0.500	0.500	0.498	0.500	0.500
Surirella min.	0.500	0.500	0.700	0.867	0.733	0.833	0.500	0.500	0.498	0.500	0.500	0.500
Sellaphora perb.	0.590	0.701	0.955	1.000	0.970	0.992	0.511	0.562	0.489	0.529	0.503	0.541
Sellaphora pu.	0.597	0.632	0.972	0.993	0.965	0.993	0.523	0.506	0.519	0.548	0.501	0.534
Stauroneis gra.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Staurosira con. bin.	0.500	0.500	0.808	0.846	0.731	0.769	0.500	0.500	0.500	0.495	0.500	0.500
Staurosira con.	0.590	0.673	1.000	1.000	0.988	0.994	0.510	0.537	0.532	0.565	0.526	0.563
Staurosira con. ven.	0.500	0.500	0.500	0.625	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Stauroneis pho.	0.500	0.500	0.556	0.722	0.611	0.667	0.500	0.500	0.500	0.500	0.500	0.500
Staurosirella pin.	0.617	0.707	0.995	0.989	0.984	1.000	0.540	0.518	0.548	0.589	0.568	0.568
Stauroneis sm.	0.500	0.500	0.500	0.625	0.625	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Tryblionella ang.	0.500	0.500	0.806	0.986	0.778	0.972	0.500	0.478	0.500	0.486	0.500	0.500
Tabellaria floc.	0.500	0.500	0.944	0.944	0.944	0.944	0.500	0.500	0.553	0.498	0.500	0.500
Ulnaria ul.	0.500	0.500	0.682	0.909	0.727	0.773	0.500	0.500	0.500	0.541	0.500	0.545

Table 36: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsTop10-nom* dataset, evaluated by using macro balanced accuracy as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Amphora ped.	0.682	0.757	0.943	0.964	0.957	0.964	0.639	0.637	0.680	0.660	0.658	0.656
Cyclotella jur. nud.	0.656	0.776	0.971	0.971	0.949	0.971	0.616	0.669	0.728	0.707	0.727	0.703
Cyclotella oc.	0.722	0.766	0.978	0.967	0.989	0.978	0.674	0.738	0.809	0.809	0.782	0.760
Cocconeis pl.	0.500	0.609	0.980	0.980	0.980	0.980	0.491	0.523	0.537	0.520	0.497	0.530
Cavinula scu.	0.657	0.704	0.958	0.967	0.942	0.950	0.619	0.621	0.773	0.720	0.709	0.701
Diploneis mau.	0.665	0.724	0.995	1.000	1.000	1.000	0.647	0.565	0.678	0.651	0.676	0.654
Navicula pre.	0.675	0.751	0.994	0.994	0.994	0.994	0.648	0.656	0.631	0.644	0.619	0.619
Navicula rot.	0.716	0.744	0.985	0.985	0.995	0.985	0.698	0.649	0.720	0.701	0.701	0.713
Navicula subr.	0.613	0.724	0.980	0.967	0.953	0.967	0.589	0.597	0.671	0.660	0.658	0.658
Staurosirella pin.	0.605	0.707	0.989	0.989	1.000	1.000	0.525	0.533	0.566	0.589	0.536	0.568

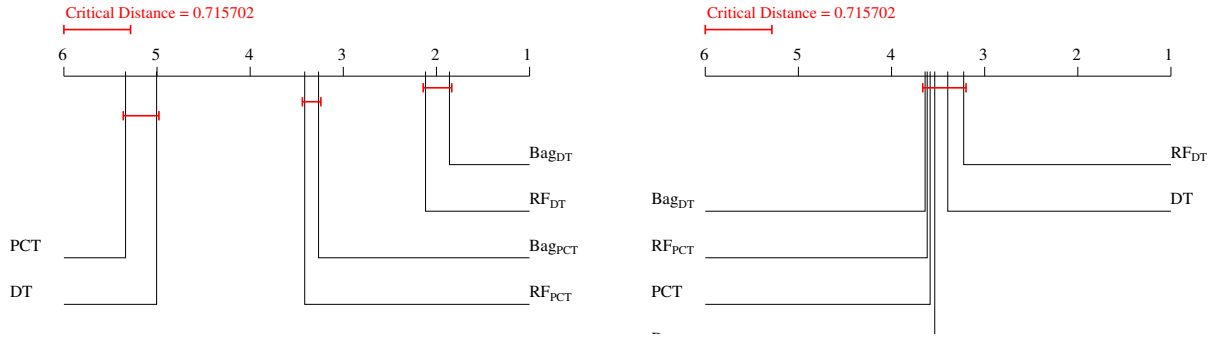
Table 37: Predictive performance of the methods (columns) on all targets (rows) of the *WaterQuality-nom* dataset, evaluated by using macro balanced accuracy as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Cladophora sp.	0.536	0.646	0.993	0.996	0.995	0.998	0.564	0.620	0.662	0.656	0.652	0.666
Gongrosira inc.	0.500	0.525	0.982	1.000	0.982	1.000	0.500	0.510	0.531	0.512	0.534	0.529
Oedogonium sp.	0.500	0.626	0.979	0.995	0.970	0.987	0.525	0.584	0.632	0.618	0.612	0.634
Stigeoclonium ten.	0.500	0.587	0.956	0.979	0.954	0.979	0.506	0.572	0.600	0.627	0.584	0.614
Melosira var.	0.628	0.694	0.995	0.995	0.994	0.994	0.596	0.648	0.690	0.685	0.691	0.690
Nitzschia pal.	0.723	0.750	0.986	0.990	0.984	0.990	0.716	0.718	0.734	0.733	0.734	0.738
Audouinella ch.	0.572	0.550	0.954	0.987	0.968	0.989	0.565	0.526	0.567	0.575	0.557	0.579
Erpobdella oc.	0.500	0.597	0.978	0.991	0.965	0.987	0.507	0.607	0.610	0.618	0.615	0.617
Gammarus fo.	0.653	0.704	0.994	0.995	0.995	0.997	0.638	0.681	0.685	0.709	0.685	0.716
Baetis rh.	0.553	0.669	0.993	0.998	0.991	0.996	0.538	0.623	0.664	0.696	0.650	0.684
Hydropsyche sp.	0.633	0.691	0.995	0.995	0.989	0.998	0.622	0.661	0.687	0.671	0.698	0.688
Rhyacophila sp.	0.655	0.638	0.984	0.997	0.984	0.997	0.640	0.618	0.661	0.658	0.680	0.663
Simulium sp.	0.500	0.554	0.994	0.998	0.994	0.996	0.500	0.539	0.596	0.611	0.614	0.609
Tubifex sp.	0.625	0.683	0.971	0.995	0.967	0.982	0.624	0.639	0.633	0.657	0.644	0.672

Table 38: Predictive performance of the methods (columns) on all targets (rows) of the *SoilQuality-nom* dataset, evaluated by using macro balanced accuracy as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

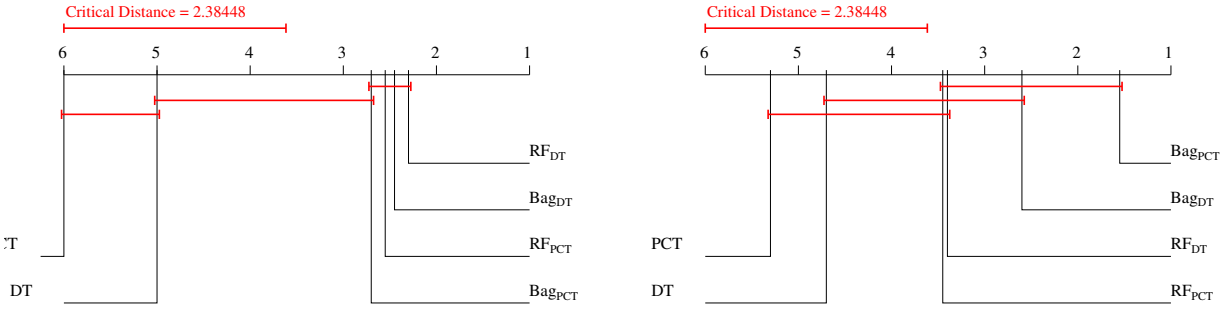
	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Anurida pyg.	0.500	0.586	0.735	0.710	0.687	0.668	0.500	0.555	0.675	0.675	0.653	0.635
Brachystomelle par.	0.660	0.779	0.845	0.840	0.830	0.836	0.658	0.771	0.806	0.807	0.792	0.806
Ceratophysella den.	0.500	0.814	0.841	0.825	0.837	0.821	0.500	0.777	0.815	0.812	0.812	0.819
Ceratophysella suc.	0.500	0.598	0.713	0.685	0.668	0.662	0.500	0.546	0.650	0.651	0.614	0.597
Entomobrya sp.	0.659	0.669	0.768	0.764	0.727	0.750	0.651	0.647	0.744	0.739	0.719	0.720
Folsomia fim.	0.611	0.693	0.810	0.810	0.800	0.804	0.612	0.687	0.755	0.757	0.759	0.755
Folsomia quad.	0.681	0.861	0.871	0.885	0.871	0.869	0.681	0.816	0.830	0.836	0.804	0.805
Folsomia spi.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.520	0.510	0.499	0.500
Friesea mir.	0.500	0.786	0.821	0.806	0.806	0.806	0.500	0.789	0.825	0.815	0.826	0.823
Heteromurus nit.	0.500	0.500	0.526	0.526	0.500	0.500	0.500	0.500	0.496	0.497	0.497	0.499
Hypogastrua sp.	0.500	0.597	0.694	0.694	0.683	0.683	0.500	0.630	0.698	0.688	0.663	0.682
Isotoma ang.	0.593	0.750	0.841	0.841	0.832	0.836	0.592	0.737	0.798	0.798	0.794	0.795
Isotoma not.	0.554	0.731	0.835	0.838	0.817	0.830	0.526	0.714	0.795	0.794	0.791	0.797
Isotoma tig.	0.820	0.882	0.920	0.920	0.916	0.916	0.820	0.880	0.907	0.916	0.914	0.915
Isotomiella min.	0.500	0.644	0.771	0.778	0.734	0.716	0.515	0.633	0.722	0.728	0.716	0.690
Isotomodes arm.	0.500	0.500	0.711	0.711	0.500	0.500	0.500	0.500	0.567	0.511	0.513	0.514
Isotomodes bis.	0.500	0.500	0.638	0.590	0.638	0.590	0.500	0.500	0.654	0.646	0.635	0.636
Isotomodes prod.	0.564	0.625	0.765	0.787	0.765	0.775	0.564	0.652	0.753	0.760	0.728	0.730
Isotomurus pal.	0.618	0.820	0.863	0.855	0.844	0.840	0.617	0.770	0.815	0.827	0.807	0.804
Isotomurus sp.	0.500	0.830	0.830	0.629	0.830	0.629	0.500	0.517	0.830	0.629	0.666	0.793
Lepidocyrtus cy.	0.691	0.865	0.890	0.890	0.886	0.879	0.691	0.851	0.859	0.861	0.871	0.867
Lepidocyrtus lan.	0.500	0.674	0.820	0.820	0.810	0.810	0.500	0.679	0.780	0.780	0.798	0.798
Mesaphorura sp.	0.500	0.548	0.767	0.742	0.722	0.722	0.500	0.541	0.709	0.696	0.673	0.673
Neanura fam.	0.500	0.752	0.799	0.799	0.764	0.662	0.542	0.600	0.739	0.740	0.647	0.591
Neelus min.	0.638	0.723	0.815	0.817	0.807	0.809	0.638	0.734	0.790	0.787	0.787	0.787
Orchesella cin.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Orchesella vil.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Protaphorura sp.	0.634	0.745	0.777	0.777	0.778	0.772	0.631	0.775	0.752	0.753	0.761	0.754
Pseudosinella al.	0.645	0.687	0.809	0.802	0.752	0.775	0.582	0.648	0.751	0.756	0.711	0.711
Pseudosinella sex.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Smint. sp.	0.668	0.690	0.804	0.805	0.800	0.801	0.634	0.667	0.751	0.751	0.755	0.757
Sminthurinus au.	0.853	0.866	0.877	0.877	0.885	0.882	0.853	0.863	0.839	0.835	0.841	0.848
Sminthurinus el.	0.500	0.547	0.721	0.711	0.697	0.699	0.500	0.549	0.664	0.665	0.656	0.658
Sminthurus vir.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.498	0.498	0.500	0.500
Stenaphorura quad.	0.500	0.500	0.596	0.570	0.570	0.570	0.500	0.500	0.567	0.568	0.553	0.526
Tomocerus fl.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Tomocerus min.	0.500	0.500	0.999	0.999	0.999	0.999	0.500	0.500	0.999	0.999	0.999	0.999
Tomocerus sp.	0.500	0.500	0.937	0.937	0.937	0.937	0.500	0.500	0.937	0.937	0.937	0.812
Willemia sp.	0.556	0.643	0.756	0.756	0.745	0.744	0.556	0.637	0.699	0.702	0.707	0.706

4.1.12. Average rank diagrams for each dataset for the macro balanced accuracy measure



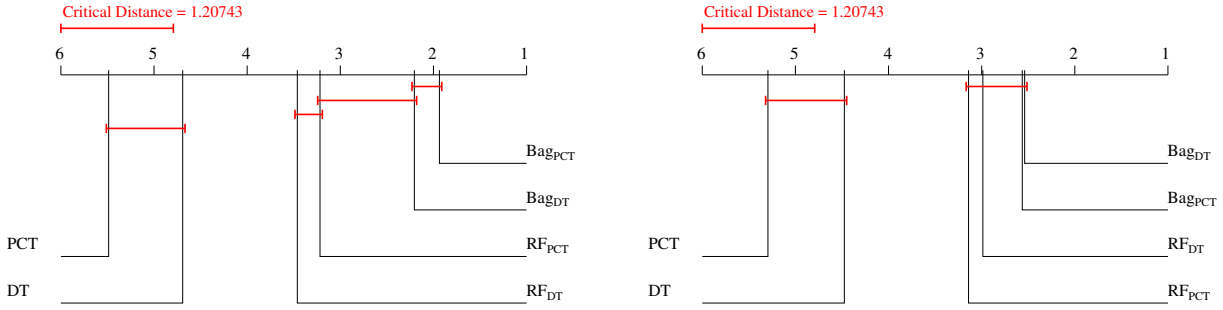
(a) Train (b) Cross-validation

Figure 33: The average rank diagrams for the macro balanced accuracy evaluation measure on the dataset *DiatomsAll-nom*.



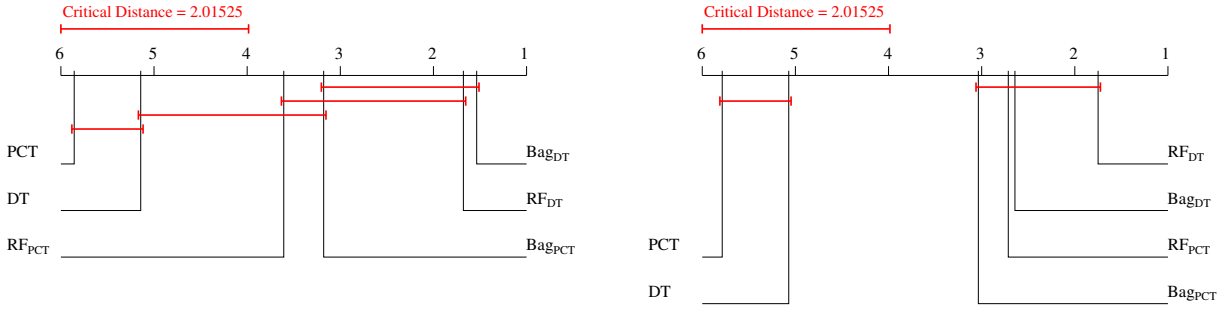
(a) Train (b) Cross-validation

Figure 34: The average rank diagrams for the macro balanced accuracy evaluation measure on the dataset *DiatomsTop10-nom*.



(a) Train (b) Cross-validation

Figure 35: The average rank diagrams for the macro balanced accuracy evaluation measure on the dataset *SoilQuality-nom*.



(a) Train (b) Cross-validation

Figure 36: The average rank diagrams for the macro balanced accuracy evaluation measure on the dataset *WaterQuality-nom*.

