

Pajek

Tool presentation

Introduction

- Developed by V. Batagelj and A. Mrvar
 - Department of Mathematics, Faculty of mathematics and physics, University of Ljubljana
- Software tool for **network** analysis:
 - Social networks
 - World wide web
 - Other networks

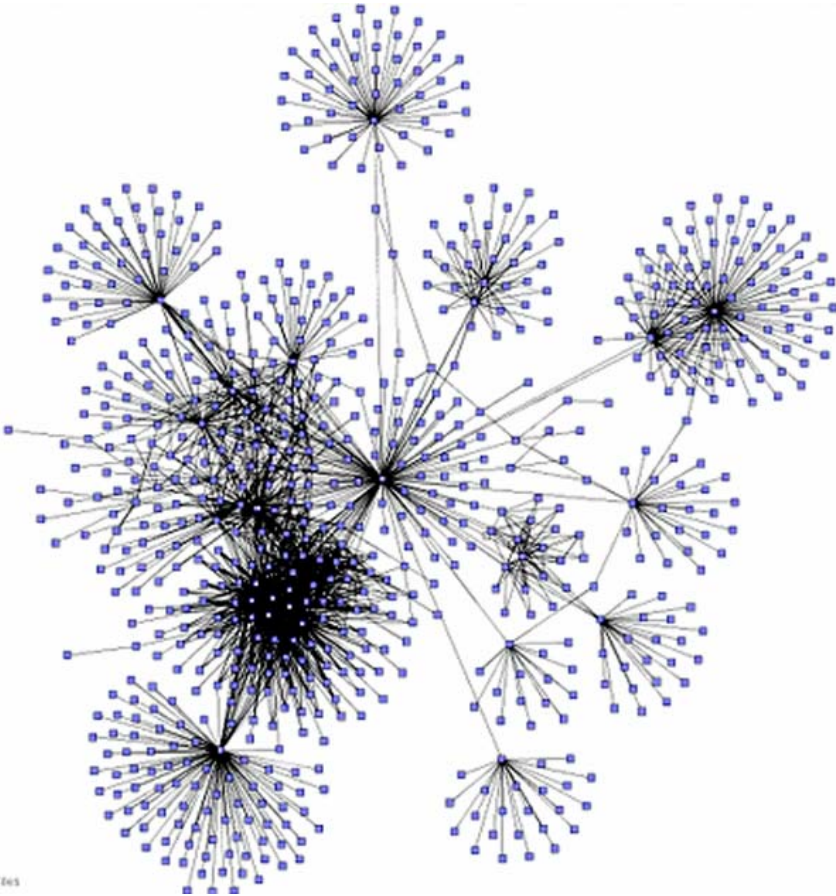
Social network analysis

- Main goal is *detecting* and *interpreting* patterns of social ties among actors
 - Cohesion: measures of cohesion
 - Brokerage: centrality, bridges
 - Ranking
 - Etc.
- De Nooy, Mrvar, Batagelj: *Exploratory Social Network Analysis with Pajek*

Example

Network of emails

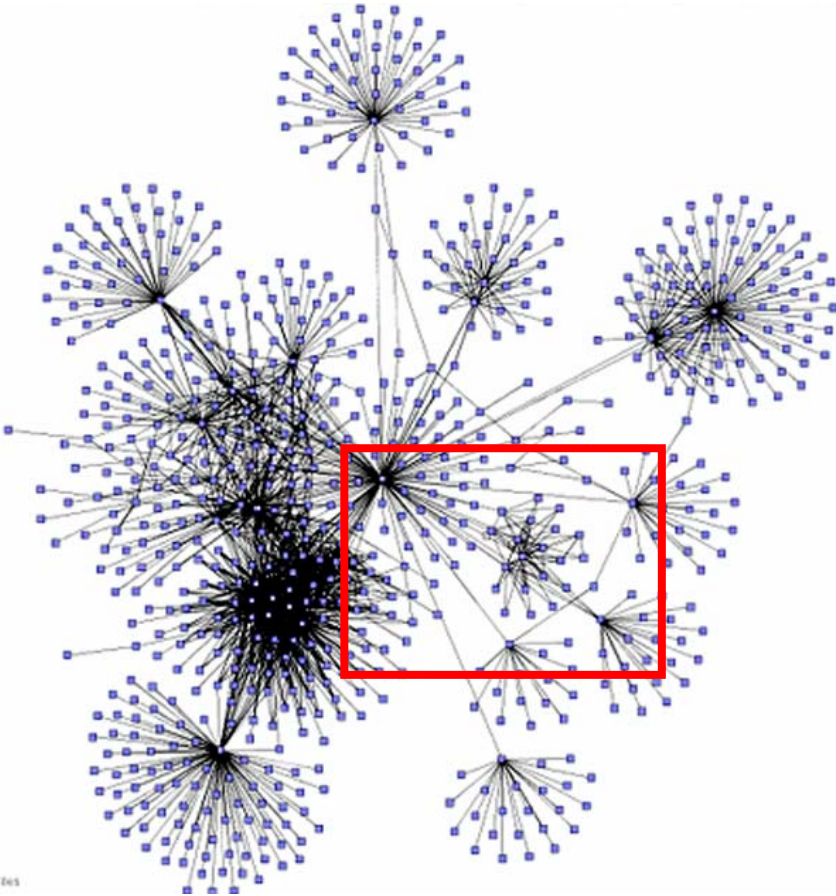
- node: person
- edge: sent email
- edge thickness: number of emails



