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Systems and Techniques of Decision Support

Questions

Version 16.11.2010

1. Introduction

1. What is Decision Problem? Which are its components and goals?
2. Which types of decision problems are there? Give examples for each problem type.
3. 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
4. What are the characteristics of complex decisions?
5. What is the difference between Decision and Decision Process?
6. What are Decision Sciences?
7. What is the difference between Decision Sciences and Decision Systems?
8. Explain the difference between Normative and Descriptive approach to Decision Science.
9. What is Decision Support?
10. Define Decision Support Systems?
11. What is Operations Research?

2. Decision Analysis

12. What is Decision Analysis?
13. Explain the concept of Evaluation Model. What are these models used for?
14. Which types of models are typical for Decision Analysis?
15. Which are the main stages of the decision making process?

3. Decision-Making under Uncertainty

16. What is a decision table?
17. What is a payoff matrix?
18. What is the difference between decision making under uncertainty and under risk?
19. Describe decision criteria for decision making under uncertainty?
20. Describe decision criteria for decision making under risk?
21. Explain each of the decision criterion and compare it with others: Dominance, Pessimistic, Optimistic, Hurwicz’s, Laplace’s, Regret, Expected Value.
22. What is sensitivity analysis? Why is it important?

4. Decision Trees

23. What is a decision tree?
24. Which components constitute a decision tree?
25. Compare decision table and decision tree.
26. How are decision trees solved?
27. How do decision trees handle the concept of time?
28. What is the value of perfect information?
29. How do we obtain the value of perfect information using decision trees?
30. What is a risk profile?

5. Influence Diagrams

31. What is an influence diagram?
32. Which components constitute an influence diagram?
33. What is the meaning of arcs in influence diagrams?
34. Compare decision tree and influence diagram.
35. What is the motivation for using influence diagrams instead of decision trees?
36. Can influence diagrams handle multi-criteria decision problems?

6. Multi-Attribute Models

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

7. Software

51. Which computer programs can deal with:
   a. decision tables,
   b. decision trees,
   c. influence diagrams,
   d. multi-attribute models?
52. What is their typical functionality?
53. 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 options.

8. DEXi

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

9. AHP

69. What is AHP? Which are its characteristics?
70. How are attributes and option values compared in AHP?
71. In AHP, how do we define:
   a. attribute weights,
   b. option values (preferences, scores)?
72. What kind of value aggregation is used in AHP?

10. Data Mining and Decision Support

73. What is the difference between Data Mining and Decision Support?
74. Explain the basic types of DM-DS integration:
   a. “DS for DM”:
   b. “DM for DS”:
   c. “DM, then DS” (sequential application):
   d. “DS, then DM” (sequential application):
   e. “DM and DS” (parallel application):
75. What is model revision?
76. **Can we create DEXi models from data?**