4.1.13. Results for the macro precision measure

Table 39: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using macro precision as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Amphora aeq.	0.454	0.454	0.978	0.995	0.967	0.985	0.454	0.454	0.454	0.454	0.454	0.454
Achnanthidium cl.	0.383	0.677	0.972	0.997	0.966	1.000	0.382	0.376	0.382	0.509	0.382	0.551
Achnanthidium cl. bal.	0.711	0.758	0.977	0.990	0.983	0.987	0.662	0.705	0.671	0.685	0.703	0.691
Achnanthes sp.	0.491	0.491	0.491	0.491	0.491	0.995	0.491	0.491	0.491	0.491	0.491	0.491
Amphora cop.	0.584	0.683	0.993	1.000	0.997	0.997	0.430	0.547	0.600	0.525	0.531	0.528
Amphora fog.	0.484	0.484	0.484	0.991	0.484	0.484	0.484	0.484	0.484	0.484	0.484	0.484
Achnanthes lac.	0.365	0.700	0.988	0.994	0.982	0.994	0.489	0.500	0.545	0.478	0.447	0.476
Amphora in.	0.438	0.716	0.982	0.990	0.982	0.992	0.438	0.548	0.438	0.437	0.438	0.438
Achnanthidium min.	0.461	0.461	0.976	0.949	0.979	0.988	0.461	0.461	0.461	0.461	0.461	0.461
Amphora ov.	0.484	0.484	0.993	0.995	0.484	0.993	0.484	0.484	0.484	0.484	0.484	0.484
Amphora ped.	0.793	0.770	0.977	0.984	0.968	0.984	0.714	0.654	0.758	0.720	0.758	0.736
Amphora th.	0.461	0.461	0.981	0.995	0.974	0.993	0.461	0.461	0.461	0.461	0.461	0.461
Aulacoseira gra.	0.450	0.450	0.971	0.992	0.960	0.985	0.450	0.450	0.450	0.701	0.450	0.449
Amphora ven.	0.489	0.489	0.991	0.991	0.993	0.991	0.489	0.489	0.488	0.488	0.489	0.489
Cymbella aff.	0.484	0.484	0.986	0.995	0.986	0.991	0.484	0.484	0.484	0.484	0.484	0.484
Cocconeis dis.	0.447	0.447	0.973	0.995	0.969	0.985	0.447	0.447	0.447	0.575	0.447	0.949
Cymatopleura el.	0.700	0.734	0.975	0.992	0.980	0.982	0.435	0.562	0.435	0.777	0.436	0.940
Cyclotella jur. nud.	0.783	0.799	0.984	0.987	0.972	0.987	0.708	0.702	0.801	0.747	0.818	0.749
Cymbella lan.	0.793	0.759	0.990	0.993	0.990	0.993	0.573	0.557	0.717	0.713	0.459	0.963
Cyclotella men.	0.479	0.479	0.993	0.993	0.995	0.991	0.479	0.479	0.479	0.479	0.479	0.479
Cocconeis neo.	0.493	0.493	0.998	0.998	0.995	0.998	0.493	0.493	0.493	0.493	0.493	0.493
Cyclotella oc.	0.772	0.848	0.986	0.991	0.994	0.994	0.693	0.762	0.822	0.873	0.871	0.875
Cocconeis pl.	0.677	0.711	0.977	0.994	0.977	0.994	0.494	0.581	0.638	0.545	0.634	0.674
Cocconeis pl. eug.	0.475	0.475	0.986	0.988	0.981	0.986	0.475	0.475	0.475	0.475	0.475	0.475
Cocconeis pl. li.	0.390	0.727	0.989	0.997	0.975	0.997	0.390	0.554	0.390	0.573	0.390	0.388
Caloneis sch.	0.452	0.452	0.985	0.995	0.985	0.983	0.452	0.452	0.452	0.451	0.452	0.452
Cavinula scu.	0.744	0.802	0.985	0.988	0.976	0.982	0.673	0.691	0.801	0.818	0.828	0.828
Cymbella neo.	0.475	0.475	0.981	0.991	0.986	0.991	0.475	0.475	0.475	0.475	0.475	0.475
Diatoma ang.	0.452	0.452	0.974	0.988	0.962	0.983	0.452	0.452	0.452	0.451	0.452	0.452
Diploneis mau.	0.673	0.725	0.995	1.000	0.996	1.000	0.595	0.565	0.706	0.651	0.693	0.657
Diploneis mod.	0.477	0.477	0.984	0.991	0.986	0.988	0.477	0.477	0.477	0.476	0.477	0.477
Diploneis ov.	0.671	0.711	0.988	0.997	0.994	0.991	0.579	0.584	0.651	0.588	0.681	0.717
Epithemia ad.	0.468	0.468	0.983	0.988	0.986	0.983	0.468	0.468	0.672	0.468	0.468	0.468
Encyonema cae.	0.468	0.468	0.974	0.983	0.972	0.983	0.468	0.468	0.468	0.468	0.468	0.468
Encyonema min.	0.489	0.489	0.995	0.489	0.991	0.991	0.489	0.489	0.489	0.489	0.489	0.489
Encyonopsis mic.	0.456	0.456	0.978	0.983	0.981	0.988	0.456	0.456	0.456	0.456	0.456	0.456
Encyonema sil.	0.472	0.472	0.979	0.986	0.979	0.986	0.472	0.472	0.472	0.472	0.472	0.472
Epithemia so.	0.424	0.424	0.958	0.979	0.960	0.984	0.424	0.422	0.424	0.422	0.424	0.423
Fragilaria cap.	0.420	0.420	0.955	0.989	0.958	0.997	0.420	0.415	0.420	0.590	0.420	0.589
Fragilaria cap. va.	0.486	0.486	0.991	0.988	0.993	0.993	0.486	0.486	0.486	0.486	0.486	0.486
Fallacia och.	0.411	0.725	0.971	0.997	0.966	0.989	0.411	0.568	0.411	0.523	0.411	0.410
Fragilaria par.	0.459	0.742	0.974	0.985	0.976	0.990	0.459	0.458	0.459	0.715	0.459	0.711
Frustulia vul.	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495
Gomphonema cl.	0.486	0.486	0.486	0.988	0.486	0.988	0.486	0.486	0.486	0.486	0.486	0.486
Geissleria dec.	0.367	0.716	0.982	0.997	0.982	1.000	0.366	0.527	0.492	0.483	0.449	0.500
Gomphonema it.	0.493	0.493	0.493	0.493	0.493	0.493	0.493	0.493	0.493	0.493	0.493	0.493
Gomphonema min.	0.445	0.445	0.978	0.992	0.960	0.992	0.445	0.443	0.445	0.444	0.445	0.445
Gomphonema ol. Horn.	0.456	0.456	0.981	0.990	0.983	0.988	0.456	0.456	0.456	0.456	0.456	0.456
Gomphonema par.	0.461	0.461	0.983	0.995	0.979	0.988	0.461	0.461	0.461	0.461	0.461	0.461
Gomphonema pum.	0.450	0.450	0.973	0.985	0.971	0.985	0.450	0.449	0.450	0.563	0.450	0.703
Gomphonema ol.	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495
Gomphonema sar.	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495
Gomphonema ter.	0.475	0.475	0.988	0.993	0.988	0.993	0.475	0.475	0.475	0.475	0.475	0.475
Gyrosigma mac.	0.658	0.791	0.984	0.993	0.990	0.993	0.599	0.613	0.579	0.586	0.615	0.616
Hannea ar.	0.489	0.489	0.489	0.489	0.489	0.489	0.489	0.489	0.489	0.489	0.489	0.489
Hantzschia amp.	0.489	0.489	0.489	0.991	0.489	0.489	0.489	0.489	0.489	0.489	0.489	0.489
Hippodonta ros.	0.489	0.489	0.489	0.489	0.489	0.991	0.489	0.489	0.489	0.489	0.489	0.489

Table 39: (ctd) Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using macro precision as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Meridion cir. con.	0.484	0.484	0.993	0.991	0.484	0.988	0.484	0.484	0.484	0.484	0.484	0.484
Meridion cir.	0.493	0.493	0.493	0.493	0.493	0.995	0.493	0.493	0.493	0.493	0.493	0.493
Martyana mar.	0.486	0.486	0.991	0.993	0.988	0.486	0.486	0.486	0.486	0.486	0.486	0.486
Nitzschia alp.	0.482	0.482	0.991	0.995	0.993	0.988	0.482	0.482	0.482	0.482	0.482	0.482
Navicula ant.	0.427	0.691	0.965	0.989	0.974	0.987	0.427	0.426	0.426	0.424	0.426	0.425
Navicula cap.	0.427	0.739	0.977	0.989	0.967	0.995	0.427	0.466	0.427	0.528	0.427	0.595
Navicula cry.	0.479	0.479	0.479	0.984	0.479	0.986	0.479	0.479	0.479	0.479	0.479	0.479
Nitzschia dis.	0.479	0.479	0.986	0.991	0.984	0.988	0.479	0.479	0.479	0.479	0.479	0.479
Neidium du.	0.493	0.493	0.493	0.493	0.493	0.493	0.493	0.493	0.493	0.493	0.493	0.493
Navicula gre.	0.484	0.484	0.484	0.986	0.991	0.986	0.484	0.484	0.484	0.484	0.484	0.484
Navicula has.	0.475	0.475	0.979	0.988	0.984	0.988	0.475	0.475	0.475	0.475	0.475	0.475
Navicula krs.	0.654	0.750	0.996	1.000	0.996	0.996	0.591	0.553	0.636	0.604	0.623	0.640
Navicula lan.	0.484	0.484	0.484	0.991	0.484	0.986	0.484	0.484	0.484	0.484	0.484	0.484
Nupela la.	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498
Nitzschia lin.	0.463	0.463	0.970	0.979	0.968	0.981	0.463	0.463	0.463	0.463	0.463	0.463
Navicula pra.	0.678	0.737	0.982	1.000	0.994	1.000	0.519	0.543	0.519	0.554	0.523	0.512
Navicula pre.	0.703	0.772	0.992	0.996	0.996	0.996	0.648	0.669	0.640	0.649	0.669	0.632
Navicula pro.	0.687	0.755	0.991	1.000	0.983	1.000	0.492	0.637	0.536	0.670	0.392	0.701
Nitzschia rec.	0.456	0.456	0.981	0.993	0.969	0.983	0.456	0.456	0.456	0.708	0.456	0.708
Navicula rei.	0.722	0.838	0.980	0.991	0.975	0.994	0.624	0.700	0.609	0.601	0.642	0.609
Navicula rot.	0.715	0.756	0.983	0.988	0.983	0.988	0.705	0.654	0.696	0.701	0.700	0.714
Navicula subh.	0.680	0.726	0.988	0.997	0.991	0.997	0.430	0.618	0.383	0.534	0.458	0.525
Navicula subr.	0.708	0.759	0.983	0.983	0.974	0.983	0.626	0.641	0.677	0.697	0.690	0.717
Nitzschia suba.	0.704	0.729	0.975	0.992	0.992	0.992	0.609	0.655	0.688	0.670	0.668	0.650
Navicula tri.	0.394	0.696	0.975	0.994	0.973	0.991	0.393	0.489	0.393	0.464	0.393	0.448
Navicula vircl.	0.667	0.733	0.986	0.997	0.983	1.000	0.565	0.530	0.541	0.504	0.396	0.480
Navicula virdu.	0.754	0.454	0.983	0.988	0.981	0.988	0.568	0.452	0.684	0.706	0.454	0.956
Orthoseira ros.	0.479	0.479	0.998	0.998	0.998	1.000	0.479	0.479	0.479	0.479	0.479	0.479
Placoneis bal.	0.683	0.780	1.000	0.995	0.995	0.996	0.595	0.680	0.689	0.720	0.661	0.721
Pinnularia bor.	0.468	0.468	0.995	0.995	0.988	0.995	0.468	0.468	0.467	0.468	0.468	0.468
Placoneis min.	0.486	0.486	0.991	0.991	0.988	0.991	0.486	0.486	0.486	0.486	0.486	0.486
Placoneis elg.	0.479	0.479	0.984	0.984	0.986	0.984	0.479	0.479	0.479	0.479	0.479	0.479
Planothidium lan.	0.404	0.404	0.976	0.989	0.966	0.992	0.404	0.402	0.403	0.400	0.404	0.402
Planothidium ros.	0.493	0.493	0.493	0.493	0.493	0.493	0.493	0.493	0.493	0.493	0.493	0.493
Placoneis neo.	0.706	0.747	0.975	0.997	0.982	0.997	0.560	0.580	0.569	0.560	0.580	0.530
Pseudostaurosira bre.	0.592	0.647	1.000	1.000	1.000	1.000	0.556	0.404	0.556	0.517	0.543	0.581
Pinnularia subc.	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498
Rhoicosphenia abb.	0.417	0.729	0.981	0.997	0.976	0.995	0.417	0.471	0.417	0.562	0.417	0.518
Rhopalodia gib.	0.443	0.443	0.975	0.980	0.973	0.987	0.443	0.443	0.694	0.694	0.442	0.442
Reimeria sin.	0.472	0.472	0.988	0.988	0.981	0.993	0.472	0.472	0.472	0.472	0.472	0.472
Surirella ang.	0.463	0.463	0.981	0.990	0.979	0.990	0.463	0.463	0.463	0.463	0.463	0.463
Surirella min.	0.466	0.466	0.979	0.990	0.981	0.988	0.466	0.466	0.465	0.466	0.466	0.466
Sellaphora perb.	0.652	0.747	0.981	1.000	0.987	0.997	0.551	0.581	0.471	0.547	0.516	0.587
Sellaphora pu.	0.637	0.714	0.987	0.997	0.984	0.997	0.551	0.511	0.546	0.574	0.504	0.562
Stauroneis gra.	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495
Staurosira con. bin.	0.470	0.470	0.988	0.990	0.983	0.986	0.470	0.470	0.470	0.470	0.470	0.470
Staurosira con.	0.594	0.686	1.000	1.000	0.993	0.996	0.511	0.555	0.540	0.575	0.543	0.581
Staurosira con. ven.	0.491	0.491	0.491	0.993	0.491	0.491	0.491	0.491	0.491	0.491	0.491	0.491
Stauroneis pho.	0.479	0.479	0.982	0.988	0.984	0.986	0.479	0.479	0.479	0.479	0.479	0.479
Staurosirella pin.	0.615	0.704	0.996	0.992	0.988	1.000	0.539	0.518	0.552	0.590	0.576	0.572
Stauroneis sm.	0.491	0.491	0.491	0.993	0.993	0.491	0.491	0.491	0.491	0.491	0.491	0.491
Tryblionella ang.	0.417	0.417	0.964	0.997	0.960	0.995	0.417	0.414	0.417	0.415	0.417	0.417
Tabellaria floc.	0.479	0.479	0.998	0.998	0.998	0.998	0.479	0.479	0.731	0.479	0.479	0.479
Ulnaria ul.	0.475	0.475	0.984	0.995	0.986	0.988	0.475	0.475	0.475	0.643	0.475	0.977

Table 40: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsTop10-nom* dataset, evaluated by using macro precision as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Amphora ped.	0.718	0.770	0.974	0.984	0.981	0.984	0.691	0.656	0.779	0.720	0.783	0.736
Cyclotella jur. nud.	0.858	0.799	0.987	0.987	0.978	0.987	0.686	0.696	0.783	0.747	0.810	0.749
Cyclotella oc.	0.892	0.908	0.994	0.991	0.997	0.994	0.715	0.816	0.873	0.873	0.885	0.875
Cocconeis pl.	0.383	0.747	0.994	0.994	0.994	0.994	0.381	0.554	0.668	0.545	0.382	0.674
Cavinula scu.	0.832	0.843	0.985	0.988	0.979	0.982	0.676	0.668	0.856	0.818	0.833	0.828
Diploneis mau.	0.665	0.725	0.996	1.000	1.000	1.000	0.647	0.565	0.679	0.651	0.683	0.657
Navicula pre.	0.679	0.772	0.996	0.996	0.996	0.996	0.650	0.669	0.634	0.649	0.628	0.632
Navicula rot.	0.715	0.762	0.988	0.988	0.996	0.988	0.697	0.649	0.719	0.701	0.706	0.714
Navicula subr.	0.769	0.759	0.990	0.983	0.977	0.983	0.705	0.641	0.740	0.697	0.729	0.717
Staurosirella pin.	0.608	0.704	0.992	0.992	1.000	1.000	0.524	0.532	0.569	0.590	0.538	0.572

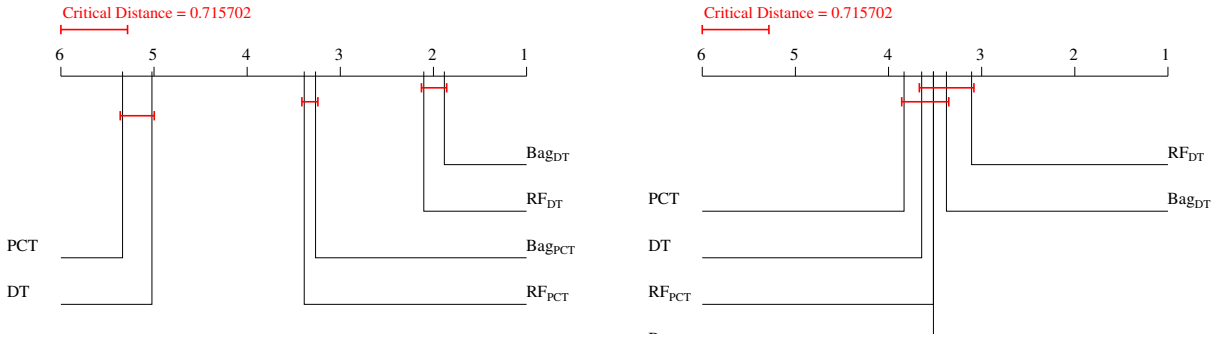
Table 41: Predictive performance of the methods (columns) on all targets (rows) of the *WaterQuality-nom* dataset, evaluated by using macro precision as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Cladophora sp.	0.555	0.680	0.994	0.997	0.996	0.998	0.570	0.629	0.666	0.659	0.657	0.669
Gongrosira inc.	0.367	0.752	0.994	1.000	0.994	1.000	0.367	0.546	0.651	0.536	0.698	0.603
Oedogonium sp.	0.356	0.693	0.992	0.998	0.988	0.995	0.595	0.623	0.698	0.661	0.695	0.685
Stigeoclonium ten.	0.397	0.741	0.989	0.995	0.988	0.995	0.598	0.673	0.734	0.719	0.728	0.718
Melosira var.	0.647	0.694	0.995	0.995	0.994	0.993	0.601	0.650	0.690	0.685	0.691	0.690
Nitzschia pal.	0.721	0.751	0.987	0.991	0.985	0.990	0.716	0.722	0.748	0.743	0.746	0.749
Audouinella ch.	0.656	0.731	0.985	0.996	0.990	0.996	0.660	0.607	0.711	0.671	0.701	0.702
Erpobdella oc.	0.359	0.736	0.992	0.995	0.987	0.995	0.541	0.665	0.658	0.651	0.672	0.656
Gammarus fo.	0.671	0.754	0.994	0.997	0.994	0.997	0.665	0.730	0.728	0.730	0.734	0.739
Baetis rh.	0.636	0.704	0.997	0.998	0.996	0.997	0.612	0.654	0.728	0.733	0.726	0.726
Hydropsyche sp.	0.635	0.700	0.996	0.996	0.991	0.998	0.621	0.665	0.687	0.672	0.697	0.689
Rhyacophila sp.	0.673	0.686	0.993	0.999	0.992	0.999	0.678	0.657	0.706	0.681	0.728	0.690
Simulium sp.	0.317	0.731	0.996	0.998	0.996	0.998	0.317	0.635	0.647	0.646	0.684	0.645
Tubifex sp.	0.705	0.737	0.988	0.996	0.984	0.991	0.701	0.684	0.693	0.693	0.705	0.713

Table 42: Predictive performance of the methods (columns) on all targets (rows) of the *SoilQuality-nom* dataset, evaluated by using macro precision as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