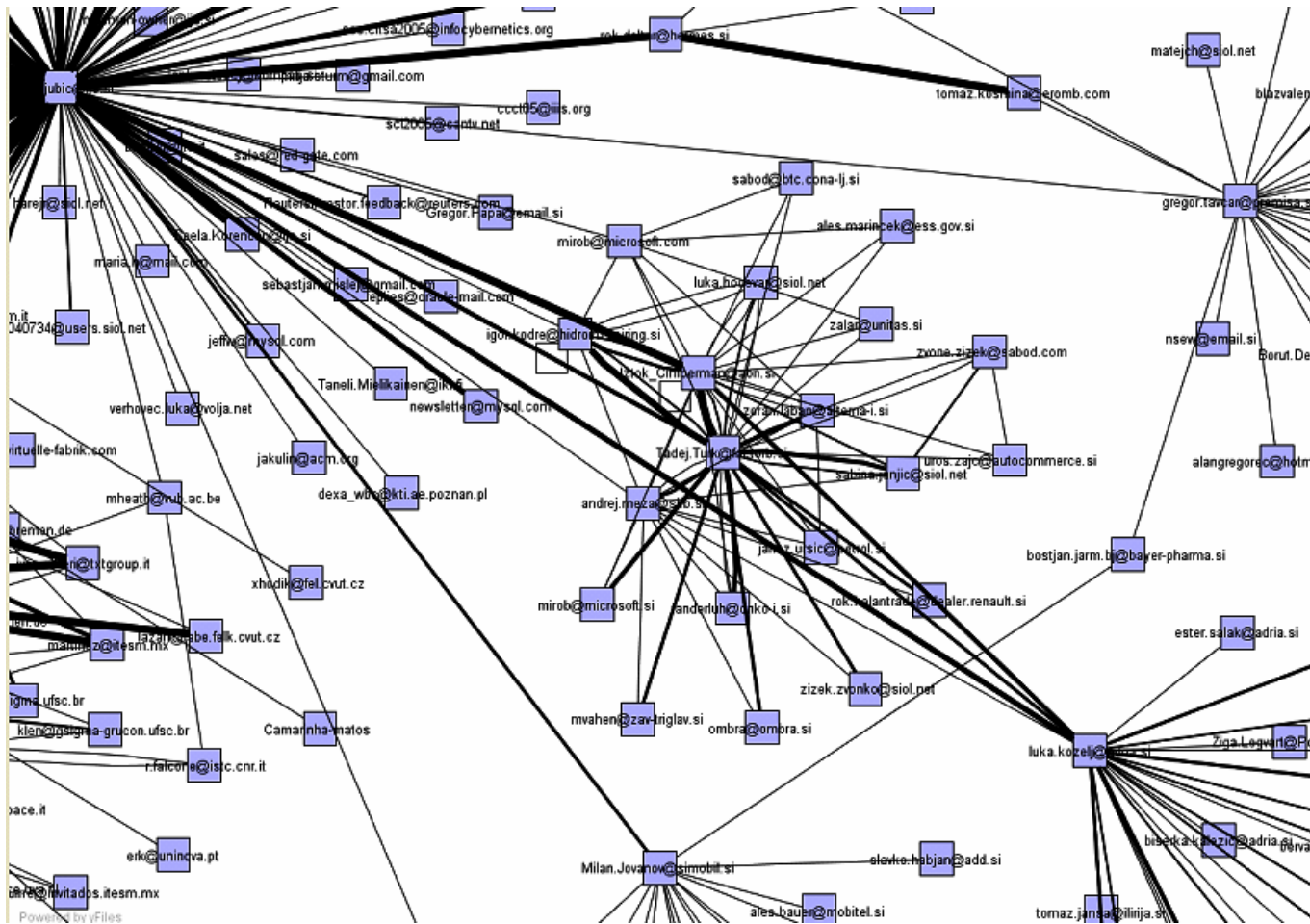
Example

Network of emails

- node: person
- edge: sent email
- edge thickness: number of emails



Example



Other examples

- Trade ties between countries
- Football player transfers between countries
- Web site popularity
- Interlocking directorates (who sits on boards of several companies)
- Etc.

Running Pajek

- Runs on Windows platforms (also on Linux with `wine` emulator)
- Download tool from website:
 - <http://vlado.fmf.uni-lj.si/pub/networks/pajek/>
 - <http://vlado.fmf.uni-lj.si/pub/networks/book/>
 - Tool
 - Documentation
 - Examples (datasets, graphs etc.)
- Download and run `pajek117.exe` or `pajek.be.exe` (book edition)

Data preparation

- Input is network consisted of set of:
 - Vertices
 - Arcs (directed edges)
 - Edges (undirected edges)
- Example in *.net format
- There are some other formats we will not use

Input example

***Vertices 3**

```
1 "Doc1" 0.0 0.0 0.0 ic Green bc Brown
2 "Doc2" 0.0 0.0 0.0 ic Green bc Brown
3 "Doc3" 0.0 0.0 0.0 ic Green bc Brown
```

