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Systems and Techniques of Decision Support

Questions

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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 multi-attribute model 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?