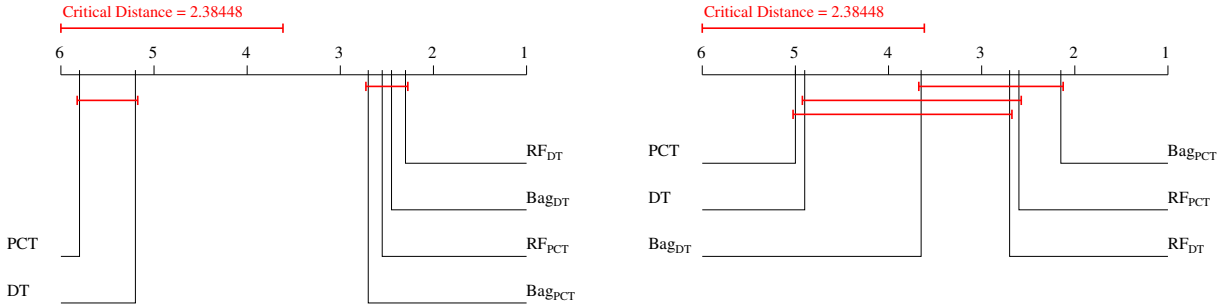
	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Anurida pyg.	0.432	0.771	0.787	0.797	0.791	0.803	0.432	0.723	0.722	0.730	0.741	0.738
Brachystomelle par.	0.736	0.802	0.864	0.868	0.863	0.867	0.734	0.799	0.845	0.839	0.835	0.845
Ceratophysella den.	0.463	0.842	0.847	0.854	0.843	0.847	0.463	0.838	0.823	0.824	0.826	0.832
Ceratophysella suc.	0.462	0.746	0.820	0.839	0.844	0.851	0.462	0.639	0.700	0.704	0.702	0.685
Entomobrya sp.	0.736	0.860	0.861	0.865	0.878	0.872	0.733	0.797	0.786	0.792	0.830	0.813
Folsomia fim.	0.611	0.714	0.811	0.811	0.800	0.805	0.612	0.696	0.756	0.758	0.759	0.755
Folsomia quad.	0.788	0.792	0.882	0.876	0.875	0.875	0.788	0.782	0.847	0.850	0.837	0.837
Folsomia spi.	0.488	0.488	0.488	0.488	0.488	0.488	0.488	0.488	0.572	0.560	0.488	0.488
Friesea mir.	0.460	0.816	0.886	0.898	0.898	0.898	0.460	0.790	0.862	0.858	0.873	0.872
Heteromurus nit.	0.486	0.486	0.737	0.737	0.486	0.486	0.486	0.486	0.486	0.486	0.486	0.486
Hypogastrua sp.	0.466	0.906	0.885	0.885	0.886	0.886	0.466	0.855	0.781	0.792	0.870	0.867
Isotoma ang.	0.593	0.767	0.841	0.841	0.832	0.836	0.593	0.747	0.798	0.798	0.794	0.795
Isotoma not.	0.573	0.749	0.836	0.836	0.823	0.830	0.543	0.723	0.794	0.792	0.794	0.798
Isotoma tig.	0.859	0.922	0.932	0.932	0.930	0.930	0.857	0.913	0.915	0.921	0.927	0.929
Isotomiella min.	0.452	0.815	0.820	0.817	0.824	0.825	0.753	0.776	0.772	0.779	0.779	0.771
Isotomodes arm.	0.491	0.491	0.773	0.773	0.491	0.491	0.491	0.491	0.606	0.525	0.616	0.658
Isotomodes bis.	0.487	0.487	0.841	0.939	0.841	0.939	0.487	0.487	0.691	0.725	0.709	0.732
Isotomodes prod.	0.721	0.829	0.849	0.834	0.829	0.837	0.721	0.754	0.780	0.787	0.777	0.794
Isotomurus pal.	0.700	0.806	0.886	0.891	0.880	0.886	0.700	0.788	0.848	0.854	0.852	0.852
Isotomurus sp.	0.493	0.808	0.808	0.884	0.808	0.884	0.493	0.577	0.808	0.845	0.870	0.793
Lepidocyrtus cy.	0.811	0.882	0.894	0.894	0.887	0.898	0.811	0.877	0.877	0.877	0.874	0.876
Lepidocyrtus lan.	0.477	0.873	0.899	0.899	0.908	0.908	0.477	0.876	0.875	0.881	0.905	0.898
Mesaphorura sp.	0.428	0.779	0.817	0.828	0.839	0.839	0.428	0.736	0.763	0.786	0.782	0.792
Neanura fam.	0.489	0.800	0.847	0.847	0.806	0.881	0.590	0.671	0.763	0.771	0.709	0.741
Neelus min.	0.793	0.838	0.852	0.850	0.850	0.849	0.793	0.799	0.816	0.820	0.822	0.821
Orchesella cin.	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499
Orchesella vil.	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499
Protaphorura sp.	0.731	0.799	0.857	0.857	0.835	0.842	0.735	0.788	0.803	0.801	0.804	0.807
Pseudosinella al.	0.698	0.781	0.824	0.827	0.844	0.840	0.669	0.757	0.778	0.778	0.775	0.792
Pseudosinella sex.	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499
Smint. sp.	0.667	0.750	0.807	0.806	0.801	0.802	0.634	0.719	0.753	0.755	0.758	0.759
Sminthurinus au.	0.751	0.811	0.883	0.882	0.875	0.875	0.751	0.802	0.832	0.826	0.826	0.843
Sminthurinus el.	0.379	0.788	0.789	0.794	0.795	0.793	0.379	0.686	0.711	0.711	0.739	0.732
Sminthurus vir.	0.474	0.474	0.474	0.474	0.474	0.474	0.474	0.474	0.474	0.474	0.474	0.474
Stenaphorura quad.	0.477	0.477	0.781	0.805	0.805	0.805	0.477	0.477	0.704	0.730	0.742	0.686
Tomocerus fl.	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499
Tomocerus min.	0.498	0.498	0.900	0.900	0.900	0.900	0.498	0.498	0.900	0.900	0.900	0.900
Tomocerus sp.	0.498	0.498	0.850	0.850	0.850	0.850	0.498	0.498	0.850	0.850	0.850	0.812
Willemia sp.	0.825	0.766	0.808	0.808	0.807	0.805	0.825	0.727	0.728	0.730	0.748	0.747

4.1.14. *Average rank diagrams for each dataset for the macro precision measure*



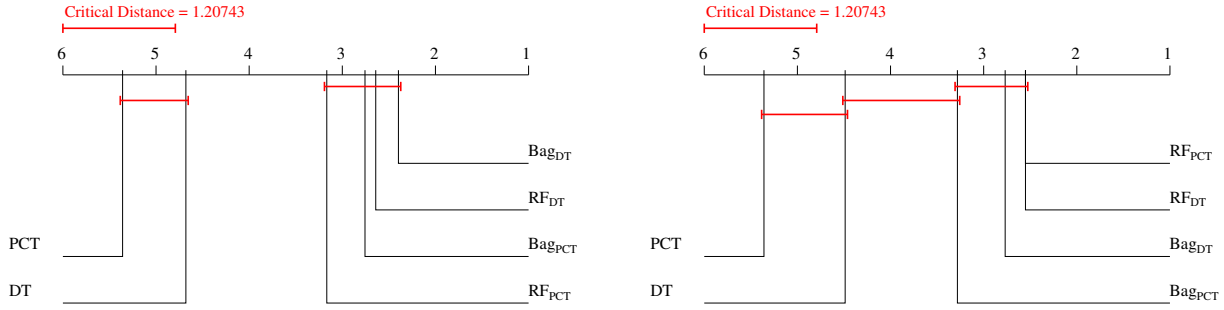
(a) Train (b) Cross-validation

Figure 37: The average rank diagrams for the macro precision evaluation measure on the dataset *DiatomsAll-nom*.



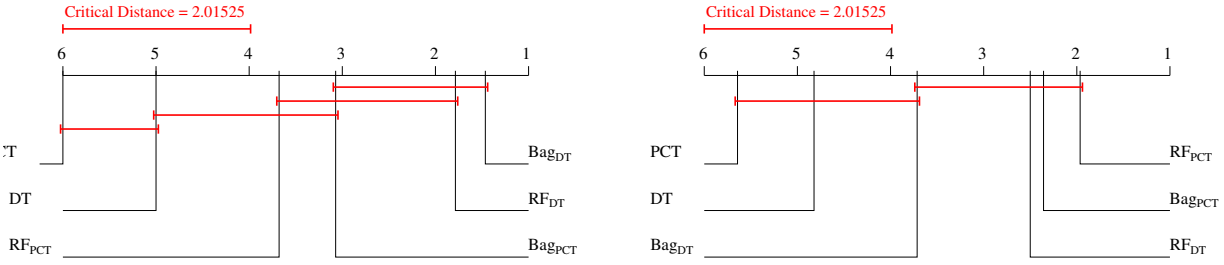
(a) Train (b) Cross-validation

Figure 38: The average rank diagrams for the macro precision evaluation measure on the dataset *DiatomsTop10-nom*.



(a) Train (b) Cross-validation

Figure 39: The average rank diagrams for the macro precision evaluation measure on the dataset *SoilQuality-nom*.



(a) Train (b) Cross-validation

Figure 40: The average rank diagrams for the macro precision evaluation measure on the dataset *WaterQuality-nom*.

4.1.15. Results for the macro recall measure

Table 43: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using macro recall as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	DT	Bag_{PCT}	Bag_{DT}	RF_{PCT}	RF_{DT}	PCT	DT	Bag_{PCT}	Bag_{DT}	RF_{PCT}	RF_{DT}
Amphora aeq.	0.500	0.500	0.775	0.950	0.650	0.850	0.500	0.500	0.500	0.500	0.500	0.500
Achnanthidium cl.	0.500	0.567	0.902	0.990	0.882	1.000	0.497	0.464	0.494	0.504	0.497	0.508
Achnanthidium cl. bal.	0.705	0.753	0.952	0.979	0.966	0.993	0.653	0.691	0.650	0.647	0.647	0.654
Achnanthes sp.	0.500	0.500	0.500	0.500	0.500	0.750	0.500	0.500	0.500	0.500	0.500	0.500
Amphora cop.	0.525	0.656	0.987	1.000	0.993	0.993	0.467	0.538	0.554	0.514	0.511	0.514
Amphora fog.	0.500	0.500	0.500	0.714	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Achnanthes lac.	0.500	0.729	0.966	0.983	0.949	0.983	0.496	0.500	0.516	0.487	0.493	0.489
Amphora in.	0.500	0.723	0.870	0.926	0.870	0.944	0.500	0.527	0.500	0.492	0.500	0.495
Achnanthidium min.	0.500	0.500	0.706	0.850	0.735	0.853	0.500	0.500	0.500	0.498	0.500	0.500
Amphora ov.	0.500	0.500	0.786	0.857	0.500	0.786	0.500	0.500	0.500	0.500	0.500	0.500
Amphora ped.	0.673	0.757	0.950	0.964	0.929	0.964	0.638	0.645	0.641	0.660	0.641	0.656
Amphora th.	0.500	0.500	0.765	0.941	0.676	0.912	0.500	0.500	0.500	0.495	0.500	0.500
Aulacoseira gra.	0.500	0.500	0.727	0.932	0.614	0.864	0.500	0.500	0.500	0.520	0.500	0.497
Amphora ven.	0.500	0.500	0.600	0.600	0.700	0.600	0.500	0.500	0.498	0.498	0.500	0.500
Cymbella aff.	0.500	0.500	0.571	0.857	0.571	0.714	0.500	0.500	0.498	0.498	0.500	0.500
Cocconeis dis.	0.500	0.500	0.761	0.957	0.717	0.870	0.500	0.500	0.500	0.528	0.500	0.522
Cymatopleura el.	0.622	0.642	0.821	0.946	0.857	0.875	0.495	0.510	0.497	0.566	0.500	0.536
Cyclotella jur. nud.	0.728	0.776	0.964	0.971	0.935	0.971	0.679	0.672	0.712	0.707	0.712	0.703
Cymbella lan.	0.763	0.732	0.889	0.917	0.889	0.917	0.538	0.551	0.601	0.551	0.500	0.556
Cyclotella men.	0.500	0.500	0.833	0.833	0.889	0.778	0.500	0.500	0.493	0.500	0.500	0.500
Cocconeis neo.	0.500	0.500	0.833	0.833	0.667	0.833	0.500	0.500	0.500	0.500	0.500	0.500
Cyclotella oc.	0.785	0.848	0.946	0.967	0.978	0.978	0.702	0.731	0.748	0.809	0.749	0.760
Cocconeis pl.	0.567	0.702	0.922	0.980	0.922	0.980	0.499	0.565	0.527	0.520	0.507	0.530
Cocconeis pl. eug.	0.500	0.500	0.727	0.773	0.636	0.727	0.500	0.500	0.500	0.500	0.500	0.500
Cocconeis pl. li.	0.500	0.670	0.958	0.990	0.906	0.990	0.500	0.529	0.500	0.526	0.500	0.491
Caloneis sch.	0.500	0.500	0.857	0.952	0.857	0.833	0.500	0.500	0.500	0.490	0.500	0.500
Cavinula scu.	0.713	0.767	0.958	0.967	0.933	0.950	0.657	0.667	0.722	0.720	0.701	0.701
Cymbella neo.	0.500	0.500	0.636	0.818	0.727	0.818	0.500	0.500	0.500	0.500	0.500	0.500
Diatoma ang.	0.500	0.500	0.738	0.881	0.619	0.833	0.500	0.500	0.500	0.492	0.500	0.497
Diploneis mau.	0.660	0.724	0.996	1.000	0.995	1.000	0.590	0.565	0.706	0.651	0.692	0.654
Diploneis mod.	0.500	0.500	0.650	0.800	0.700	0.750	0.500	0.500	0.500	0.481	0.500	0.500
Diploneis ov.	0.590	0.682	0.967	0.992	0.983	0.975	0.539	0.568	0.563	0.549	0.551	0.595
Epithemia ad.	0.500	0.500	0.750	0.821	0.786	0.750	0.500	0.500	0.564	0.498	0.500	0.500
Encyonema cae.	0.500	0.500	0.607	0.750	0.571	0.750	0.500	0.500	0.500	0.500	0.500	0.500
Encyonema min.	0.500	0.500	0.800	0.500	0.600	0.600	0.500	0.500	0.500	0.500	0.500	0.500
Encyonopsis mic.	0.500	0.500	0.763	0.816	0.789	0.868	0.500	0.500	0.497	0.492	0.497	0.497
Encyonema sil.	0.500	0.500	0.625	0.750	0.625	0.750	0.500	0.500	0.500	0.498	0.500	0.500
Epithemia so.	0.500	0.500	0.742	0.879	0.758	0.909	0.500	0.484	0.495	0.481	0.500	0.486
Fragilaria cap.	0.500	0.500	0.743	0.943	0.757	0.986	0.500	0.470	0.500	0.526	0.500	0.518
Fragilaria cap. va.	0.500	0.500	0.667	0.583	0.750	0.750	0.500	0.500	0.498	0.498	0.500	0.500
Fallacia och.	0.500	0.702	0.859	0.987	0.833	0.949	0.500	0.526	0.500	0.506	0.500	0.494
Fragilaria par.	0.500	0.730	0.694	0.833	0.722	0.889	0.500	0.495	0.500	0.576	0.500	0.525
Frustulia vul.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Gomphonema cl.	0.500	0.500	0.500	0.583	0.500	0.583	0.500	0.500	0.500	0.500	0.500	0.500
Geissleria dec.	0.500	0.649	0.948	0.991	0.948	1.000	0.494	0.517	0.498	0.494	0.493	0.500
Gomphonema it.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Gomphonema min.	0.500	0.500	0.812	0.938	0.646	0.938	0.500	0.485	0.500	0.495	0.500	0.500
Gomphonema ol. Horn.	0.500	0.500	0.789	0.895	0.816	0.868	0.500	0.500	0.500	0.500	0.500	0.497
Gomphonema par.	0.500	0.500	0.794	0.941	0.735	0.853	0.500	0.500	0.495	0.495	0.500	0.498
Gomphonema pum.	0.500	0.500	0.750	0.864	0.727	0.864	0.500	0.497	0.500	0.528	0.500	0.540
Gomphonema ol.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Gomphonema sar.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Gomphonema ter.	0.500	0.500	0.773	0.864	0.773	0.864	0.500	0.500	0.500	0.498	0.500	0.500
Gyrosigma mac.	0.614	0.698	0.964	0.997	0.978	0.986	0.571	0.594	0.544	0.564	0.558	0.562
Hannea ar.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Hantzschia amp.	0.500	0.500	0.500	0.600	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Hippodonta ros.	0.500	0.500	0.500	0.500	0.500	0.600	0.500	0.500	0.500	0.500	0.500	0.500

Table 43: (ctd) Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using macro recall as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Meridion cir. con.	0.500	0.500	0.786	0.714	0.500	0.643	0.500	0.500	0.498	0.500	0.500	0.500
Meridion cir.	0.500	0.500	0.500	0.500	0.500	0.667	0.500	0.500	0.500	0.500	0.500	0.500
Martyana mar.	0.500	0.500	0.667	0.750	0.583	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Nitzschia alp.	0.500	0.500	0.750	0.875	0.812	0.688	0.500	0.500	0.500	0.500	0.500	0.500
Navicula ant.	0.500	0.603	0.781	0.938	0.844	0.922	0.500	0.492	0.497	0.478	0.497	0.487
Navicula cap.	0.500	0.637	0.859	0.938	0.797	0.969	0.500	0.486	0.500	0.510	0.500	0.510
Navicula cry.	0.500	0.500	0.500	0.611	0.500	0.667	0.500	0.500	0.500	0.500	0.500	0.500
Nitzschia dis.	0.500	0.500	0.667	0.778	0.611	0.722	0.500	0.500	0.498	0.498	0.500	0.500
Neidium du.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.498	0.500	0.500
Navicula gre.	0.500	0.500	0.500	0.571	0.714	0.571	0.500	0.500	0.500	0.500	0.500	0.500
Navicula has.	0.500	0.500	0.591	0.773	0.682	0.773	0.500	0.500	0.500	0.500	0.500	0.500
Navicula krs.	0.648	0.659	0.994	1.000	0.994	0.994	0.565	0.545	0.602	0.583	0.592	0.611
Navicula lan.	0.500	0.500	0.500	0.714	0.500	0.571	0.500	0.500	0.500	0.500	0.500	0.500
Nupela la.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Nitzschia lin.	0.500	0.500	0.594	0.719	0.562	0.750	0.500	0.500	0.500	0.500	0.500	0.500
Navicula pra.	0.685	0.666	0.949	1.000	0.983	1.000	0.512	0.527	0.509	0.547	0.508	0.506
Navicula pre.	0.696	0.751	0.989	0.994	0.994	0.994	0.642	0.656	0.637	0.644	0.654	0.619
Navicula pro.	0.575	0.602	0.968	1.000	0.936	1.000	0.498	0.612	0.507	0.572	0.497	0.552
Nitzschia rec.	0.500	0.500	0.789	0.921	0.658	0.816	0.500	0.500	0.500	0.524	0.500	0.524
Navicula rei.	0.634	0.654	0.929	0.969	0.908	0.980	0.559	0.621	0.538	0.542	0.522	0.538
Navicula rot.	0.712	0.756	0.980	0.985	0.980	0.985	0.703	0.653	0.696	0.701	0.699	0.713
Navicula subh.	0.629	0.764	0.959	0.990	0.969	0.990	0.481	0.618	0.476	0.517	0.492	0.507
Navicula subr.	0.618	0.724	0.967	0.967	0.947	0.967	0.584	0.597	0.608	0.660	0.608	0.658
Nitzschia suba.	0.711	0.724	0.968	0.989	0.989	0.989	0.609	0.659	0.693	0.667	0.670	0.646
Navicula tri.	0.500	0.636	0.902	0.978	0.891	0.967	0.488	0.494	0.488	0.487	0.488	0.488
Navicula vircl.	0.607	0.613	0.944	0.989	0.933	1.000	0.511	0.520	0.508	0.502	0.494	0.497
Navicula virdu.	0.707	0.500	0.825	0.875	0.800	0.875	0.532	0.480	0.587	0.522	0.500	0.525
Orthoseira ros.	0.500	0.500	0.944	0.944	0.944	1.000	0.500	0.500	0.498	0.498	0.500	0.500
Placoneis bal.	0.683	0.774	1.000	0.996	0.996	0.995	0.596	0.683	0.692	0.723	0.663	0.724
Pinnularia bor.	0.500	0.500	0.929	0.929	0.821	0.929	0.500	0.500	0.493	0.500	0.500	0.500
Placoneis min.	0.500	0.500	0.667	0.667	0.583	0.667	0.500	0.500	0.500	0.500	0.500	0.500
Placoneis elg.	0.500	0.500	0.611	0.611	0.667	0.611	0.500	0.500	0.500	0.500	0.500	0.500
Planothidium lan.	0.500	0.500	0.893	0.952	0.845	0.964	0.500	0.489	0.494	0.480	0.500	0.489
Planothidium ros.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Placoneis neo.	0.576	0.681	0.950	0.991	0.943	0.991	0.523	0.546	0.530	0.523	0.510	0.507
Pseudostaurosira bre.	0.560	0.615	1.000	1.000	1.000	1.000	0.537	0.405	0.544	0.514	0.529	0.567
Pinnularia subc.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Rhoicosphenia abb.	0.500	0.620	0.903	0.986	0.875	0.972	0.500	0.484	0.497	0.514	0.497	0.503
Rhopalodia gib.	0.500	0.500	0.800	0.840	0.780	0.900	0.500	0.500	0.517	0.517	0.497	0.497
Reimeria sin.	0.500	0.500	0.792	0.792	0.667	0.875	0.500	0.500	0.500	0.498	0.500	0.500
Surirella ang.	0.500	0.500	0.750	0.875	0.719	0.875	0.500	0.500	0.500	0.498	0.500	0.500
Surirella min.	0.500	0.500	0.700	0.867	0.733	0.833	0.500	0.500	0.498	0.500	0.500	0.500
Sellaphora perb.	0.590	0.701	0.955	1.000	0.970	0.992	0.511	0.562	0.489	0.529	0.503	0.541
Sellaphora pu.	0.597	0.632	0.972	0.993	0.965	0.993	0.523	0.506	0.519	0.548	0.501	0.534
Stauroneis gra.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Staurosira con. bin.	0.500	0.500	0.808	0.846	0.731	0.769	0.500	0.500	0.500	0.495	0.500	0.500
Staurosira con.	0.590	0.673	1.000	1.000	0.988	0.994	0.510	0.537	0.532	0.565	0.526	0.563
Staurosira con. ven.	0.500	0.500	0.500	0.625	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Stauroneis pho.	0.500	0.500	0.556	0.722	0.611	0.667	0.500	0.500	0.500	0.500	0.500	0.500
Staurosirella pin.	0.617	0.707	0.995	0.989	0.984	1.000	0.540	0.518	0.548	0.589	0.568	0.568
Stauroneis sm.	0.500	0.500	0.500	0.625	0.625	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Tryblionella ang.	0.500	0.500	0.806	0.986	0.778	0.972	0.500	0.478	0.500	0.486	0.500	0.500
Tabellaria floc.	0.500	0.500	0.944	0.944	0.944	0.944	0.500	0.500	0.553	0.498	0.500	0.500
Ulnaria ul.	0.500	0.500	0.682	0.909	0.727	0.773	0.500	0.500	0.500	0.541	0.500	0.545