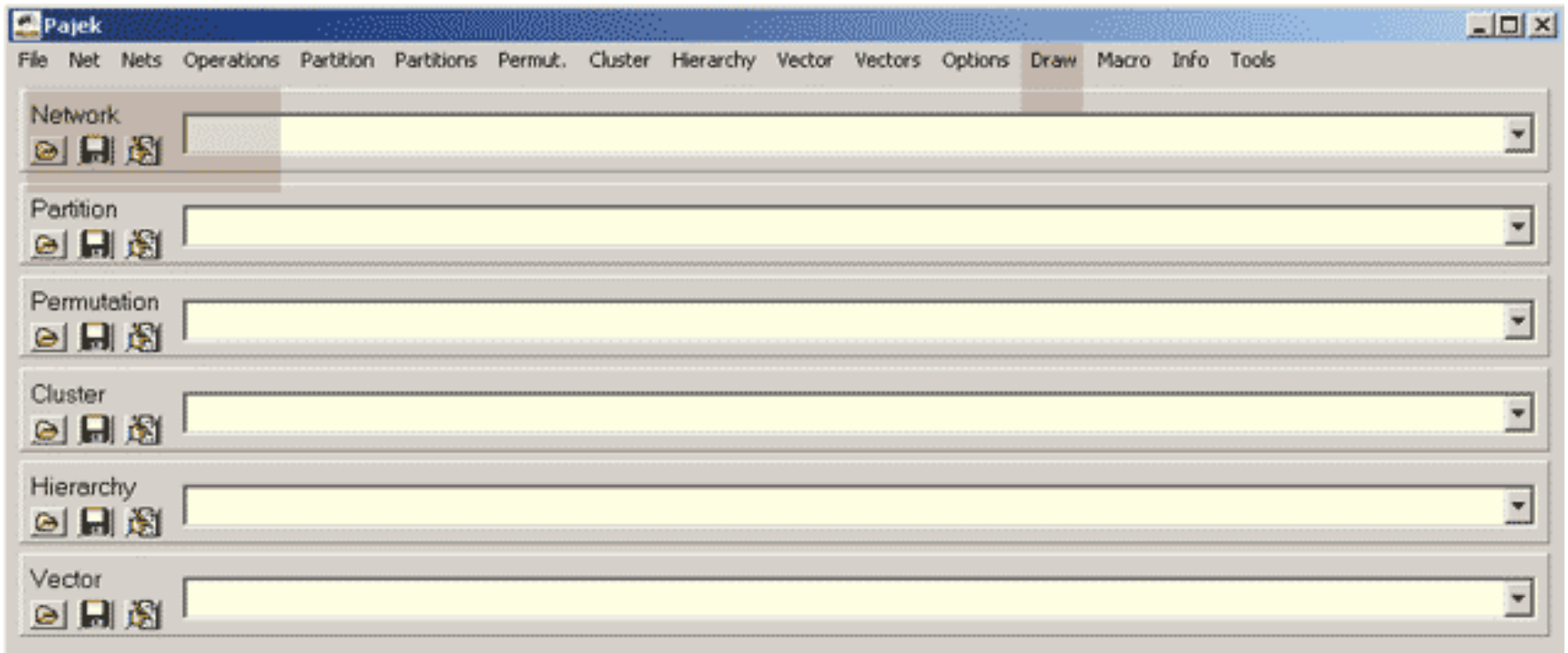
***Arcs**

```
1 2 3 c Green
2 3 5 c Black
```

