

Marko Bohanec: Decision Support

Typical theoretical questions for examinations

Version 28.10.2015

I. REQUIRED TOPICS

1. Introduction

1. What is *Decision Problem*? Which are its components and goals?
2. What is the difference between *Data Mining* and *Decision Support*?
3. What are *Decision Sciences*?
4. What is the difference between *Decision Sciences* and *Decision Systems*?
5. Explain the difference between *Normative* and *Descriptive* approach to Decision Science. What are their typical sub-disciplines and approaches?
6. What is *Decision Support*? What can it offer to decision makers? Give examples of typical approaches and techniques.
7. What is *Decision Analysis*? Which are its typical stages?
8. What is an *Evaluation Model*? Which are the two main tasks supported by evaluation models?
9. Which *types of decision problems* are there? Give examples for each problem type.
10. Explain the difference between different decision problems:
 - a. Easy (routine, everyday) vs. Difficult (complex)
 - b. One-Time vs. Recurring
 - c. One-Stage vs. Sequential
 - d. Single Objective vs. Multiple Objectives
 - e. Individual vs. Group
 - f. Structured vs. Unstructured
 - g. Tactical, Operational, Strategic
11. What are the characteristics of *complex decisions*?
12. What is the difference between *Decision* and *Decision Process*?
13. Define *Decision Support Systems*? Which types of DSS are there?
14. What is *Operations Research*?

2. Decision Analysis

15. What is *Decision Analysis*?
16. Explain the concept of *Evaluation Model*. What are these models used for?
17. Which *types of models* are typical for Decision Analysis?
18. Which are the main *stages* of the decision making process?

3. Decision-Making under Uncertainty

19. What is a *decision table*?
20. What is a *payoff matrix*?
21. What is the difference between decision making under *uncertainty* and under *risk*?
22. Describe decision criteria for decision making under *uncertainty*?
23. Describe decision criteria for decision making under *risk*?

24. Explain each of the *decision criterion* and compare it with others: Dominance, Pessimistic, Optimistic, Hurwicz's, Laplace's, Regret, Expected Value.
25. What is *sensitivity analysis*? Why is it important?

4. Decision Trees

26. What is a *decision tree*?
27. Which *components* constitute a decision tree?
28. Compare *decision table* and *decision tree*.
29. How are decision trees *solved*?
30. How do decision trees handle the concept of time?
31. What is the *value of perfect information*? How do we obtain it from a decision tree?
32. What is a *risk profile*?

5. Multi-Attribute Models

33. What is the motivation for using multi-attribute (multi-criteria) models?
34. What is a *multi-attribute model*?
35. Which *components* constitute a multi-attribute model?
36. What is an *attribute*?
37. What is a *value function*?
38. What is an *alternative* (or *option*)?
39. What is a *preference*?
40. What are the characteristics, and what is the difference between *quantitative* and *qualitative* multi-attribute models?
41. Why do we talk about *hierarchical* multi-attribute models?
42. What is the difference between a *tree* and *hierarchy*?
43. What are the *characteristics of hierarchical models*?
44. Why are multi-attribute models so *useful*?
45. Which are the typical *stages* of multi-attribute model development?
46. Which are the three *strategies* for developing attribute structure?
47. Which are the *criteria* for selection and composition of attributes?

6. Kepner-Tregoe method

48. What is the *Kepner-Tregoe* (K-T) method? Which are its characteristics?
49. Explain the advantages and disadvantages of using K-T.
50. What types of decision problems are suitable for K-T?

7. AHP

51. What is *AHP*? Which are its characteristics?
52. How are attributes and alternative values compared in AHP?
53. In AHP, how do we define:
 - a. attribute weights,
 - b. alternative values (preferences, scores)?
54. What kind of value *aggregation* is used in AHP?
55. What types of decision problems are suitable for AHP?
56. Summarize the advantages and disadvantages of AHP.
57. Compare AHP with DEX.

8. DEX and DEXi

58. Which are the main characteristics of the *DEX* method?
59. What is *DEXi*?
60. Which are the *typical stages* of working with *DEXi*?
61. Which are the *strategies* and '*rules of thumb*' for creating a tree of attributes with *DEXi*?
62. What kind of attribute scales are used in *DEXi*? How should we create scales?
63. What are *decision rules*?
64. Which are the possible approaches to define decision rules in *DEXi*?
65. How are *alternatives (options)* described in *DEXi*?
66. How are options *evaluated* by *DEXi*?
67. How does *DEXi* handle *incomplete* information (missing decision rules, incomplete alternative data)?
68. What types of *analyses* can be performed in *DEXi*?
69. Which *components* may constitute a *DEXi* report?
70. What kind of *charts* can be produced in *DEXi*?
71. What kind of data can be *exported* from *DEXi* and how?
72. Which types of decision problems are suitable for *DEXi*?
73. Summarize the advantages and disadvantages of *DEX*.

II. ADVANCED TOPICS

[Advanced topics constitute 10% of written examination]

9. Multi-Criteria Methods

74. Explain the three decision tasks, so-called "Problematics".
75. Which four properties are used to classify multi-criteria methods?
76. Which are the main approaches ("schools") to multi-criteria modeling?
77. What are the main characteristics of outranking methods?
78. What is PROMETHEE?
79. What is TOPSIS?
80. What is the point of disaggregation/aggregation approach?
81. What is UTA?

10. Aggregation and value functions

82. Explain the difference between *quantitative* and *qualitative* evaluation models.
83. What is an *aggregation function*?
84. What is a *marginal function*?
85. Which types of *aggregation functions* are used in quantitative models?
86. Explain differences between the aggregation in quantitative and qualitative models.

11. Data Mining and Decision Support

87. Explain the basic ways and types of DM-DS integration.
88. What is *model revision*?
89. Can we create *DEX* models from data?

III. OPTIONAL TOPICS

12. Influence Diagrams

90. What is an *influence diagram*?
91. Which *components* constitute an influence diagram?
92. What is the meaning of *arcs* in influence diagrams?
93. Compare *decision tree* and *influence diagram*.
94. What is the motivation for using influence diagrams instead of decision trees?
95. Can influence diagrams handle multi-criteria decision problems?

13. Software

96. Which computer programs can deal with:
 - a. decision tables,
 - b. decision trees,
 - c. influence diagrams,
 - d. multi-attribute models?
97. What is their typical functionality?
98. What is the functionality of Web-HIPRE? Which methods does it provide for:
 - a. dealing with a tree of attributes
 - b. designing utility functions
 - c. evaluation and analysis of alternatives.