Table 44: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsTop10-nom* dataset, evaluated by using macro recall as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Amphora ped.	0.682	0.757	0.943	0.964	0.957	0.964	0.639	0.637	0.680	0.660	0.658	0.656
Cyclotella jur. nud.	0.656	0.776	0.971	0.971	0.949	0.971	0.616	0.669	0.728	0.707	0.727	0.703
Cyclotella oc.	0.722	0.766	0.978	0.967	0.989	0.978	0.674	0.738	0.809	0.809	0.782	0.760
Cocconeis pl.	0.500	0.609	0.980	0.980	0.980	0.980	0.491	0.523	0.537	0.520	0.497	0.530
Cavinula scu.	0.657	0.704	0.958	0.967	0.942	0.950	0.619	0.621	0.773	0.720	0.709	0.701
Diploneis mau.	0.665	0.724	0.995	1.000	1.000	1.000	0.647	0.565	0.678	0.651	0.676	0.654
Navicula pre.	0.675	0.751	0.994	0.994	0.994	0.994	0.648	0.656	0.631	0.644	0.619	0.619
Navicula rot.	0.716	0.744	0.985	0.985	0.995	0.985	0.698	0.649	0.720	0.701	0.701	0.713
Navicula subr.	0.613	0.724	0.980	0.967	0.953	0.967	0.589	0.597	0.671	0.660	0.658	0.658
Staurosirella pin.	0.605	0.707	0.989	0.989	1.000	1.000	0.525	0.533	0.566	0.589	0.536	0.568

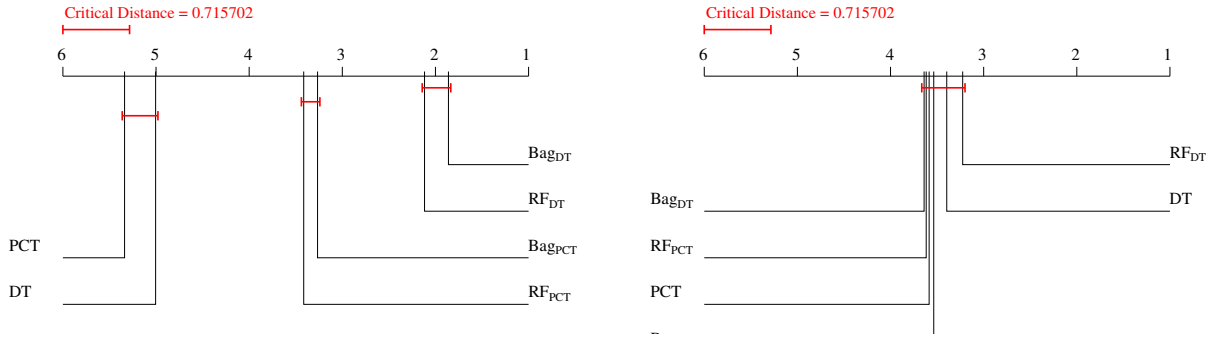
Table 45: Predictive performance of the methods (columns) on all targets (rows) of the *WaterQuality-nom* dataset, evaluated by using macro recall as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Cladophora sp.	0.536	0.646	0.993	0.996	0.995	0.998	0.564	0.620	0.662	0.656	0.652	0.666
Gongrosira inc.	0.500	0.525	0.982	1.000	0.982	1.000	0.500	0.510	0.531	0.512	0.534	0.529
Oedogonium sp.	0.500	0.626	0.979	0.995	0.970	0.987	0.525	0.584	0.632	0.618	0.612	0.634
Stigeoclonium ten.	0.500	0.587	0.956	0.979	0.954	0.979	0.506	0.572	0.600	0.627	0.584	0.614
Melosira var.	0.628	0.694	0.995	0.995	0.994	0.994	0.596	0.648	0.690	0.685	0.691	0.690
Nitzschia pal.	0.723	0.750	0.986	0.990	0.984	0.990	0.716	0.718	0.734	0.733	0.734	0.738
Audouinella ch.	0.572	0.550	0.954	0.987	0.968	0.989	0.565	0.526	0.567	0.575	0.557	0.579
Erpobdella oc.	0.500	0.597	0.978	0.991	0.965	0.987	0.507	0.607	0.610	0.618	0.615	0.617
Gammarus fo.	0.653	0.704	0.994	0.995	0.995	0.997	0.638	0.681	0.685	0.709	0.685	0.716
Baetis rh.	0.553	0.669	0.993	0.998	0.991	0.996	0.538	0.623	0.664	0.696	0.650	0.684
Hydropsyche sp.	0.633	0.691	0.995	0.995	0.989	0.998	0.622	0.661	0.687	0.671	0.698	0.688
Rhyacophila sp.	0.655	0.638	0.984	0.997	0.984	0.997	0.640	0.618	0.661	0.658	0.680	0.663
Simulium sp.	0.500	0.554	0.994	0.998	0.994	0.996	0.500	0.539	0.596	0.611	0.614	0.609
Tubifex sp.	0.625	0.683	0.971	0.995	0.967	0.982	0.624	0.639	0.633	0.657	0.644	0.672

Table 46: Predictive performance of the methods (columns) on all targets (rows) of the *SoilQuality-nom* dataset, evaluated by using macro recall as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

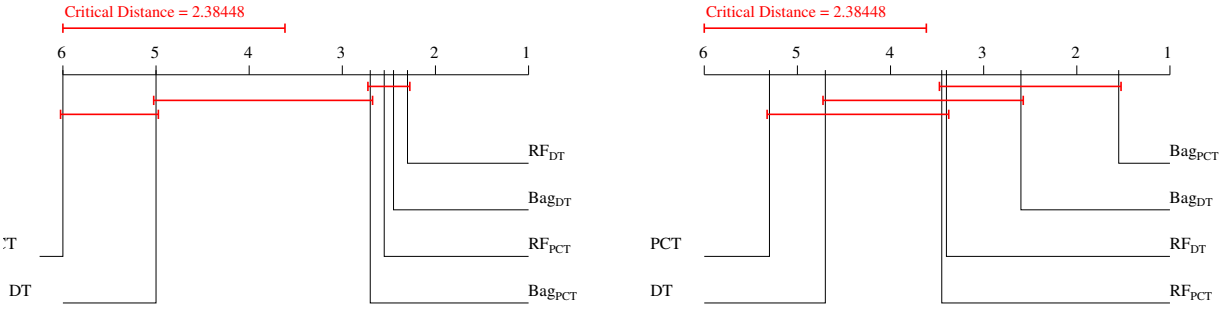
	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Anurida pyg.	0.500	0.586	0.735	0.710	0.687	0.668	0.500	0.555	0.675	0.675	0.653	0.635
Brachystomelle par.	0.660	0.779	0.845	0.840	0.830	0.836	0.658	0.771	0.806	0.807	0.792	0.806
Ceratophysella den.	0.500	0.814	0.841	0.825	0.837	0.821	0.500	0.777	0.815	0.812	0.812	0.819
Ceratophysella suc.	0.500	0.598	0.713	0.685	0.668	0.662	0.500	0.546	0.650	0.651	0.614	0.597
Entomobrya sp.	0.659	0.669	0.768	0.764	0.727	0.750	0.651	0.647	0.744	0.739	0.719	0.720
Folsomia fim.	0.611	0.693	0.810	0.810	0.800	0.804	0.612	0.687	0.755	0.757	0.759	0.755
Folsomia quad.	0.681	0.861	0.871	0.885	0.871	0.869	0.681	0.816	0.830	0.836	0.804	0.805
Folsomia spi.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.520	0.510	0.499	0.500
Friesea mir.	0.500	0.786	0.821	0.806	0.806	0.806	0.500	0.789	0.825	0.815	0.826	0.823
Heteromurus nit.	0.500	0.500	0.526	0.526	0.500	0.500	0.500	0.500	0.496	0.497	0.497	0.499
Hypogastrua sp.	0.500	0.597	0.694	0.694	0.683	0.683	0.500	0.630	0.698	0.688	0.663	0.682
Isotoma ang.	0.593	0.750	0.841	0.841	0.832	0.836	0.592	0.737	0.798	0.798	0.794	0.795
Isotoma not.	0.554	0.731	0.835	0.838	0.817	0.830	0.526	0.714	0.795	0.794	0.791	0.797
Isotoma tig.	0.820	0.882	0.920	0.920	0.916	0.916	0.820	0.880	0.907	0.916	0.914	0.915
Isotomiella min.	0.500	0.644	0.771	0.778	0.734	0.716	0.515	0.633	0.722	0.728	0.716	0.690
Isotomodes arm.	0.500	0.500	0.711	0.711	0.500	0.500	0.500	0.500	0.567	0.511	0.513	0.514
Isotomodes bis.	0.500	0.500	0.638	0.590	0.638	0.590	0.500	0.500	0.654	0.646	0.635	0.636
Isotomodes prod.	0.564	0.625	0.765	0.787	0.765	0.775	0.564	0.652	0.753	0.760	0.728	0.730
Isotomurus pal.	0.618	0.820	0.863	0.855	0.844	0.840	0.617	0.770	0.815	0.827	0.807	0.804
Isotomurus sp.	0.500	0.830	0.830	0.629	0.830	0.629	0.500	0.517	0.830	0.629	0.666	0.793
Lepidocyrtus cy.	0.691	0.865	0.890	0.890	0.886	0.879	0.691	0.851	0.859	0.861	0.871	0.867
Lepidocyrtus lan.	0.500	0.674	0.820	0.820	0.810	0.810	0.500	0.679	0.780	0.780	0.798	0.798
Mesaphorura sp.	0.500	0.548	0.767	0.742	0.722	0.722	0.500	0.541	0.709	0.696	0.673	0.673
Neanura fam.	0.500	0.752	0.799	0.799	0.764	0.662	0.542	0.600	0.739	0.740	0.647	0.591
Neelus min.	0.638	0.723	0.815	0.817	0.807	0.809	0.638	0.734	0.790	0.787	0.787	0.787
Orchesella cin.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Orchesella vil.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Protaphorura sp.	0.634	0.745	0.777	0.777	0.778	0.772	0.631	0.775	0.752	0.753	0.761	0.754
Pseudosinella al.	0.645	0.687	0.809	0.802	0.752	0.775	0.582	0.648	0.751	0.756	0.711	0.711
Pseudosinella sex.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Smint. sp.	0.668	0.690	0.804	0.805	0.800	0.801	0.634	0.667	0.751	0.751	0.755	0.757
Sminthurinus au.	0.853	0.866	0.877	0.877	0.885	0.882	0.853	0.863	0.839	0.835	0.841	0.848
Sminthurinus el.	0.500	0.547	0.721	0.711	0.697	0.699	0.500	0.549	0.664	0.665	0.656	0.658
Sminthurus vir.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.498	0.498	0.500	0.500
Stenaphorura quad.	0.500	0.500	0.596	0.570	0.570	0.570	0.500	0.500	0.567	0.568	0.553	0.526
Tomocerus fl.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Tomocerus min.	0.500	0.500	0.999	0.999	0.999	0.999	0.500	0.500	0.999	0.999	0.999	0.999
Tomocerus sp.	0.500	0.500	0.937	0.937	0.937	0.937	0.500	0.500	0.937	0.937	0.937	0.812
Willemia sp.	0.556	0.643	0.756	0.756	0.745	0.744	0.556	0.637	0.699	0.702	0.707	0.706

4.1.16. Average rank diagrams for each dataset for the macro recall measure



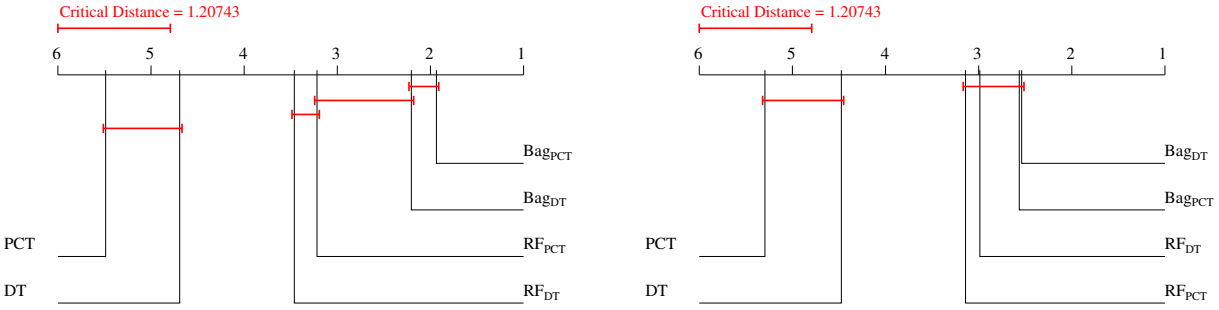
(a) Train (b) Cross-validation

Figure 41: The average rank diagrams for the macro recall evaluation measure on the dataset *DiatomsAll-nom*.



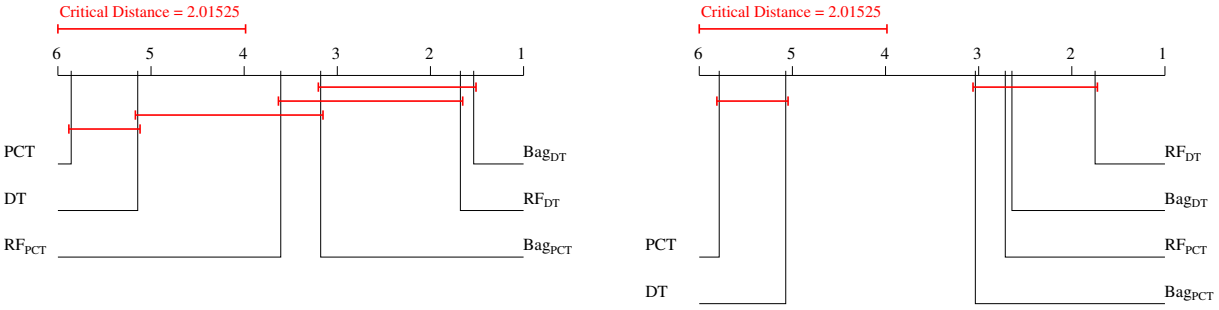
(a) Train (b) Cross-validation

Figure 42: The average rank diagrams for the macro recall evaluation measure on the dataset *DiatomsTop10-nom*.



(a) Train (b) Cross-validation

Figure 43: The average rank diagrams for the macro recall evaluation measure on the dataset *SoilQuality-nom*.



(a) Train (b) Cross-validation

Figure 44: The average rank diagrams for the macro recall evaluation measure on the dataset *WaterQuality-nom*.