***Edges**

```
1 3 4 c Green
```

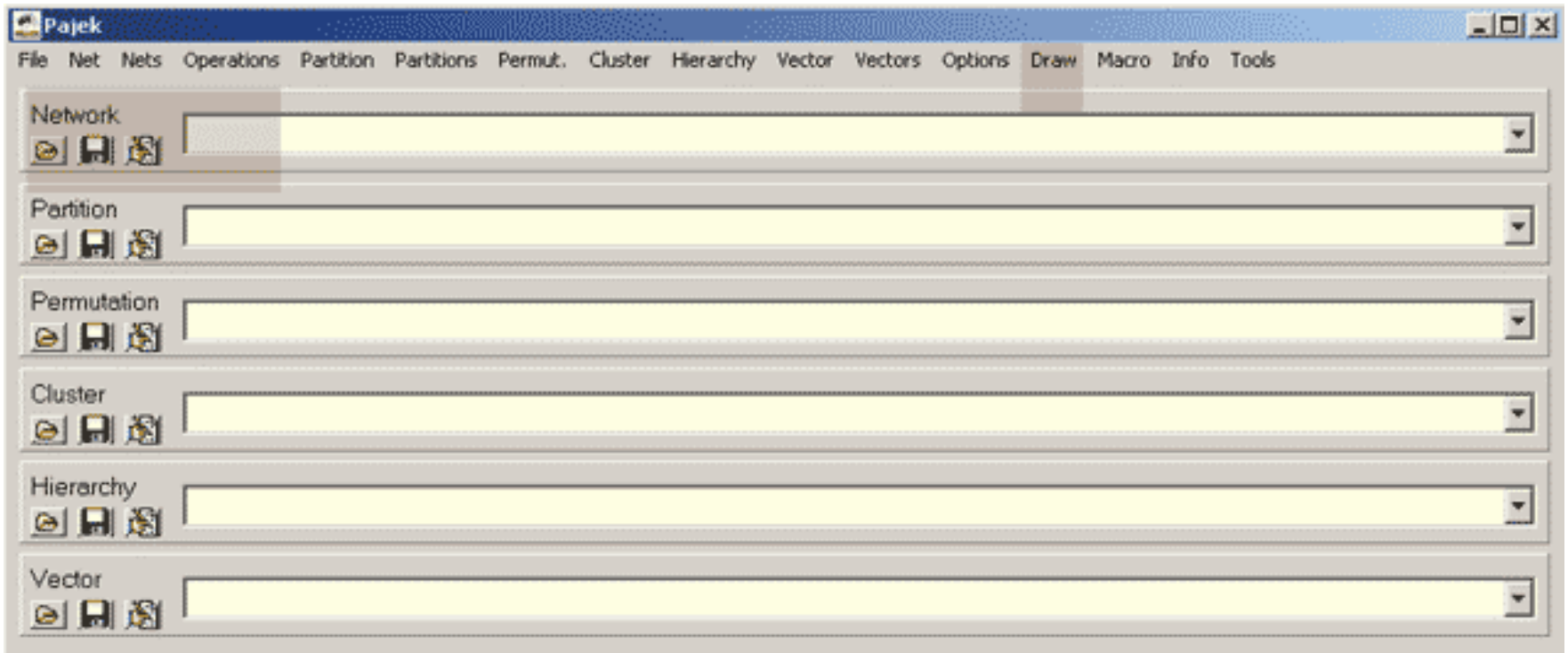
Pajek layout



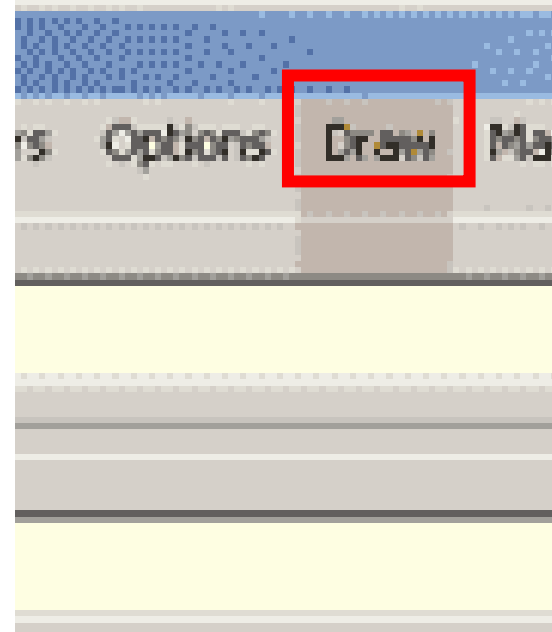
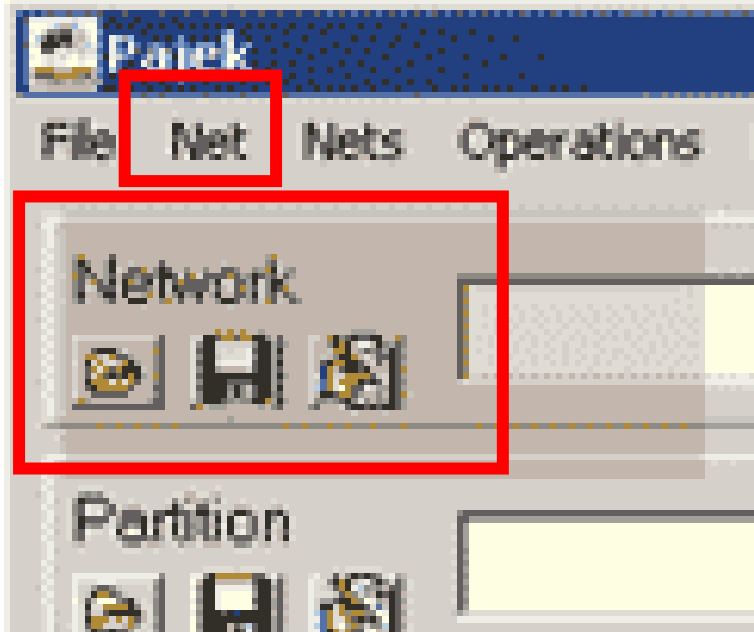
Basic Pajek concepts

- **Network** is set of vertices, arcs and edges
- **Partition** of network – classification of the vertices, such that each vertex is assigned to exactly one class
- **Permutation** of a network is a renumbering of its vertices
- **Vector** assigns a numerical value to each vertex in the network

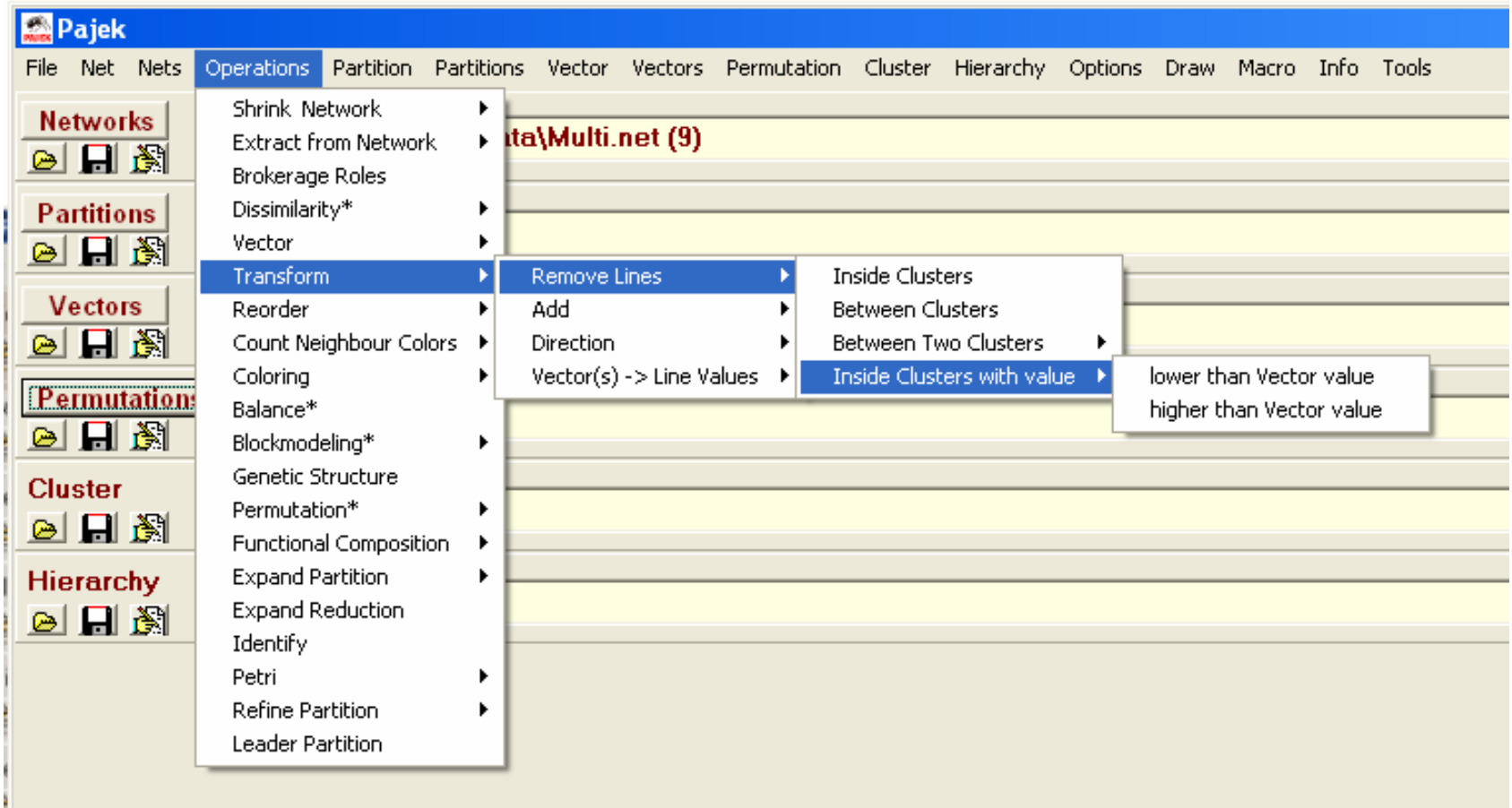
Pajek layout



Starting points



Lost?



Get familiar with Pajek

- Download and install software
- Download and try some examples
- Try some visualizations, layouts
- Get comfortable with data preparation (typing, Excel, sql, xslt, ?)

Some other links

Pajek:

- <http://iv.slis.indiana.edu/lm/lm-pajek.html>

Social Network Analysis:

- http://en.wikipedia.org/wiki/Social_network

Network Visualization:

- <http://www.visualcomplexity.com/vc/>
- http://www.yworks.com/en/products_yed_about.htm

The task

ILPnet2

What is ILPnet2

- Network of Excellence in Inductive Logic Programming (1998-2002)
- Consisting of 37 universities and research institutes
- Successor of ILPnet (1993-1996)
- <http://www.cs.bris.ac.uk/~ILPnet2/>
- Focus on ILPnet2 library

Setting

- Library consists of papers and books
- The papers and the books were written by people
- Authors collaborate
- Library covers different topics within ILP
- Topics and collaborations evolve with time

Problem

- You walk through the door into an ILP world and some questions rise?
 - Who are the most important authors in the area?
 - Which topic is hot, which is not?
 - Are there any closed groups of authors?
 - Is there any person among most of these groups?
 - Is this the same person also very important?

Problem

- Is there hierarchy of topics?
- What were the glory days of some topics?
- Who switched the most topics?
- Three aspects (can be combined)
 - Social
 - Content
 - Time

The data

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The ILPnet2 on-line library

Welcome to the on-line library of ILPnet2. This library contains ILP-related references from 1970 onwards. It is based on the ILP-bibliography over 1970-1996 that was compiled by [ILPnet](#). A number of references over 1997 and 1998 were added courtesy of the [ILP2 project](#). This live web-database was constructed from those bibtex files and is maintained by ILPnet2. It currently contains more than 1,000 entries by well over 500 different authors. Many, more recent entries include an abstract and a link to an on-line version of the paper. Thanks are due to [Henk Muller](#) for providing the necessary software, and to [Elias Gyftodimos](#) for maintenance.

We are currently working on a new version of the library with added functionality.
This new version will then be extended with post-2003 references.
Watch this space!

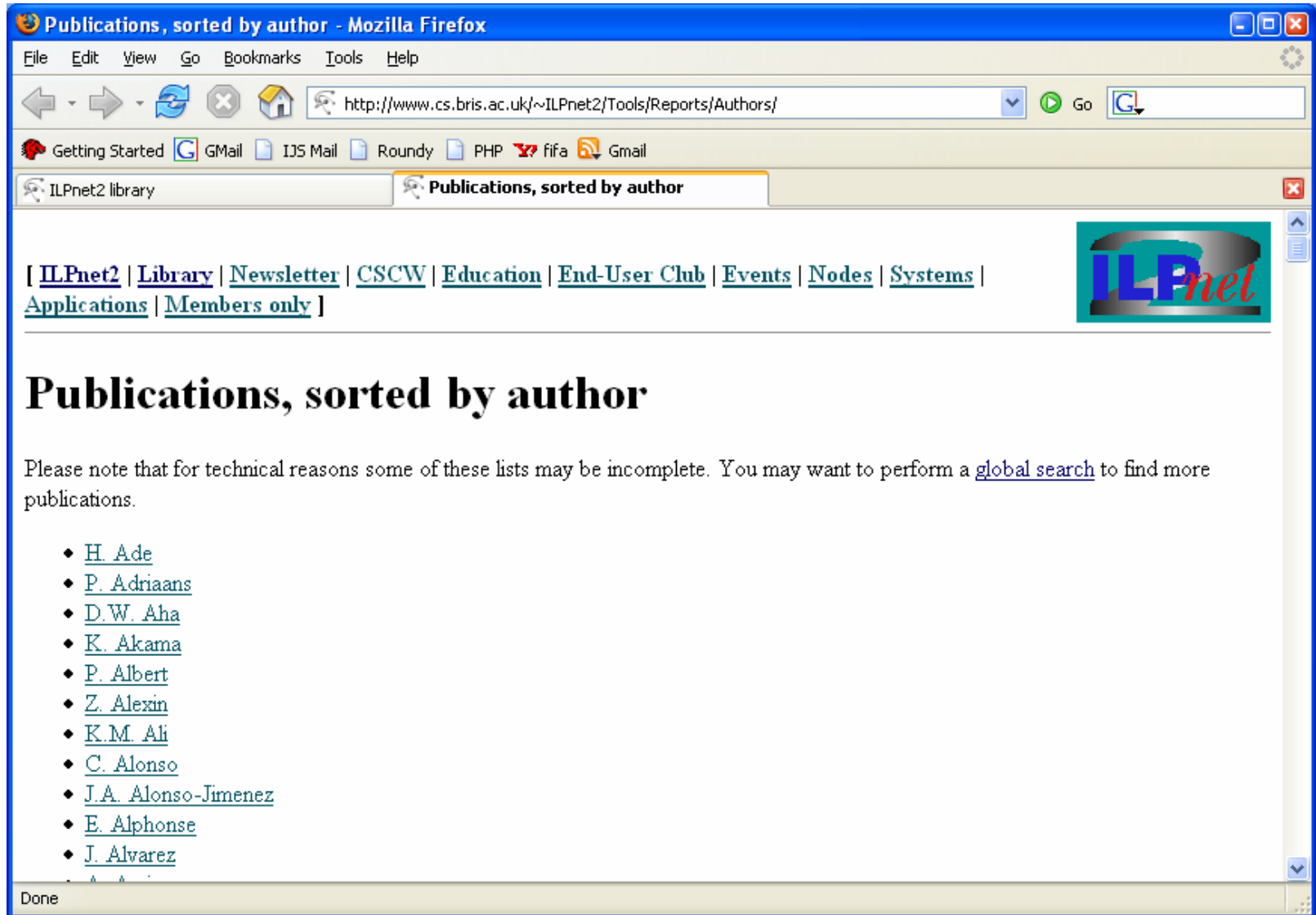
You can access the library by

- [Author](#)
- [Keyword](#)
- [Type of publication](#)
- Year: [2003](#); [2002](#); [2001](#); [2000](#); [1999](#); [1998](#); [1997](#); [1996](#); [1995](#); [1994](#); [1993](#); [1992](#); [1991](#); [1990](#); [1989](#); [1988](#); [1987](#); [1986](#); [1984](#); [1983](#); [1981](#); [1980](#); [1971](#); [1970](#);