4.1.17. Results for the macro F measure

Table 47: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using macro F as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Amphora aeq.	0.476	0.476	0.844	0.971	0.714	0.904	0.476	0.476	0.476	0.476	0.476	0.476
Achnanthidium cl.	0.434	0.568	0.931	0.994	0.916	1.000	0.432	0.416	0.431	0.487	0.432	0.465
Achnanthidium cl. bal.	0.708	0.755	0.963	0.984	0.974	0.990	0.657	0.697	0.656	0.655	0.655	0.662
Achnanthes sp.	0.495	0.495	0.495	0.495	0.495	0.831	0.495	0.495	0.495	0.495	0.495	0.495
Amphora cop.	0.479	0.663	0.990	1.000	0.995	0.995	0.424	0.536	0.539	0.489	0.468	0.485
Amphora fog.	0.492	0.492	0.492	0.795	0.492	0.492	0.492	0.492	0.492	0.492	0.492	0.492
Achnanthes lac.	0.422	0.709	0.976	0.988	0.964	0.988	0.461	0.498	0.490	0.471	0.430	0.462
Amphora in.	0.467	0.719	0.917	0.955	0.917	0.967	0.467	0.529	0.467	0.463	0.467	0.464
Achnanthidium min.	0.480	0.480	0.780	0.893	0.809	0.908	0.480	0.480	0.480	0.478	0.480	0.480
Amphora ov.	0.492	0.492	0.860	0.914	0.492	0.860	0.492	0.492	0.492	0.492	0.492	0.492
Amphora ped.	0.689	0.763	0.962	0.973	0.945	0.973	0.647	0.648	0.650	0.671	0.650	0.668
Amphora th.	0.480	0.480	0.836	0.966	0.748	0.948	0.480	0.480	0.480	0.477	0.480	0.480
Aulacoseira gra.	0.473	0.473	0.798	0.960	0.664	0.914	0.473	0.473	0.473	0.515	0.473	0.472
Amphora ven.	0.494	0.494	0.662	0.662	0.782	0.662	0.494	0.494	0.493	0.493	0.494	0.494
Cymbella aff.	0.492	0.492	0.618	0.914	0.618	0.795	0.492	0.492	0.491	0.491	0.492	0.492
Cocconeis dis.	0.472	0.472	0.829	0.975	0.787	0.917	0.472	0.472	0.472	0.531	0.472	0.515
Cymatopleura el.	0.646	0.671	0.878	0.968	0.906	0.920	0.463	0.494	0.464	0.585	0.466	0.535
Cyclotella jur. nud.	0.744	0.785	0.973	0.978	0.950	0.978	0.689	0.681	0.733	0.720	0.734	0.717
Cymbella lan.	0.777	0.745	0.933	0.951	0.933	0.951	0.546	0.553	0.632	0.569	0.478	0.581
Cyclotella men.	0.489	0.489	0.896	0.896	0.935	0.852	0.489	0.489	0.486	0.489	0.489	0.489
Cocconeis neo.	0.497	0.497	0.899	0.899	0.748	0.899	0.497	0.497	0.497	0.497	0.497	0.497
Cyclotella oc.	0.778	0.848	0.964	0.979	0.986	0.986	0.697	0.744	0.776	0.835	0.788	0.799
Cocconeis pl.	0.568	0.706	0.946	0.987	0.946	0.987	0.459	0.569	0.500	0.506	0.452	0.503
Cocconeis pl. eug.	0.487	0.487	0.805	0.847	0.705	0.805	0.487	0.487	0.487	0.487	0.487	0.487
Cocconeis pl. li.	0.438	0.689	0.972	0.993	0.935	0.993	0.438	0.523	0.438	0.511	0.438	0.434
Caloneis sch.	0.475	0.475	0.909	0.972	0.909	0.891	0.475	0.475	0.475	0.470	0.475	0.475
Cavinula scu.	0.725	0.781	0.970	0.977	0.952	0.964	0.664	0.676	0.745	0.746	0.729	0.729
Cymbella neo.	0.487	0.487	0.705	0.884	0.805	0.884	0.487	0.487	0.487	0.487	0.487	0.487
Diatoma ang.	0.475	0.475	0.809	0.926	0.673	0.891	0.475	0.475	0.475	0.471	0.475	0.473
Diploneis mau.	0.651	0.724	0.995	1.000	0.995	1.000	0.583	0.564	0.706	0.651	0.692	0.654
Diploneis mod.	0.488	0.488	0.722	0.870	0.779	0.827	0.488	0.488	0.488	0.478	0.488	0.488
Diploneis ov.	0.594	0.692	0.977	0.994	0.988	0.982	0.528	0.571	0.556	0.544	0.531	0.598
Epithemia ad.	0.483	0.483	0.825	0.885	0.856	0.825	0.483	0.483	0.587	0.482	0.483	0.483
Encyonema cae.	0.483	0.483	0.663	0.825	0.611	0.825	0.483	0.483	0.483	0.483	0.483	0.483
Encyonema min.	0.494	0.494	0.873	0.494	0.662	0.662	0.494	0.494	0.494	0.494	0.494	0.494
Encyonopsis mic.	0.477	0.477	0.834	0.878	0.857	0.918	0.477	0.477	0.476	0.473	0.476	0.476
Encyonema sil.	0.486	0.486	0.689	0.826	0.689	0.826	0.486	0.486	0.486	0.485	0.486	0.486
Epithemia so.	0.459	0.459	0.805	0.920	0.819	0.942	0.459	0.451	0.456	0.449	0.459	0.452
Fragilaria cap.	0.456	0.456	0.803	0.964	0.817	0.991	0.456	0.441	0.456	0.520	0.456	0.502
Fragilaria cap. va.	0.493	0.493	0.745	0.637	0.830	0.830	0.493	0.493	0.492	0.492	0.493	0.493
Fallacia och.	0.451	0.712	0.903	0.992	0.882	0.967	0.451	0.520	0.451	0.485	0.451	0.448
Fragilaria par.	0.478	0.736	0.767	0.893	0.795	0.933	0.478	0.476	0.478	0.603	0.478	0.528
Frustulia vul.	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498
Gomphonema cl.	0.493	0.493	0.493	0.637	0.493	0.637	0.493	0.493	0.493	0.493	0.493	0.493
Geissleria dec.	0.423	0.665	0.964	0.994	0.964	1.000	0.420	0.510	0.447	0.461	0.432	0.465
Gomphonema it.	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.497
Gomphonema min.	0.471	0.471	0.873	0.963	0.705	0.963	0.471	0.463	0.471	0.468	0.471	0.471
Gomphonema ol. Horn.	0.477	0.477	0.857	0.936	0.878	0.918	0.477	0.477	0.477	0.477	0.477	0.476
Gomphonema par.	0.480	0.480	0.862	0.966	0.809	0.908	0.480	0.480	0.477	0.477	0.480	0.478
Gomphonema pum.	0.473	0.473	0.820	0.914	0.798	0.914	0.473	0.472	0.473	0.531	0.473	0.550
Gomphonema ol.	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498
Gomphonema sar.	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498
Gomphonema ter.	0.487	0.487	0.847	0.917	0.847	0.917	0.487	0.487	0.487	0.486	0.487	0.487
Gyrosigma mac.	0.619	0.717	0.973	0.995	0.984	0.989	0.571	0.598	0.533	0.564	0.546	0.552
Hannea ar.	0.494	0.494	0.494	0.494	0.494	0.494	0.494	0.494	0.494	0.494	0.494	0.494
Hantzschia amp.	0.494	0.494	0.494	0.662	0.494	0.494	0.494	0.494	0.494	0.494	0.494	0.494
Hippodonta ros.	0.494	0.494	0.494	0.494	0.494	0.662	0.494	0.494	0.494	0.494	0.494	0.494

Table 47: (ctd) Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using macro F as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Meridion cir. con.	0.492	0.492	0.860	0.795	0.492	0.716	0.492	0.492	0.491	0.492	0.492	0.492
Meridion cir.	0.497	0.497	0.497	0.497	0.497	0.748	0.497	0.497	0.497	0.497	0.497	0.497
Martyana mar.	0.493	0.493	0.745	0.830	0.637	0.493	0.493	0.493	0.493	0.493	0.493	0.493
Nitzschia alp.	0.491	0.491	0.829	0.926	0.881	0.767	0.491	0.491	0.491	0.491	0.491	0.491
Navicula ant.	0.460	0.625	0.842	0.961	0.894	0.951	0.460	0.456	0.459	0.449	0.459	0.454
Navicula cap.	0.460	0.667	0.906	0.961	0.856	0.981	0.460	0.469	0.460	0.499	0.460	0.487
Navicula cry.	0.489	0.489	0.489	0.674	0.489	0.743	0.489	0.489	0.489	0.489	0.489	0.489
Nitzschia dis.	0.489	0.489	0.743	0.852	0.674	0.802	0.489	0.489	0.488	0.488	0.489	0.489
Neidium du.	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.495	0.497	0.497
Navicula gre.	0.492	0.492	0.492	0.618	0.795	0.618	0.492	0.492	0.492	0.492	0.492	0.492
Navicula has.	0.487	0.487	0.643	0.847	0.758	0.847	0.487	0.487	0.487	0.487	0.487	0.487
Navicula krs.	0.650	0.657	0.995	1.000	0.995	0.995	0.555	0.540	0.597	0.579	0.587	0.610
Navicula lan.	0.492	0.492	0.492	0.795	0.492	0.618	0.492	0.492	0.492	0.492	0.492	0.492
Nupela la.	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499
Nitzschia lin.	0.481	0.481	0.642	0.793	0.594	0.824	0.481	0.481	0.481	0.481	0.481	0.481
Navicula pra.	0.681	0.684	0.964	1.000	0.988	1.000	0.504	0.521	0.489	0.548	0.477	0.487
Navicula pre.	0.698	0.757	0.990	0.995	0.995	0.995	0.644	0.658	0.638	0.646	0.657	0.621
Navicula pro.	0.583	0.620	0.979	1.000	0.957	1.000	0.465	0.621	0.472	0.579	0.438	0.546
Nitzschia rec.	0.477	0.477	0.857	0.953	0.724	0.878	0.477	0.477	0.477	0.525	0.477	0.525
Navicula rei.	0.654	0.686	0.951	0.980	0.936	0.987	0.561	0.638	0.527	0.536	0.490	0.527
Navicula rot.	0.706	0.756	0.981	0.986	0.981	0.986	0.697	0.653	0.696	0.701	0.699	0.713
Navicula subh.	0.644	0.740	0.973	0.993	0.980	0.993	0.440	0.618	0.425	0.506	0.447	0.478
Navicula subr.	0.618	0.735	0.974	0.974	0.958	0.974	0.581	0.597	0.607	0.668	0.606	0.667
Nitzschia suba.	0.700	0.726	0.971	0.990	0.990	0.990	0.609	0.656	0.690	0.668	0.669	0.647
Navicula tri.	0.441	0.654	0.933	0.986	0.925	0.979	0.435	0.480	0.435	0.459	0.435	0.449
Navicula vircl.	0.621	0.634	0.963	0.993	0.956	1.000	0.478	0.518	0.476	0.481	0.440	0.456
Navicula virdu.	0.728	0.476	0.885	0.922	0.865	0.922	0.538	0.466	0.612	0.521	0.476	0.525
Orthoseira ros.	0.489	0.489	0.969	0.969	0.969	1.000	0.489	0.489	0.488	0.488	0.489	0.489
Placoneis bal.	0.683	0.757	1.000	0.995	0.995	0.995	0.596	0.678	0.690	0.719	0.661	0.722
Pinnularia bor.	0.483	0.483	0.959	0.959	0.885	0.959	0.483	0.483	0.480	0.483	0.483	0.483
Placoneis min.	0.493	0.493	0.745	0.745	0.637	0.745	0.493	0.493	0.493	0.493	0.493	0.493
Placoneis elg.	0.489	0.489	0.674	0.674	0.743	0.674	0.489	0.489	0.489	0.489	0.489	0.489
Planothidium lan.	0.447	0.447	0.928	0.969	0.891	0.977	0.447	0.441	0.444	0.437	0.447	0.441
Planothidium ros.	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.497
Placoneis neo.	0.578	0.701	0.962	0.994	0.961	0.994	0.506	0.544	0.518	0.506	0.463	0.471
Pseudostaurosira bre.	0.543	0.614	1.000	1.000	1.000	1.000	0.518	0.405	0.537	0.506	0.511	0.564
Pinnularia subc.	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499
Rhoicosphenia abb.	0.455	0.646	0.937	0.992	0.917	0.983	0.455	0.472	0.454	0.497	0.454	0.475
Rhopalodia gib.	0.470	0.470	0.862	0.895	0.845	0.938	0.470	0.470	0.506	0.506	0.468	0.468
Reimeria sin.	0.486	0.486	0.862	0.862	0.740	0.925	0.486	0.486	0.486	0.485	0.486	0.486
Surirella ang.	0.481	0.481	0.824	0.924	0.793	0.924	0.481	0.481	0.481	0.480	0.481	0.481
Surirella min.	0.482	0.482	0.775	0.918	0.809	0.894	0.482	0.482	0.481	0.482	0.482	0.482
Sellaphora perb.	0.592	0.715	0.967	1.000	0.978	0.995	0.458	0.562	0.450	0.520	0.444	0.524
Sellaphora pu.	0.600	0.639	0.979	0.995	0.973	0.995	0.495	0.485	0.487	0.541	0.450	0.517
Stauroneis gra.	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498
Staurosira con. bin.	0.485	0.485	0.875	0.904	0.807	0.843	0.485	0.485	0.485	0.482	0.485	0.485
Staurosira con.	0.591	0.677	1.000	1.000	0.990	0.995	0.509	0.523	0.526	0.564	0.506	0.558
Staurosira con. ven.	0.495	0.495	0.495	0.697	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495
Stauroneis pho.	0.489	0.489	0.591	0.802	0.674	0.743	0.489	0.489	0.489	0.489	0.489	0.489
Staurosirella pin.	0.609	0.697	0.995	0.991	0.986	1.000	0.535	0.517	0.547	0.589	0.566	0.568
Stauroneis sm.	0.495	0.495	0.495	0.697	0.697	0.495	0.495	0.495	0.495	0.495	0.495	0.495
Tryblionella ang.	0.455	0.455	0.861	0.992	0.836	0.983	0.455	0.444	0.455	0.448	0.455	0.455
Tabellaria floc.	0.489	0.489	0.969	0.969	0.969	0.969	0.489	0.489	0.580	0.488	0.489	0.489
Ulnaria ul.	0.487	0.487	0.758	0.948	0.805	0.847	0.487	0.487	0.487	0.557	0.487	0.572

Table 48: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsTop10-nom* dataset, evaluated by using macro F as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Amphora ped.	0.693	0.763	0.957	0.973	0.968	0.973	0.648	0.643	0.697	0.671	0.671	0.668
Cyclotella jur. nud.	0.669	0.785	0.978	0.978	0.962	0.978	0.621	0.677	0.744	0.720	0.748	0.717
Cyclotella oc.	0.768	0.811	0.986	0.979	0.993	0.986	0.689	0.766	0.835	0.835	0.819	0.799
Cocconeis pl.	0.434	0.626	0.987	0.987	0.987	0.987	0.429	0.509	0.517	0.506	0.432	0.503
Cavinula scu.	0.680	0.734	0.970	0.977	0.958	0.964	0.630	0.631	0.800	0.746	0.738	0.729
Diploneis mau.	0.665	0.724	0.995	1.000	1.000	1.000	0.647	0.564	0.678	0.651	0.675	0.654
Navicula pre.	0.676	0.757	0.995	0.995	0.995	0.995	0.649	0.658	0.632	0.646	0.621	0.621
Navicula rot.	0.715	0.745	0.986	0.986	0.995	0.986	0.697	0.649	0.719	0.701	0.702	0.713
Navicula subr.	0.605	0.735	0.985	0.974	0.964	0.974	0.575	0.597	0.682	0.668	0.667	0.667
Staurosirella pin.	0.605	0.697	0.991	0.991	1.000	1.000	0.523	0.532	0.566	0.589	0.535	0.568

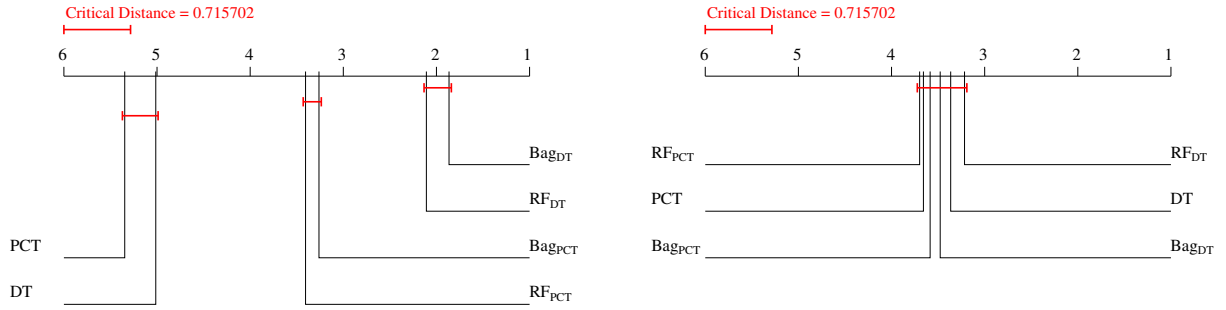
Table 49: Predictive performance of the methods (columns) on all targets (rows) of the *WaterQuality-nom* dataset, evaluated by using macro F as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Cladophora sp.	0.511	0.643	0.993	0.996	0.995	0.998	0.562	0.620	0.663	0.657	0.654	0.667
Gongrosira inc.	0.423	0.478	0.988	1.000	0.988	1.000	0.423	0.468	0.499	0.484	0.499	0.503
Oedogonium sp.	0.416	0.637	0.985	0.997	0.979	0.991	0.489	0.588	0.643	0.627	0.620	0.645
Stigeoclonium ten.	0.443	0.601	0.972	0.987	0.970	0.987	0.459	0.580	0.617	0.648	0.596	0.634
Melosira var.	0.608	0.694	0.995	0.995	0.994	0.993	0.587	0.643	0.690	0.685	0.691	0.690
Nitzschia pal.	0.721	0.751	0.987	0.990	0.985	0.990	0.716	0.719	0.737	0.736	0.736	0.741
Audouinella ch.	0.574	0.533	0.969	0.991	0.978	0.992	0.563	0.500	0.563	0.577	0.547	0.582
Erpobdella oc.	0.418	0.599	0.985	0.993	0.975	0.991	0.452	0.615	0.618	0.626	0.625	0.625
Gammarus fo.	0.654	0.708	0.994	0.996	0.994	0.997	0.638	0.683	0.688	0.713	0.687	0.721
Baetis rh.	0.531	0.679	0.995	0.998	0.994	0.997	0.507	0.629	0.676	0.707	0.660	0.696
Hydropsyche sp.	0.620	0.672	0.995	0.995	0.990	0.998	0.617	0.647	0.687	0.672	0.697	0.688
Rhyacophila sp.	0.662	0.647	0.988	0.998	0.988	0.998	0.649	0.624	0.672	0.665	0.692	0.671
Simulium sp.	0.388	0.503	0.995	0.998	0.995	0.997	0.388	0.489	0.591	0.612	0.611	0.609
Tubifex sp.	0.635	0.698	0.979	0.995	0.975	0.986	0.634	0.650	0.644	0.668	0.656	0.685

Table 50: Predictive performance of the methods (columns) on all targets (rows) of the *SoilQuality-nom* dataset, evaluated by using macro F as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

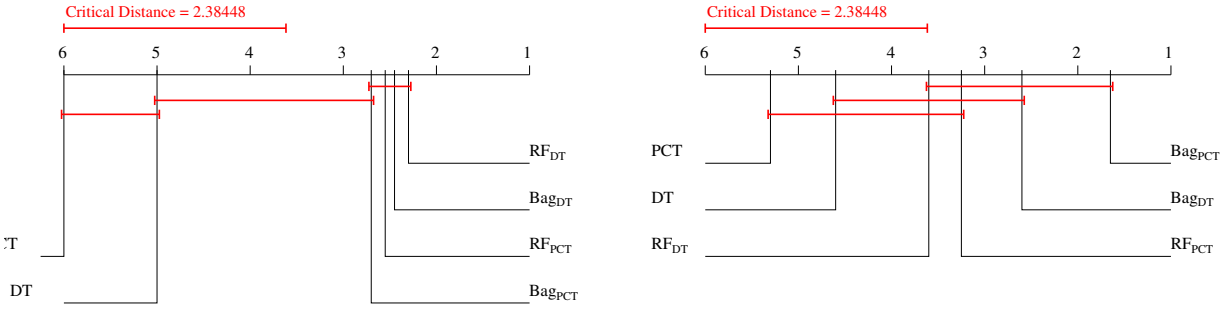
	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Anurida pyg.	0.463	0.612	0.757	0.742	0.722	0.708	0.463	0.566	0.694	0.697	0.682	0.664
Brachystomelle par.	0.682	0.790	0.854	0.852	0.845	0.850	0.680	0.784	0.823	0.821	0.810	0.823
Ceratophysella den.	0.481	0.827	0.844	0.839	0.840	0.833	0.481	0.804	0.819	0.818	0.819	0.825
Ceratophysella suc.	0.480	0.634	0.753	0.735	0.721	0.716	0.480	0.561	0.671	0.672	0.642	0.623
Entomobrya sp.	0.684	0.714	0.804	0.802	0.775	0.793	0.678	0.683	0.762	0.761	0.757	0.753
Folsomia fim.	0.611	0.687	0.810	0.810	0.800	0.804	0.612	0.684	0.755	0.758	0.759	0.755
Folsomia quad.	0.714	0.819	0.876	0.881	0.873	0.872	0.714	0.797	0.838	0.843	0.819	0.819
Folsomia spi.	0.494	0.494	0.494	0.494	0.494	0.494	0.494	0.494	0.528	0.513	0.494	0.494
Friesea mir.	0.479	0.800	0.850	0.845	0.845	0.845	0.479	0.790	0.842	0.835	0.848	0.845
Heteromurus nit.	0.493	0.493	0.542	0.542	0.493	0.493	0.493	0.493	0.491	0.491	0.491	0.492
Hypogastrua sp.	0.482	0.646	0.753	0.753	0.742	0.742	0.482	0.682	0.731	0.727	0.721	0.738
Isotoma ang.	0.592	0.743	0.841	0.841	0.832	0.836	0.591	0.732	0.798	0.798	0.794	0.795
Isotoma not.	0.543	0.736	0.835	0.837	0.820	0.830	0.499	0.717	0.795	0.793	0.793	0.797
Isotoma tig.	0.836	0.899	0.926	0.926	0.923	0.923	0.835	0.894	0.911	0.918	0.920	0.921
Isotomiella min.	0.475	0.689	0.793	0.796	0.769	0.756	0.506	0.673	0.744	0.750	0.742	0.721
Isotomodes arm.	0.495	0.495	0.738	0.738	0.495	0.495	0.495	0.495	0.582	0.514	0.521	0.522
Isotomodes bis.	0.493	0.493	0.694	0.645	0.694	0.645	0.493	0.493	0.670	0.676	0.664	0.671
Isotomodes prod.	0.578	0.664	0.799	0.808	0.792	0.801	0.578	0.684	0.766	0.772	0.749	0.756
Isotomurus pal.	0.639	0.813	0.874	0.872	0.860	0.861	0.638	0.778	0.830	0.840	0.827	0.825
Isotomurus sp.	0.497	0.819	0.819	0.692	0.819	0.692	0.497	0.526	0.819	0.686	0.728	0.793
Lepidocyrtus cy.	0.728	0.873	0.892	0.892	0.886	0.888	0.728	0.863	0.867	0.869	0.873	0.872
Lepidocyrtus lan.	0.488	0.733	0.855	0.855	0.851	0.851	0.488	0.739	0.820	0.822	0.843	0.840
Mesaphorura sp.	0.461	0.553	0.789	0.775	0.762	0.762	0.461	0.542	0.731	0.728	0.708	0.710
Neanura fam.	0.494	0.774	0.821	0.821	0.783	0.725	0.556	0.626	0.751	0.754	0.672	0.630
Neelus min.	0.659	0.755	0.831	0.831	0.825	0.825	0.659	0.756	0.801	0.801	0.802	0.802
Orchesella cin.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Orchesella vil.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Protaphorura sp.	0.658	0.767	0.808	0.808	0.802	0.800	0.656	0.782	0.773	0.773	0.780	0.776
Pseudosinella al.	0.665	0.720	0.816	0.814	0.788	0.802	0.600	0.680	0.763	0.766	0.736	0.742
Pseudosinella sex.	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Smint. sp.	0.655	0.690	0.805	0.805	0.800	0.801	0.634	0.664	0.752	0.753	0.756	0.758
Sminthurinus au.	0.774	0.833	0.880	0.879	0.880	0.878	0.774	0.825	0.836	0.831	0.833	0.846
Sminthurinus el.	0.431	0.526	0.744	0.737	0.725	0.726	0.431	0.535	0.680	0.680	0.677	0.678
Sminthurus vir.	0.487	0.487	0.487	0.487	0.487	0.487	0.487	0.487	0.486	0.486	0.487	0.487
Stenaphorura quad.	0.488	0.488	0.637	0.606	0.606	0.606	0.488	0.488	0.596	0.599	0.579	0.536
Tomocerus fl.	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499
Tomocerus min.	0.499	0.499	0.944	0.944	0.944	0.944	0.499	0.499	0.944	0.944	0.944	0.944
Tomocerus sp.	0.499	0.499	0.888	0.888	0.888	0.888	0.499	0.499	0.888	0.888	0.888	0.812
Willemia sp.	0.526	0.658	0.774	0.774	0.765	0.764	0.526	0.650	0.710	0.713	0.721	0.720

4.1.18. Average rank diagrams for each dataset for the macro F measure



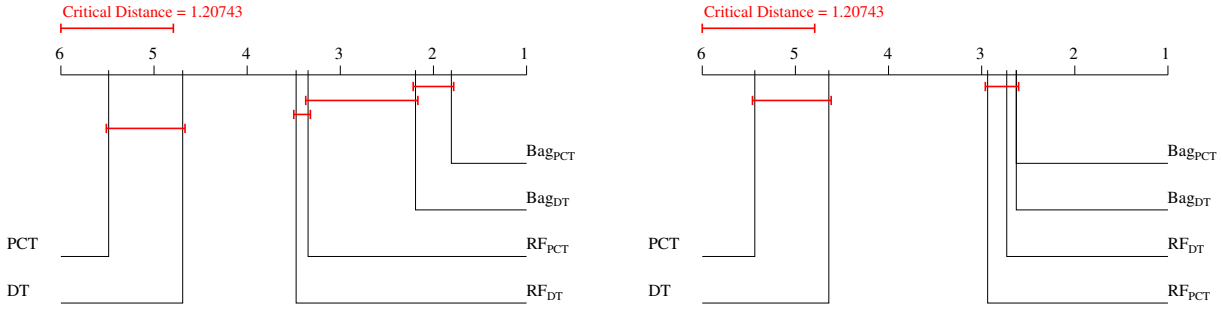
(a) Train (b) Cross-validation

Figure 45: The average rank diagrams for the macro F measure evaluation measure on the dataset *DiatomsAll-nom*.



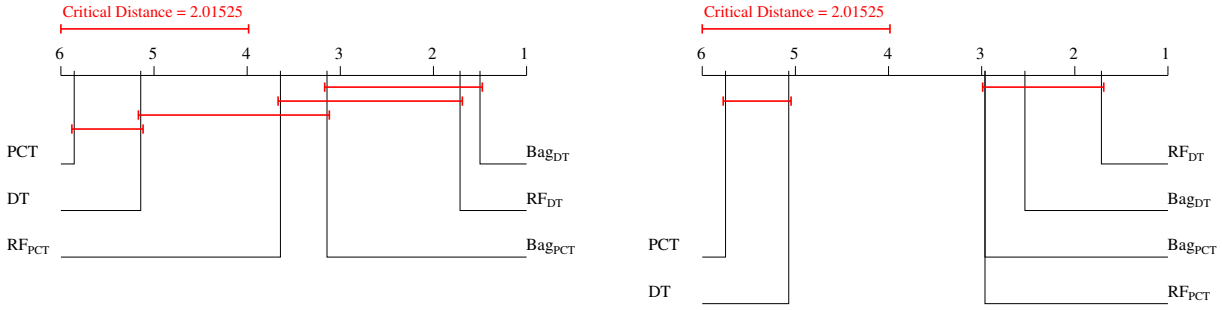
(a) Train (b) Cross-validation

Figure 46: The average rank diagrams for the macro F measure evaluation measure on the dataset *DiatomsTop10-nom*.



(a) Train (b) Cross-validation

Figure 47: The average rank diagrams for the macro F measure evaluation measure on the dataset *SoilQuality-nom*.



(a) Train (b) Cross-validation

Figure 48: The average rank diagrams for the macro F measure evaluation measure on the dataset *WaterQuality-nom*.

4.1.19. Results for the macro Matthews correlation coefficient measure

Table 51: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using macro Matthews correlation coefficient as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Amphora aeq.	0.000	0.000	0.725	0.944	0.529	0.824	0.000	0.000	0.000	0.000	0.000	0.000
Achnanthidium cl.	0.000	0.218	0.871	0.987	0.845	1.000	-0.038	-0.133	-0.053	0.012	-0.038	0.039
Achnanthidium cl. bal.	0.416	0.511	0.929	0.969	0.949	0.980	0.315	0.396	0.321	0.330	0.345	0.343
Achnanthes sp.	0.000	0.000	0.000	0.000	0.000	0.704	0.000	0.000	0.000	0.000	0.000	0.000
Amphora cop.	0.092	0.338	0.980	1.000	0.990	0.990	-0.096	0.085	0.147	0.037	0.037	0.039
Amphora fog.	0.000	0.000	0.000	0.649	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Achnanthes lac.	0.000	0.428	0.954	0.977	0.930	0.977	-0.013	0.000	0.054	-0.034	-0.039	-0.033
Amphora in.	0.000	0.438	0.845	0.913	0.845	0.935	0.000	0.072	0.000	-0.044	0.000	-0.036
Achnanthidium min.	0.000	0.000	0.626	0.794	0.671	0.830	0.000	0.000	0.000	-0.020	0.000	0.000
Amphora ov.	0.000	0.000	0.751	0.841	0.000	0.751	0.000	0.000	0.000	0.000	0.000	0.000
Amphora ped.	0.450	0.527	0.927	0.948	0.896	0.948	0.343	0.298	0.381	0.375	0.381	0.383
Amphora th.	0.000	0.000	0.714	0.935	0.578	0.901	0.000	0.000	0.000	-0.028	0.000	0.000
Aulacoseira gra.	0.000	0.000	0.654	0.922	0.457	0.840	0.000	0.000	0.000	0.127	0.000	-0.023
Amphora ven.	0.000	0.000	0.443	0.443	0.628	0.443	0.000	0.000	-0.010	-0.010	0.000	0.000
Cymbella aff.	0.000	0.000	0.373	0.841	0.373	0.649	0.000	0.000	-0.012	-0.012	0.000	0.000
Cocconeis dis.	0.000	0.000	0.703	0.951	0.638	0.847	0.000	0.000	0.000	0.092	0.000	0.198
Cymatopleura el.	0.313	0.365	0.781	0.938	0.828	0.851	-0.037	0.050	-0.026	0.271	0.000	0.251
Cyclotella jur. nud.	0.508	0.574	0.947	0.958	0.906	0.958	0.386	0.373	0.505	0.452	0.519	0.450
Cymbella lan.	0.555	0.491	0.873	0.906	0.873	0.906	0.105	0.107	0.296	0.207	0.000	0.321
Cyclotella men.	0.000	0.000	0.811	0.811	0.878	0.738	0.000	0.000	-0.025	0.000	0.000	0.000
Cocconeis neo.	0.000	0.000	0.815	0.815	0.575	0.815	0.000	0.000	0.000	0.000	0.000	0.000
Cyclotella oc.	0.556	0.697	0.931	0.959	0.972	0.972	0.395	0.492	0.566	0.678	0.608	0.625
Cocconeis pl.	0.218	0.412	0.897	0.974	0.897	0.974	-0.006	0.146	0.123	0.060	0.060	0.145
Cocconeis pl. eug.	0.000	0.000	0.665	0.730	0.512	0.665	0.000	0.000	0.000	0.000	0.000	0.000
Cocconeis pl. li.	0.000	0.393	0.946	0.987	0.878	0.987	0.000	0.079	0.000	0.087	0.000	-0.063
Caloneis sch.	0.000	0.000	0.833	0.946	0.833	0.802	0.000	0.000	0.000	-0.045	0.000	0.000
Cavinula scu.	0.456	0.568	0.943	0.954	0.908	0.931	0.330	0.357	0.516	0.528	0.514	0.514
Cymbella neo.	0.000	0.000	0.512	0.790	0.665	0.790	0.000	0.000	0.000	0.000	0.000	0.000
Diatoma ang.	0.000	0.000	0.672	0.862	0.469	0.802	0.000	0.000	0.000	-0.039	0.000	-0.022
Diploneis mau.	0.332	0.449	0.991	1.000	0.991	1.000	0.186	0.130	0.413	0.302	0.385	0.311
Diploneis mod.	0.000	0.000	0.539	0.767	0.624	0.699	0.000	0.000	0.000	-0.043	0.000	0.000
Diploneis ov.	0.249	0.391	0.954	0.989	0.977	0.966	0.111	0.151	0.196	0.132	0.192	0.286
Epithemia ad.	0.000	0.000	0.695	0.792	0.745	0.695	0.000	0.000	0.210	-0.018	0.000	0.000
Encyonema cae.	0.000	0.000	0.451	0.695	0.367	0.695	0.000	0.000	0.000	0.000	0.000	0.000
Encyonema min.	0.000	0.000	0.771	0.000	0.443	0.443	0.000	0.000	0.000	0.000	0.000	0.000
Encyonopsis mic.	0.000	0.000	0.710	0.781	0.746	0.848	0.000	0.000	-0.021	-0.036	-0.021	-0.021
Encyonema sil.	0.000	0.000	0.489	0.697	0.489	0.697	0.000	0.000	0.000	-0.016	0.000	0.000
Epithemia so.	0.000	0.000	0.666	0.852	0.689	0.890	0.000	-0.071	-0.041	-0.077	0.000	-0.065
Fragilaria cap.	0.000	0.000	0.665	0.931	0.686	0.983	0.000	-0.101	0.000	0.098	0.000	0.079
Fragilaria cap. va.	0.000	0.000	0.572	0.404	0.702	0.702	0.000	0.000	-0.011	-0.011	0.000	0.000
Fallacia och.	0.000	0.426	0.822	0.984	0.788	0.937	0.000	0.085	0.000	0.023	0.000	-0.045
Fragilaria par.	0.000	0.472	0.607	0.805	0.651	0.873	0.000	-0.029	0.000	0.255	0.000	0.146
Frustulia vul.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gomphonema cl.	0.000	0.000	0.000	0.404	0.000	0.404	0.000	0.000	0.000	0.000	0.000	0.000
Geissleria dec.	0.000	0.359	0.930	0.988	0.930	1.000	-0.058	0.044	-0.007	-0.020	-0.038	0.000
Gomphonema it.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gomphonema min.	0.000	0.000	0.773	0.928	0.518	0.928	0.000	-0.059	0.000	-0.034	0.000	0.000
Gomphonema ol. Horn.	0.000	0.000	0.746	0.880	0.781	0.848	0.000	0.000	0.000	0.000	0.000	-0.021
Gomphonema par.	0.000	0.000	0.754	0.935	0.671	0.830	0.000	0.000	-0.028	-0.028	0.000	-0.020
Gomphonema pum.	0.000	0.000	0.688	0.840	0.654	0.840	0.000	-0.023	0.000	0.084	0.000	0.181
Gomphonema ol.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gomphonema sar.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gomphonema ter.	0.000	0.000	0.730	0.847	0.730	0.847	0.000	0.000	0.000	-0.016	0.000	0.000
Gyrosigma mac.	0.268	0.480	0.947	0.989	0.968	0.979	0.168	0.206	0.118	0.149	0.163	0.169
Hannea ar.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hantzschia amp.	0.000	0.000	0.000	0.443	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hippodonta ros.	0.000	0.000	0.000	0.000	0.000	0.443	0.000	0.000	0.000	0.000	0.000	0.000