BibTeX downloads

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The data – authors (482)



Publications, sorted by author - Mozilla Firefox


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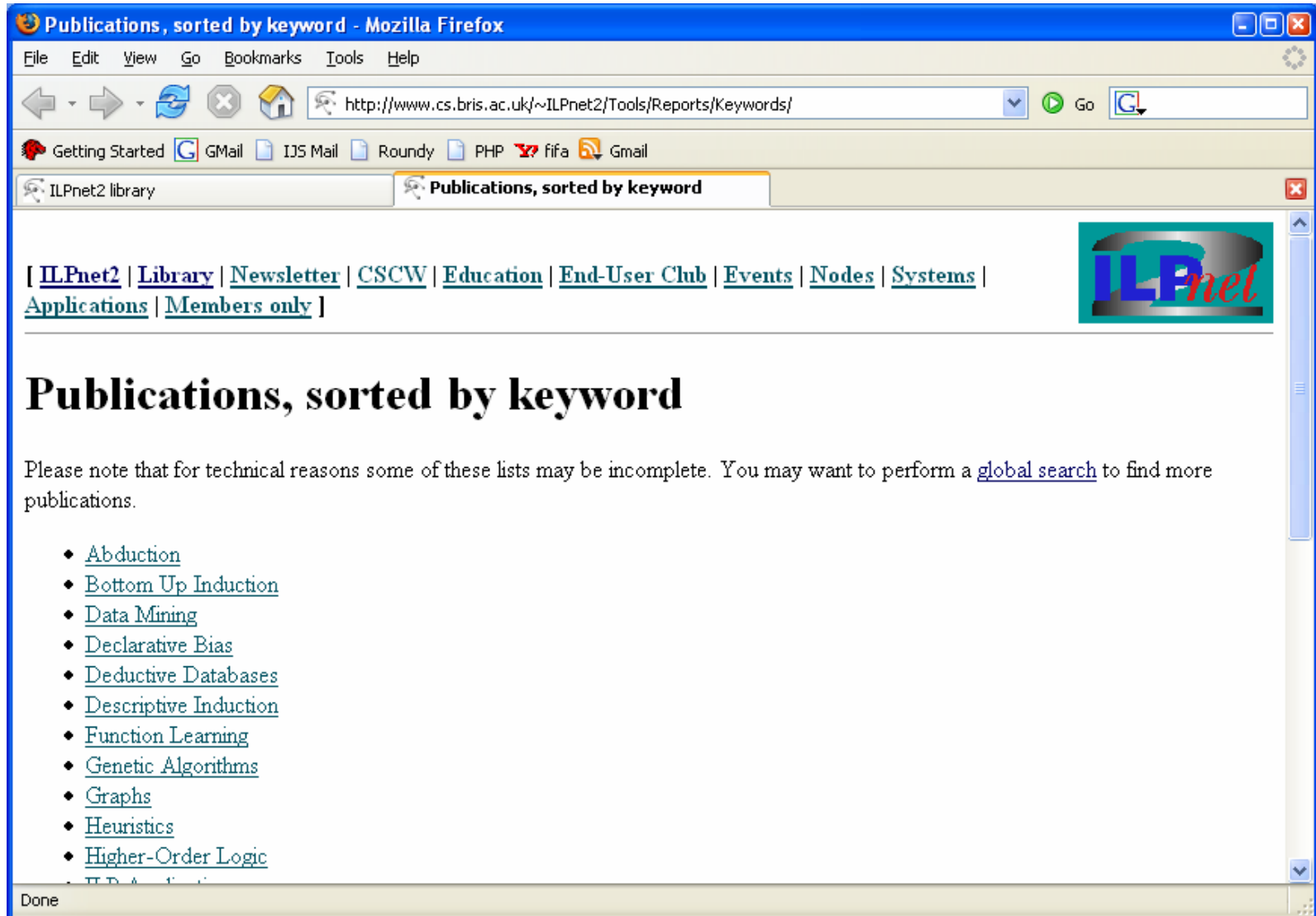
Publications, sorted by author

Please note that for technical reasons some of these lists may be incomplete. You may want to perform a [global search](#) to find more publications.

- [H. Ade](#)
- [P. Adriaans](#)
- [D.W. Aha](#)
- [K. Akama](#)
- [P. Albert](#)
- [Z. Alexin](#)
- [K.M. Ali](#)
- [C. Alonso](#)
- [J.A. Alonso-Jimenez](#)
- [E. Alphonse](#)
- [J. Alvarez](#)

Done

The data – keywords (31)



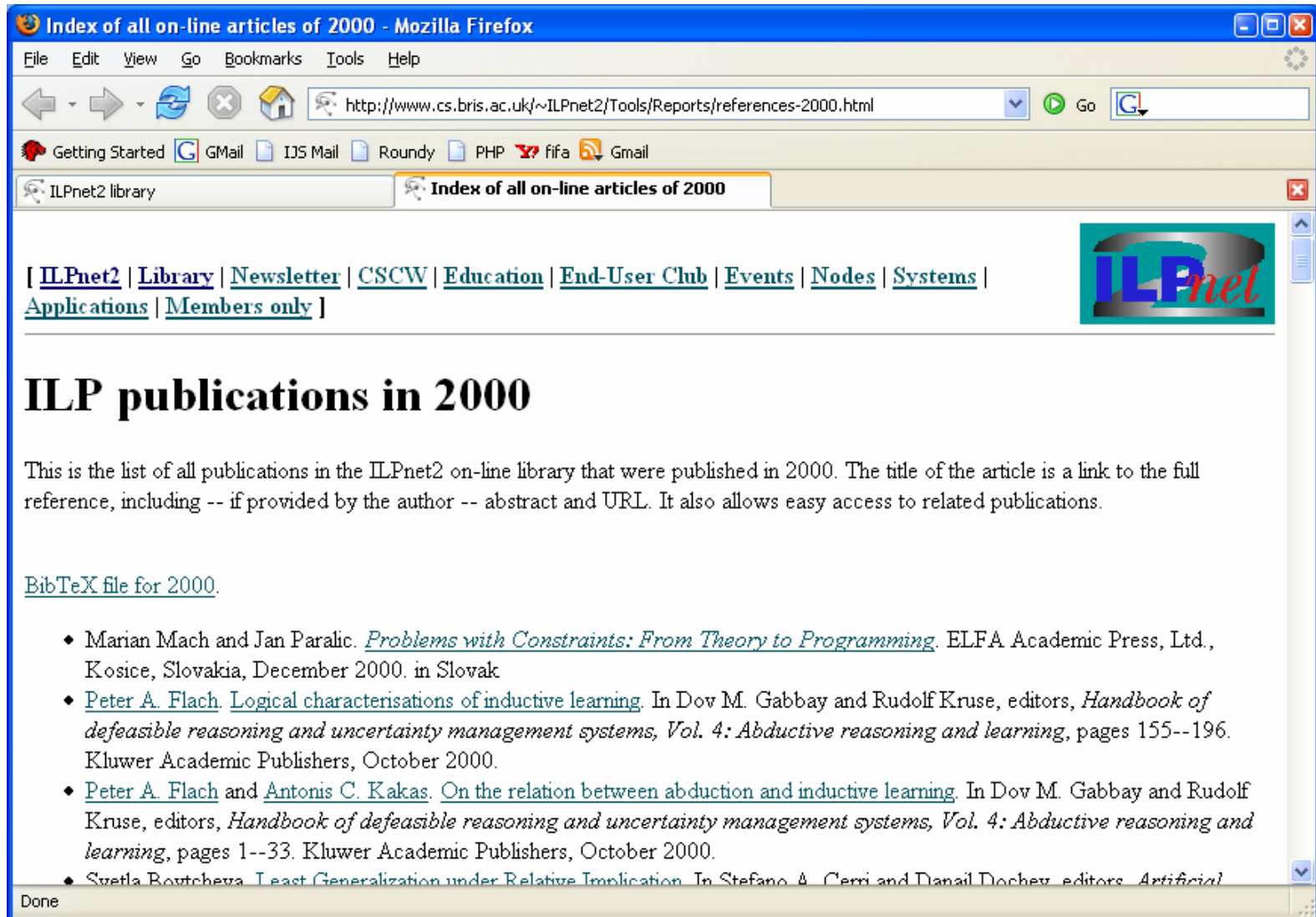
The screenshot shows a Mozilla Firefox browser window with the address bar displaying <http://www.cs.bris.ac.uk/~ILPnet2/Tools/Reports/Keywords/>. The page title is "Publications, sorted by keyword". The browser's menu bar includes File, Edit, View, Go, Bookmarks, Tools, and Help. The address bar contains navigation icons and a search button. The browser's toolbar shows various icons for getting started, Gmail, IJS Mail, Roundy, PHP, fifa, and another Gmail. The browser's tab bar shows two tabs: "ILPnet2 library" and "Publications, sorted by keyword".

The webpage content includes a navigation menu with links: [\[ILPnet2 | Library | Newsletter | CSCW | Education | End-User Club | Events | Nodes | Systems | Applications | Members only \]](#). A logo for "ILPnet" is visible in the top right corner. The main heading is "Publications, sorted by keyword". Below the heading, a paragraph states: "Please note that for technical reasons some of these lists may be incomplete. You may want to perform a [global search](#) to find more publications."

- ◆ [Abduction](#)
- ◆ [Bottom Up Induction](#)
- ◆ [Data Mining](#)
- ◆ [Declarative Bias](#)
- ◆ [Deductive Databases](#)
- ◆ [Descriptive Induction](#)
- ◆ [Function Learning](#)
- ◆ [Genetic Algorithms](#)
- ◆ [Graphs](#)
- ◆ [Heuristics](#)
- ◆ [Higher-Order Logic](#)
- ◆ [ILPnet2](#)

The status bar at the bottom of the browser window shows "Done".

The data – publications (?)



Index of all on-line articles of 2000 - Mozilla Firefox


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http://www.cs.bris.ac.uk/~ILPnet2/Tools/Reports/references-2000.html