Table 51: (ctd) Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsAll-nom* dataset, evaluated by using macro Matthews correlation coefficient as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**	**PCT**	**DT**	**Bag_{PCT}**	**Bag_{DT}**	**RF_{PCT}**	**RF_{DT}**
Meridion cir. con.	0.000	0.000	0.751	0.649	0.000	0.528	0.000	0.000	-0.012	0.000	0.000	0.000
Meridion cir.	0.000	0.000	0.000	0.000	0.000	0.575	0.000	0.000	0.000	0.000	0.000	0.000
Martyana mar.	0.000	0.000	0.572	0.702	0.404	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nitzschia alp.	0.000	0.000	0.700	0.862	0.785	0.605	0.000	0.000	0.000	0.000	0.000	0.000
Navicula ant.	0.000	0.281	0.723	0.926	0.808	0.906	0.000	-0.049	-0.028	-0.081	-0.028	-0.064
Navicula cap.	0.000	0.363	0.828	0.926	0.745	0.963	0.000	-0.043	0.000	0.033	0.000	0.062
Navicula cry.	0.000	0.000	0.000	0.464	0.000	0.569	0.000	0.000	0.000	0.000	0.000	0.000
Nitzschia dis.	0.000	0.000	0.569	0.738	0.464	0.659	0.000	0.000	-0.014	-0.014	0.000	0.000
Neidium du.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.008	0.000	0.000
Navicula gre.	0.000	0.000	0.000	0.373	0.649	0.373	0.000	0.000	0.000	0.000	0.000	0.000
Navicula has.	0.000	0.000	0.417	0.730	0.593	0.730	0.000	0.000	0.000	0.000	0.000	0.000
Navicula krs.	0.302	0.399	0.990	1.000	0.990	0.990	0.155	0.097	0.236	0.185	0.213	0.250
Navicula lan.	0.000	0.000	0.000	0.649	0.000	0.373	0.000	0.000	0.000	0.000	0.000	0.000
Nupela la.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nitzschia lin.	0.000	0.000	0.420	0.647	0.342	0.694	0.000	0.000	0.000	0.000	0.000	0.000
Navicula pra.	0.363	0.396	0.930	1.000	0.977	1.000	0.031	0.068	0.026	0.100	0.027	0.017
Navicula pre.	0.399	0.523	0.981	0.990	0.990	0.990	0.291	0.324	0.276	0.293	0.322	0.251
Navicula pro.	0.237	0.323	0.959	1.000	0.918	1.000	-0.008	0.247	0.031	0.222	-0.036	0.205
Nitzschia rec.	0.000	0.000	0.746	0.911	0.544	0.781	0.000	0.000	0.000	0.141	0.000	0.141
Navicula rei.	0.344	0.457	0.907	0.960	0.880	0.974	0.171	0.310	0.128	0.130	0.111	0.128
Navicula rot.	0.427	0.511	0.964	0.973	0.964	0.973	0.408	0.307	0.392	0.402	0.399	0.427
Navicula subh.	0.305	0.489	0.947	0.987	0.960	0.987	-0.074	0.237	-0.105	0.048	-0.036	0.026
Navicula subr.	0.314	0.482	0.950	0.950	0.920	0.950	0.206	0.234	0.276	0.355	0.287	0.370
Nitzschia suba.	0.415	0.452	0.943	0.981	0.981	0.981	0.219	0.314	0.381	0.337	0.338	0.296
Navicula tri.	0.000	0.327	0.874	0.972	0.860	0.959	-0.071	-0.016	-0.071	-0.044	-0.071	-0.051
Navicula vircl.	0.267	0.325	0.929	0.986	0.915	1.000	0.053	0.049	0.036	0.005	-0.049	-0.017
Navicula virdu.	0.459	0.000	0.792	0.855	0.759	0.855	0.094	-0.062	0.254	0.136	0.000	0.214
Orthoseira ros.	0.000	0.000	0.941	0.941	0.941	1.000	0.000	0.000	-0.014	-0.014	0.000	0.000
Placoneis bal.	0.366	0.553	1.000	0.991	0.991	0.991	0.191	0.363	0.381	0.443	0.323	0.445
Pinnularia bor.	0.000	0.000	0.921	0.921	0.792	0.921	0.000	0.000	-0.031	0.000	0.000	0.000
Placoneis min.	0.000	0.000	0.572	0.572	0.404	0.572	0.000	0.000	0.000	0.000	0.000	0.000
Placoneis elg.	0.000	0.000	0.464	0.464	0.569	0.464	0.000	0.000	0.000	0.000	0.000	0.000
Planothidium lan.	0.000	0.000	0.865	0.941	0.802	0.956	0.000	-0.067	-0.047	-0.089	0.000	-0.067
Planothidium ros.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Placoneis neo.	0.251	0.422	0.924	0.988	0.925	0.988	0.074	0.121	0.090	0.074	0.056	0.029
Pseudostaurosira bre.	0.148	0.260	1.000	1.000	1.000	1.000	0.090	-0.191	0.100	0.031	0.070	0.148
Pinnularia subc.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rhoicosphenia abb.	0.000	0.331	0.881	0.983	0.845	0.967	0.000	-0.044	-0.030	0.059	-0.030	0.014
Rhopalodia gib.	0.000	0.000	0.755	0.808	0.728	0.883	0.000	0.000	0.116	0.116	-0.024	-0.024
Reimeria sin.	0.000	0.000	0.755	0.755	0.566	0.860	0.000	0.000	0.000	-0.016	0.000	0.000
Surirella ang.	0.000	0.000	0.694	0.858	0.647	0.858	0.000	0.000	0.000	-0.019	0.000	0.000
Surirella min.	0.000	0.000	0.619	0.848	0.670	0.807	0.000	0.000	-0.018	0.000	0.000	0.000
Sellaphora perb.	0.234	0.445	0.935	1.000	0.957	0.989	0.046	0.141	-0.036	0.074	0.014	0.119
Sellaphora pu.	0.231	0.336	0.958	0.990	0.948	0.990	0.068	0.016	0.060	0.119	0.004	0.092
Stauroneis gra.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Staurosira con. bin.	0.000	0.000	0.775	0.824	0.668	0.723	0.000	0.000	0.000	-0.024	0.000	0.000
Staurosira con.	0.183	0.358	1.000	1.000	0.981	0.990	0.021	0.091	0.072	0.140	0.068	0.143
Staurosira con. ven.	0.000	0.000	0.000	0.497	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Stauroneis pho.	0.000	0.000	0.327	0.659	0.464	0.569	0.000	0.000	0.000	0.000	0.000	0.000
Staurosirella pin.	0.233	0.411	0.991	0.981	0.972	1.000	0.078	0.036	0.100	0.179	0.144	0.141
Stauroneis sm.	0.000	0.000	0.000	0.497	0.497	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Tryblionella ang.	0.000	0.000	0.753	0.983	0.715	0.967	0.000	-0.087	0.000	-0.068	0.000	0.000
Tabellaria floc.	0.000	0.000	0.941	0.941	0.941	0.941	0.000	0.000	0.222	-0.014	0.000	0.000
Ulnaria ul.	0.000	0.000	0.593	0.900	0.665	0.730	0.000	0.000	0.000	0.153	0.000	0.294

Table 52: Predictive performance of the methods (columns) on all targets (rows) of the *DiatomsTop10-nom* dataset, evaluated by using macro Matthews correlation coefficient as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Amphora ped.	0.399	0.527	0.917	0.948	0.937	0.948	0.326	0.293	0.448	0.375	0.423	0.383
Cyclotella jur. nud.	0.473	0.574	0.958	0.958	0.926	0.958	0.293	0.363	0.508	0.452	0.530	0.450
Cyclotella oc.	0.591	0.659	0.972	0.959	0.986	0.972	0.386	0.548	0.678	0.678	0.659	0.625
Cocconeis pl.	0.000	0.329	0.974	0.974	0.974	0.974	-0.065	0.070	0.158	0.060	-0.038	0.145
Cavinula scu.	0.457	0.529	0.943	0.954	0.920	0.931	0.290	0.285	0.623	0.528	0.528	0.514
Diploneis mau.	0.330	0.449	0.991	1.000	1.000	1.000	0.294	0.130	0.357	0.302	0.359	0.311
Navicula pre.	0.353	0.523	0.990	0.990	0.990	0.990	0.298	0.324	0.265	0.293	0.247	0.251
Navicula rot.	0.431	0.505	0.973	0.973	0.991	0.973	0.396	0.299	0.439	0.402	0.407	0.427
Navicula subr.	0.348	0.482	0.970	0.950	0.930	0.950	0.270	0.234	0.406	0.355	0.381	0.370
Staurosirella pin.	0.213	0.411	0.981	0.981	1.000	1.000	0.049	0.065	0.134	0.179	0.075	0.141

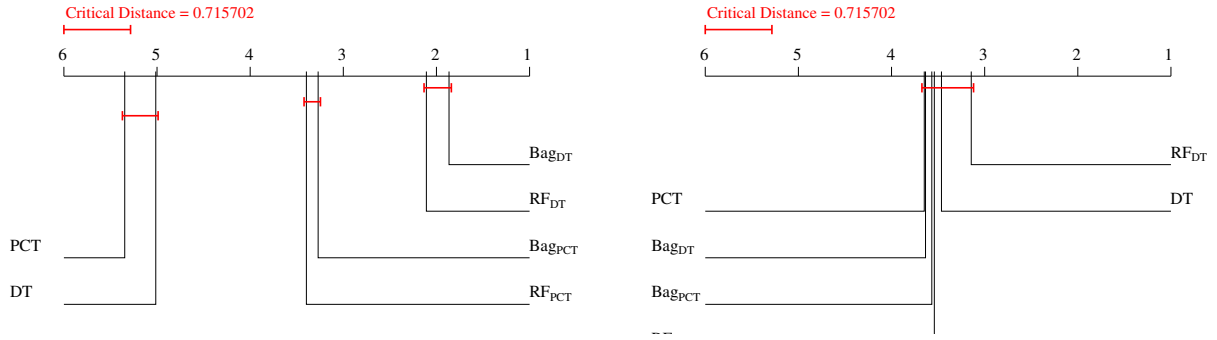
Table 53: Predictive performance of the methods (columns) on all targets (rows) of the *WaterQuality-nom* dataset, evaluated by using macro Matthews correlation coefficient as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Cladophora sp.	0.090	0.324	0.987	0.992	0.990	0.996	0.133	0.249	0.328	0.315	0.310	0.335
Gongrosira inc.	0.000	0.159	0.976	1.000	0.976	1.000	0.000	0.043	0.137	0.042	0.164	0.110
Oedogonium sp.	0.000	0.312	0.970	0.993	0.959	0.982	0.097	0.203	0.323	0.276	0.295	0.315
Stigeoclonium ten.	0.000	0.290	0.945	0.974	0.942	0.974	0.047	0.223	0.305	0.334	0.276	0.315
Melosira var.	0.274	0.388	0.991	0.991	0.989	0.987	0.198	0.297	0.380	0.371	0.382	0.379
Nitzschia pal.	0.443	0.502	0.973	0.981	0.969	0.981	0.433	0.440	0.482	0.476	0.480	0.488
Audouinella ch.	0.212	0.216	0.939	0.982	0.957	0.985	0.203	0.106	0.238	0.226	0.214	0.253
Erpobdella oc.	0.000	0.303	0.970	0.986	0.951	0.981	0.033	0.265	0.264	0.267	0.281	0.270
Gammarus fo.	0.323	0.455	0.988	0.992	0.988	0.994	0.302	0.408	0.411	0.439	0.417	0.455
Baetis rh.	0.170	0.372	0.989	0.996	0.987	0.994	0.131	0.275	0.387	0.427	0.368	0.408
Hydropsyche sp.	0.268	0.391	0.990	0.990	0.981	0.996	0.243	0.326	0.374	0.343	0.395	0.376
Rhyacophila sp.	0.328	0.321	0.976	0.996	0.976	0.996	0.316	0.272	0.364	0.338	0.404	0.352
Simulium sp.	0.000	0.224	0.990	0.996	0.990	0.994	0.000	0.145	0.238	0.255	0.289	0.252
Tubifex sp.	0.320	0.416	0.959	0.991	0.950	0.973	0.315	0.320	0.320	0.348	0.343	0.383

Table 54: Predictive performance of the methods (columns) on all targets (rows) of the *SoilQuality-nom* dataset, evaluated by using macro Matthews correlation coefficient as evaluation measure. We give the performance on the training set (*Train*) and the performance on unseen data estimated by 10-fold cross-validation (*10-fold cross-validation*).

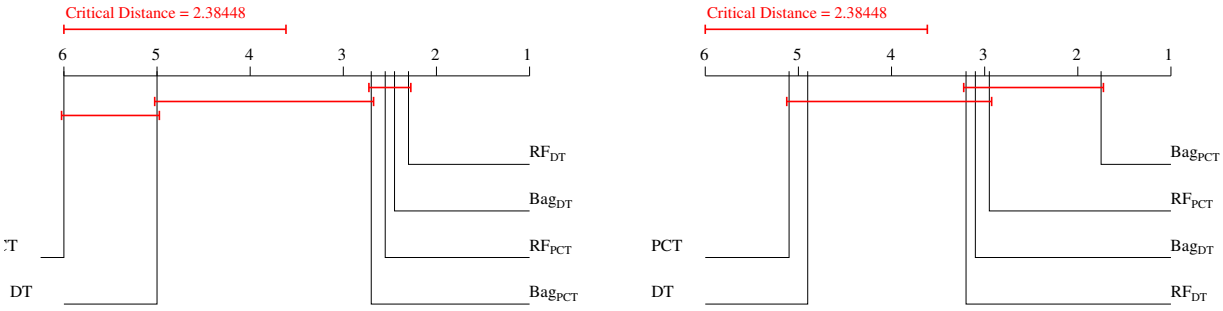
	Train						10-fold cross-validation					
	PCT	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**	**PCT**	**DT**	**Bag$_{PCT}$**	**Bag$_{DT}$**	**RF$_{PCT}$**	**RF$_{DT}$**
Anurida pyg.	0.000	0.306	0.520	0.500	0.467	0.452	0.000	0.221	0.394	0.402	0.384	0.358
Brachystomelle par.	0.389	0.581	0.709	0.707	0.693	0.703	0.385	0.570	0.649	0.645	0.625	0.649
Ceratophysella den.	0.000	0.655	0.688	0.678	0.680	0.668	0.000	0.611	0.638	0.636	0.638	0.651
Ceratophysella suc.	0.000	0.311	0.522	0.501	0.481	0.477	0.000	0.160	0.347	0.351	0.303	0.268
Entomobrya sp.	0.387	0.493	0.622	0.621	0.586	0.610	0.376	0.418	0.528	0.528	0.538	0.524
Folsomia fim.	0.223	0.407	0.621	0.621	0.600	0.608	0.224	0.383	0.511	0.515	0.518	0.510
Folsomia quad.	0.457	0.649	0.753	0.761	0.746	0.744	0.457	0.597	0.677	0.686	0.640	0.641
Folsomia spi.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.075	0.048	-0.006	0.000
Friesea mir.	0.000	0.601	0.704	0.698	0.698	0.698	0.000	0.579	0.686	0.672	0.698	0.693
Heteromurus nit.	0.000	0.000	0.158	0.158	0.000	0.000	0.000	0.000	-0.015	-0.014	-0.013	-0.009
Hypogastrua sp.	0.000	0.398	0.546	0.546	0.531	0.531	0.000	0.429	0.473	0.469	0.491	0.516
Isotoma ang.	0.186	0.516	0.682	0.682	0.663	0.672	0.185	0.483	0.596	0.595	0.587	0.589
Isotoma not.	0.126	0.480	0.671	0.674	0.640	0.660	0.067	0.437	0.589	0.586	0.585	0.594
Isotoma tig.	0.677	0.803	0.852	0.852	0.846	0.846	0.676	0.792	0.822	0.837	0.841	0.844
Isotomiella min.	0.000	0.426	0.589	0.594	0.550	0.530	0.123	0.384	0.491	0.504	0.491	0.454
Isotomodes arm.	0.000	0.000	0.480	0.480	0.000	0.000	0.000	0.000	0.168	0.032	0.079	0.093
Isotomodes bis.	0.000	0.000	0.434	0.397	0.434	0.397	0.000	0.000	0.343	0.362	0.337	0.355
Isotomodes prod.	0.237	0.406	0.609	0.619	0.591	0.609	0.237	0.394	0.533	0.546	0.502	0.520
Isotomurus pal.	0.307	0.626	0.748	0.745	0.723	0.725	0.306	0.558	0.662	0.680	0.658	0.655
Isotomurus sp.	0.000	0.638	0.638	0.445	0.638	0.445	0.000	0.073	0.638	0.422	0.496	0.587
Lepidocyrtus cy.	0.488	0.747	0.784	0.784	0.772	0.777	0.488	0.727	0.735	0.738	0.745	0.743
Lepidocyrtus lan.	0.000	0.509	0.715	0.715	0.711	0.711	0.000	0.519	0.648	0.653	0.695	0.689
Mesaphorura sp.	0.000	0.231	0.582	0.563	0.548	0.548	0.000	0.197	0.469	0.474	0.442	0.449
Neanura fam.	0.000	0.550	0.645	0.645	0.568	0.497	0.123	0.262	0.502	0.509	0.350	0.296
Neelus min.	0.403	0.549	0.665	0.666	0.655	0.656	0.403	0.529	0.605	0.606	0.608	0.607
Orchesella cin.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Orchesella vil.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Protaphorura sp.	0.351	0.541	0.629	0.629	0.610	0.610	0.351	0.564	0.552	0.552	0.564	0.559
Pseudosinella al.	0.340	0.459	0.633	0.628	0.590	0.611	0.236	0.390	0.528	0.534	0.482	0.497
Pseudosinella sex.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Smint. sp.	0.334	0.436	0.611	0.611	0.600	0.603	0.268	0.382	0.504	0.507	0.513	0.515
Sminthurinus au.	0.595	0.675	0.760	0.759	0.761	0.756	0.596	0.661	0.672	0.661	0.667	0.692
Sminthurinus el.	0.000	0.232	0.505	0.498	0.482	0.483	0.000	0.191	0.372	0.373	0.386	0.383
Sminthurus vir.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.016	-0.013	0.000	0.000
Stenaphorura quad.	0.000	0.000	0.328	0.291	0.291	0.291	0.000	0.000	0.234	0.250	0.226	0.138
Tomocerus fl.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Tomocerus min.	0.000	0.000	0.894	0.894	0.894	0.894	0.000	0.000	0.894	0.894	0.894	0.894
Tomocerus sp.	0.000	0.000	0.782	0.782	0.782	0.782	0.000	0.000	0.782	0.782	0.782	0.623
Willemia sp.	0.270	0.390	0.561	0.561	0.548	0.545	0.270	0.352	0.426	0.431	0.452	0.451

4.1.20. Average rank diagrams for each dataset for the macro Matthews correlation coefficient measure



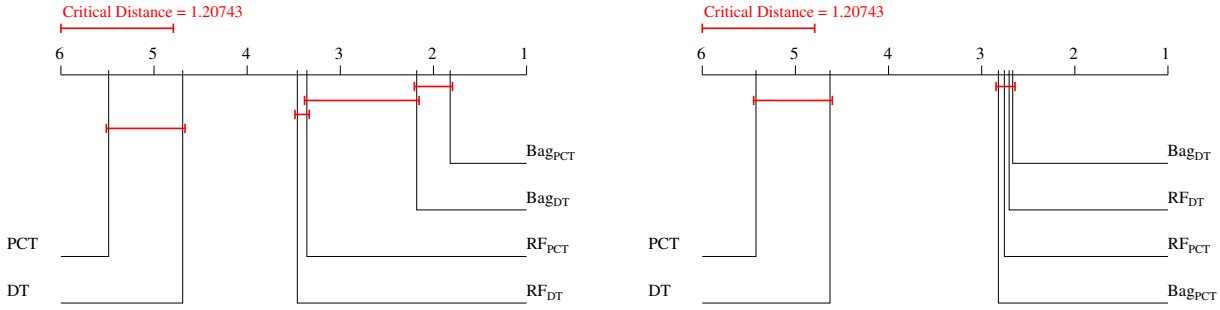
(a) Train (b) Cross-validation

Figure 49: The average rank diagrams for the macro Matthews correlation coefficient evaluation measure on the dataset *DiatomsAll-nom*.



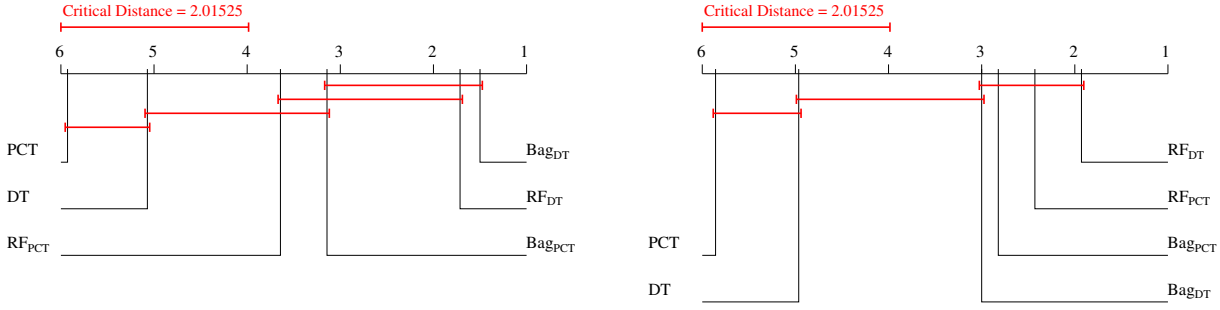
(a) Train (b) Cross-validation

Figure 50: The average rank diagrams for the macro Matthews correlation coefficient evaluation measure on the dataset *DiatomsTop10-nom*.



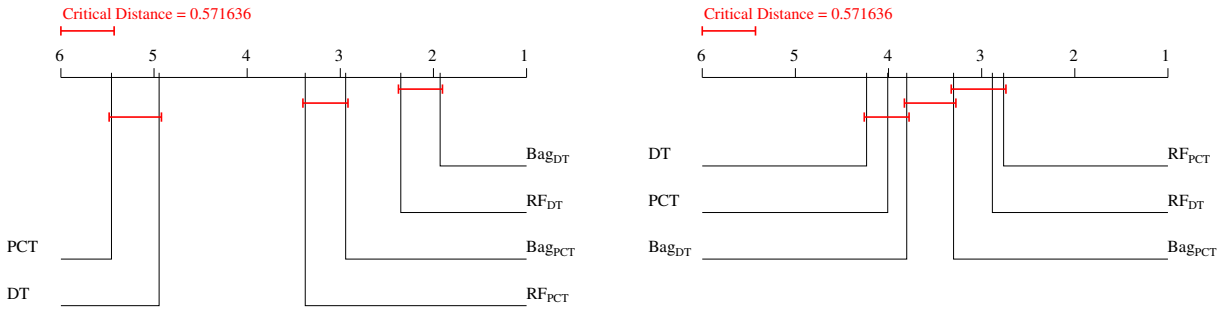
(a) Train (b) Cross-validation

Figure 51: The average rank diagrams for the macro Matthews correlation coefficient evaluation measure on the dataset *SoilQuality-nom*.



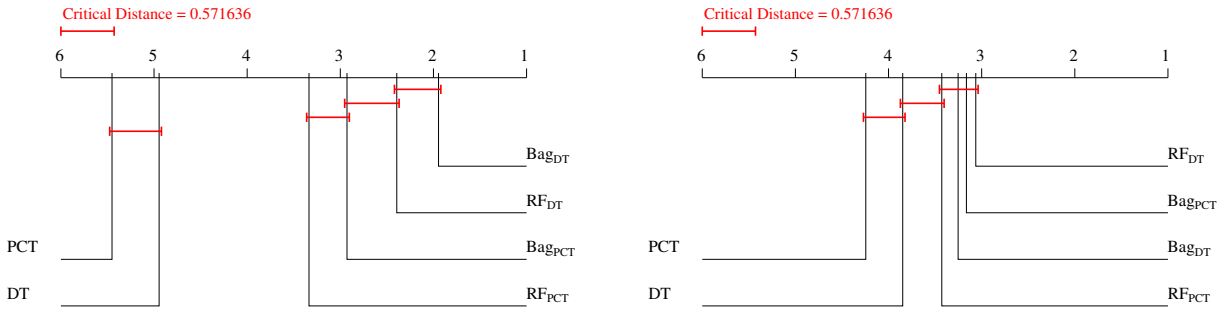
(a) Train (b) Cross-validation

Figure 52: The average rank diagrams for the macro Matthews correlation coefficient evaluation measure on the dataset *WaterQuality-nom*.



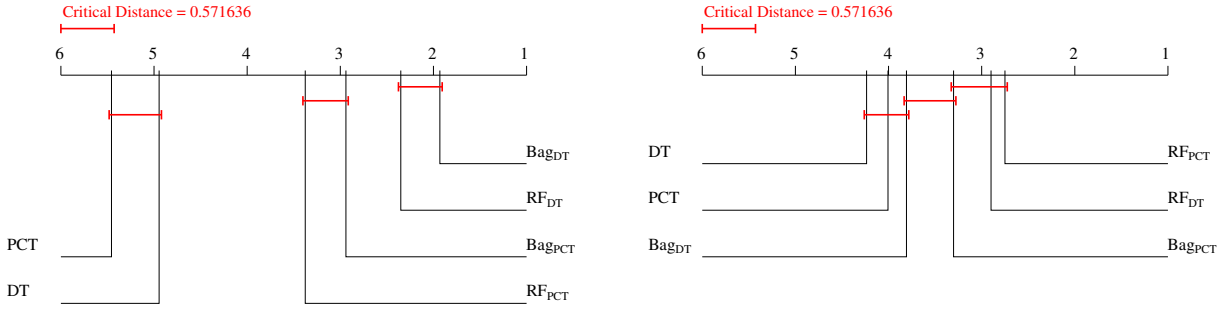
(a) Train (b) Cross-validation

Figure 53: The average rank diagrams for the micro balanced accuracy evaluation measure for all datasets that contain information about species presence/absence.



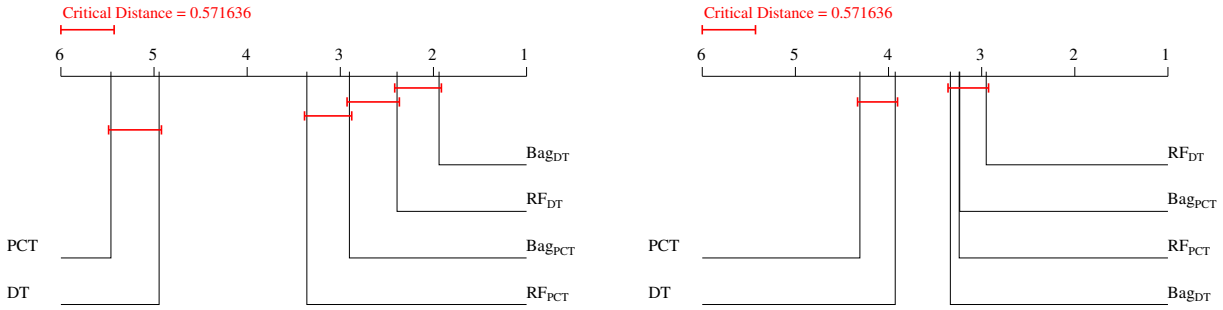
(a) Train (b) Cross-validation

Figure 54: The average rank diagrams for the macro balanced accuracy evaluation measure for all datasets that contain information about species presence/absence.



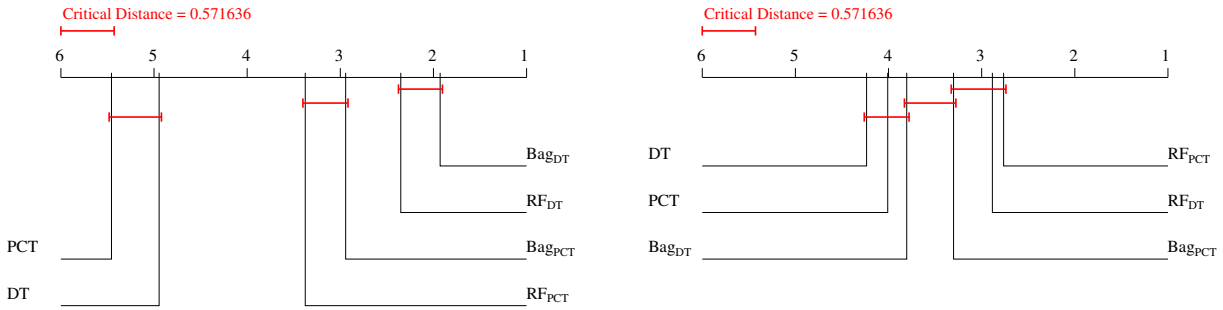
(a) Train (b) Cross-validation

Figure 55: The average rank diagrams for the micro Matthews correlation coefficient evaluation measure for all datasets that contain information about species presence/absence.



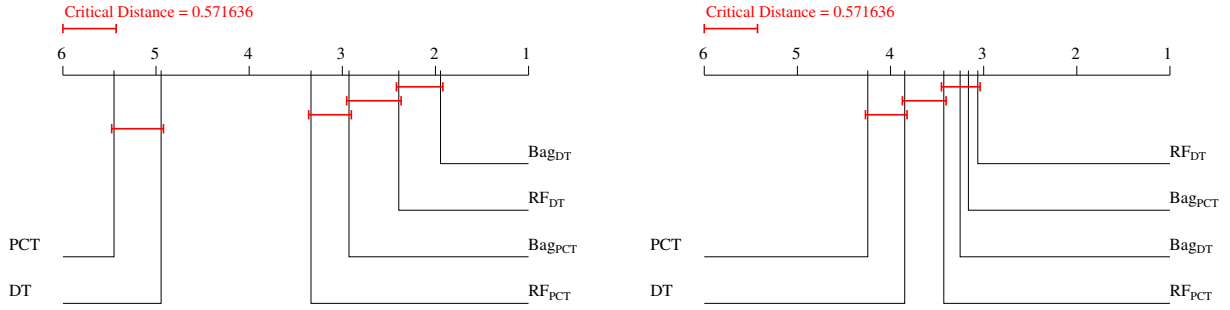
(a) Train (b) Cross-validation

Figure 56: The average rank diagrams for the macro Matthews correlation coefficient evaluation measure for all datasets that contain information about species presence/absence.



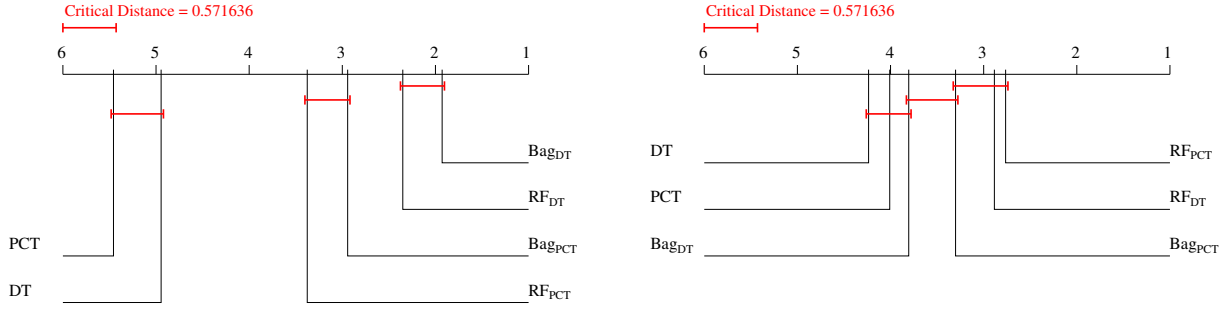
(a) Train (b) Cross-validation

Figure 57: The average rank diagrams for the micro recall evaluation measure for all datasets that contain information about species presence/absence.



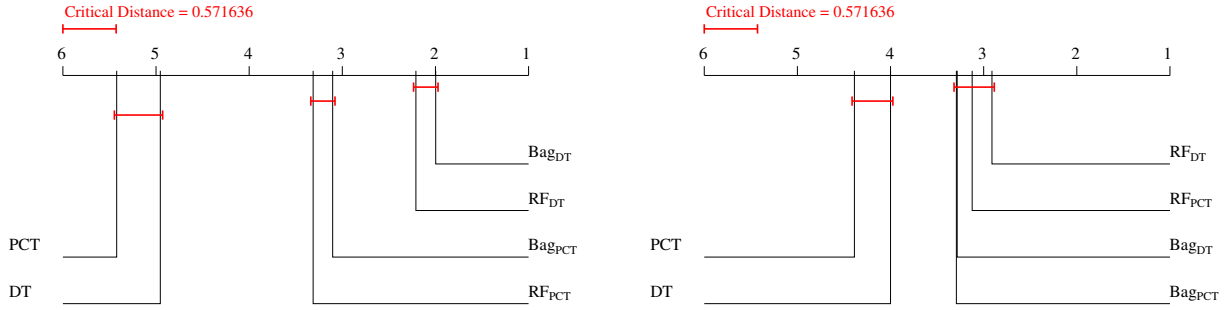
(a) Train (b) Cross-validation

Figure 58: The average rank diagrams for the macro recall evaluation measure for all datasets that contain information about species presence/absence.



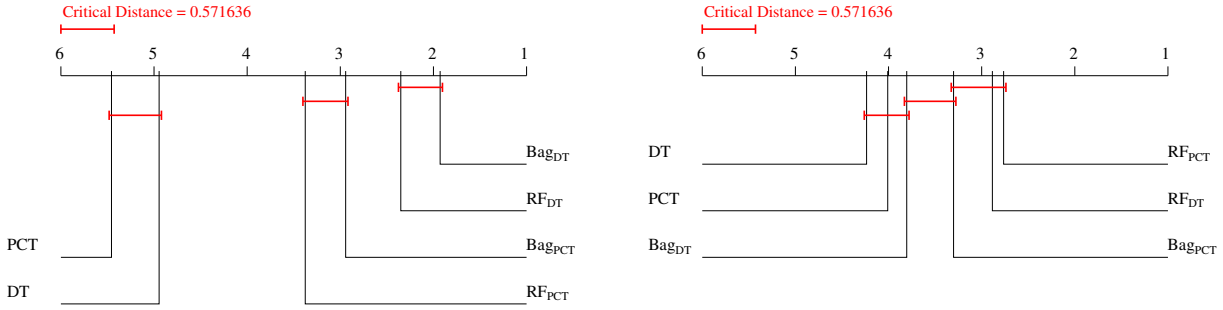
(a) Train (b) Cross-validation

Figure 59: The average rank diagrams for the micro precision evaluation measure for all datasets that contain information about species presence/absence.



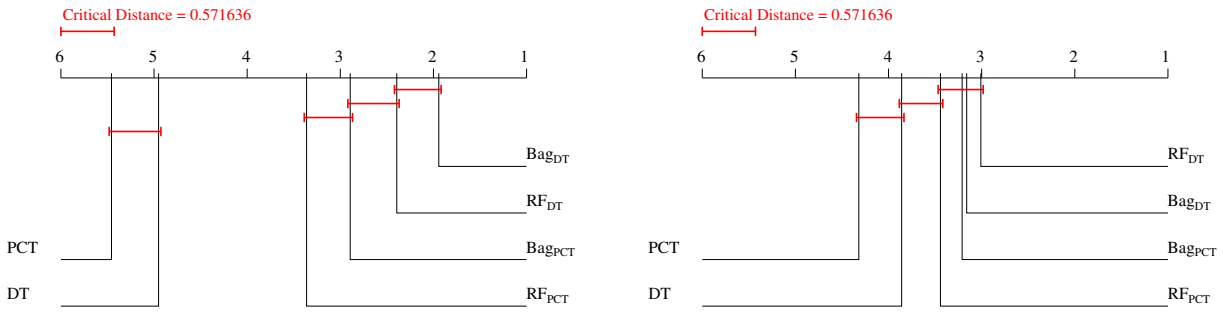
(a) Train (b) Cross-validation

Figure 60: The average rank diagrams for the macro precision evaluation measure for all datasets that contain information about species presence/absence.



(a) Train (b) Cross-validation

Figure 61: The average rank diagrams for the micro F-score evaluation measure for all datasets that contain information about species presence/absence.



(a) Train (b) Cross-validation

Figure 62: The average rank diagrams for the macro F-score evaluation measure for all datasets that contain information about species presence/absence.

4.3. Variable importance for the multi-target classification tasks

Table 55: Variable importance for the datasets that contain information about species presence/absense, obtained by feature ranking via random forests of multi-target trees.

	SoilQuality-nom		Diatoms All-nom		DiatomsTop10-nom		WaterQuality-nom	
	Desc. Attributes	Importance	Desc. Attributes	Importance	Desc. Attributes	Importance	Desc. Attributes	Importance
1	SoilTreatment-2	0.092	Cu	0.019	SO_4	0.125	CO_2	0.098
2	AnnualCrop	0.090	pH	0.019	N_{org}	0.125	NO_3	0.097
3	WinterCrop	0.090	N_{total}	0.019	K	0.125	Hardness	0.094
4	FertilizerType	0.090	Mn	0.018	pH	0.124	PO_4	0.094
5	AnnualCrop-1	0.090	Conductivity	0.018	Cu	0.123	SiO_2	0.094
6	MultiCrop-3	0.090	N_{org}	0.018	P_{total}	0.123	pH	0.090
7	MonthsSubshallow	0.090	Mg	0.018	Zn	0.123	Temperature	0.086
8	AnnualCrop-2	0.089	SO_4	0.018	NH_4	0.123	Conductivity	0.084
9	MultiCrop	0.089	SecchiDepth	0.018	NO_2	0.121	NH_4	0.084
10	MultiCrop-2	0.088	NO_2	0.018	SecchiDepth	0.119	O_2	0.084
11	SoilTreatment-3	0.088	K	0.018	Mn	0.116	cl	0.083
12	WinterCrop-2	0.088	Zn	0.018	Na	0.116	O_{sat}	0.083
13	SoilTreatment-1	0.087	NO_3	0.018	Mg	0.116	BOD	0.082
14	WinterCrop-1	0.087	O_{sat}	0.017	N_{total}	0.115	NO_2	0.080
15	MonthsShallow	0.087	P_{total}	0.017	NO_3	0.114	$K_2Cr_2O_7$	0.078
16	MultiCrop-1	0.086	NH_4	0.017	Temperature	0.110	$KMnO_4$	0.074
17	MonthsFertilization	0.086	Temperature	0.016	O_{sat}	0.109		
18	PermanentCrop-3	0.086	Na	0.016	Conductivity	0.108		
19	AnnualCrop-3	0.086						
20	MonthsDeep	0.084						
21	StubbleField	0.084						
22	PermanentCrop-1	0.082						
23	Pesticide	0.082						
24	Soil JB index	0.081						
25	SamplingTime	0.081						
26	Crop-2	0.080						
27	BareFieldHarrowed	0.079						
28	Crop-1	0.079						
29	AgeOfCurrentSituat.	0.078						
30	FertilizerLevel	0.077						
31	WinterCrop-3	0.077						
32	Crop	0.077						
33	Crop-3	0.075						
34	PermanentCrop-2	0.072						
35	CatchCrop	0.061						
36	MonthsPacking	0.057						
37	CattleGrazing-2	0.054						
38	CattleGrazing-3	0.054						
39	SeedBedBareField	0.052						
40	PermanentCrop	0.052						
41	CattleGrazing-1	0.044						
42	SeedBedPloughed	0.039						
43	SillageCrop	0.034						
44	CattleGrazing	0.033						
45	AnimalsGrazing	0.030						
46	BareFieldPloughed	0.027						
47	SeedBedHarrowed	0.009						
48	SheepGrazing	0.007						

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