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ILP publications in 2000

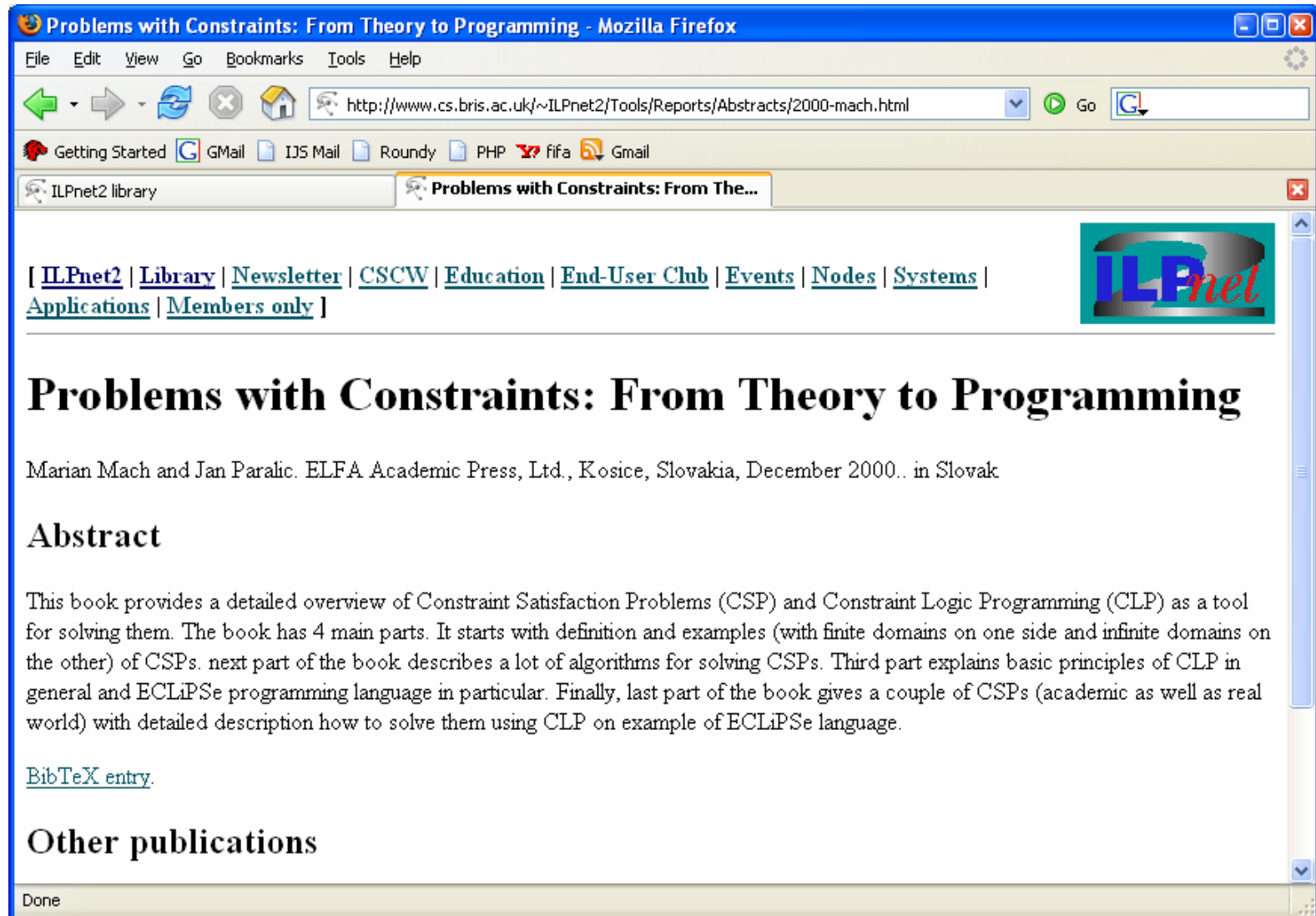
This is the list of all publications in the ILPnet2 on-line library that were published in 2000. The title of the article is a link to the full reference, including -- if provided by the author -- abstract and URL. It also allows easy access to related publications.

[BibTeX file for 2000.](#)

- Marian Mach and Jan Paralic. [Problems with Constraints: From Theory to Programming](#). ELFA Academic Press, Ltd., Kosice, Slovakia, December 2000. in Slovak
- [Peter A. Flach](#). [Logical characterisations of inductive learning](#). In Dov M. Gabbay and Rudolf Kruse, editors, *Handbook of defeasible reasoning and uncertainty management systems, Vol. 4: Abductive reasoning and learning*, pages 155--196. Kluwer Academic Publishers, October 2000.
- [Peter A. Flach](#) and [Antonis C. Kakas](#). [On the relation between abduction and inductive learning](#). In Dov M. Gabbay and Rudolf Kruse, editors, *Handbook of defeasible reasoning and uncertainty management systems, Vol. 4: Abductive reasoning and learning*, pages 1--33. Kluwer Academic Publishers, October 2000.
- [Svetla Boytcheva](#). [Least Generalization under Relative Implication](#). In Stefano A. Cerri and Daniel Doherty, editors, *Artificial*

Done

The data - publication



The screenshot shows a Mozilla Firefox browser window with the title "Problems with Constraints: From Theory to Programming - Mozilla Firefox". The address bar contains the URL "http://www.cs.bris.ac.uk/~ILPnet2/Tools/Reports/Abstracts/2000-mach.html". The browser's toolbar includes navigation buttons (back, forward, home, stop, refresh) and a search engine. The page content features a navigation menu with links for "ILPnet2", "Library", "Newsletter", "CSCW", "Education", "End-User Club", "Events", "Nodes", "Systems", "Applications", and "Members only". A logo for "ILPnet" is visible in the top right corner. The main heading is "Problems with Constraints: From Theory to Programming", followed by the authors "Marian Mach and Jan Paralic" and the publisher "ELFA Academic Press, Ltd., Kosice, Slovakia, December 2000.. in Slovak". The "Abstract" section describes the book's content, covering Constraint Satisfaction Problems (CSP) and Constraint Logic Programming (CLP). A "BibTeX entry" link is provided at the bottom of the abstract. The "Other publications" section is partially visible at the bottom of the page.

Problems with Constraints: From Theory to Programming - Mozilla Firefox


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http://www.cs.bris.ac.uk/~ILPnet2/Tools/Reports/Abstracts/2000-mach.html

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ILPnet2 library Problems with Constraints: From The...

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Problems with Constraints: From Theory to Programming

Marian Mach and Jan Paralic. ELFA Academic Press, Ltd., Kosice, Slovakia, December 2000.. in Slovak

Abstract

This book provides a detailed overview of Constraint Satisfaction Problems (CSP) and Constraint Logic Programming (CLP) as a tool for solving them. The book has 4 main parts. It starts with definition and examples (with finite domains on one side and infinite domains on the other) of CSPs. next part of the book describes a lot of algorithms for solving CSPs. Third part explains basic principles of CLP in general and ECLiPSe programming language in particular. Finally, last part of the book gives a couple of CSPs (academic as well as real world) with detailed description how to solve them using CLP on example of ECLiPSe language.

[BibTeX entry.](#)

Other publications

Done

The data – external

Additional information about collaboration and reputation can be obtained from:

- Google Scholar (<http://scholar.google.com>)
- Citeseer (<http://http://citeseer.ist.psu.edu/>)
- Web of Science (<http://wos.izum.si>)