

Kennissystemen Re-examination

June 30, 2004

13:30 – 16:30

This exam consists of 5 questions on 2 pages.

Credits:

1a	1b	2a	2b	2c	3a	3b	4a	4b	5a	5b
10	5	5	5	15	5	5	10	10	10	10

Grade = (points + 10) / 10

Be sure to answer all sub-questions. Good luck!

Question 1: Basic principles

- a) Knowledge systems can only be successfully applied when some preconditions are met. List four success factors for knowledge systems.
- b) Explain what an analogue (or direct, or vivid) representation is. Give an example of an analogue representation.

Question 2: Uncertainty

Certainty factors are a mechanism to cope with uncertainty in rule-based systems.

- a) Describe two problems of certainty factors.

Wednesday June 23 was a thrilling day for the Dutch team at the European Football Championship in Portugal. Whether or not the Dutch team would continue to the quarter-finals did not only depend on the results of the game Netherlands – Latvia, but also on the results of Germany – Czech. We could (incompletely) model this uncertainty with certainty factors as follows.

The abbreviations **GW** / **GL** / **GD** / **GtQ** stand for Germany Wins / Looses / Draws / to Quarter-finals respectively, while **NW** / **NL** / **ND** / **NtQ** stand for the Netherlands Wins / Looses / Draws / to Quarter-finals. The numbers between brackets behind the rules and facts represent the certainty factors.

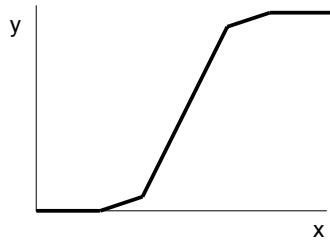
IF **GW** THEN **GtQ** (1.0)
IF **GtQ** THEN **NtQ** (-1.0)
IF (**GL** AND **ND**) THEN **NtQ** (0.5)
GW (0.8)
GL (-0.5)
ND (0.2)

- b) What does the second line say? Give your answer by rephrasing the rule in natural language. Be sure to take the certainty factor into account.

- c) Calculate the certainty factor for the fact that the Netherlands will continue to the quarter-finals (NtQ). Show your calculations.

Question 3: Vagueness

“Fuzzy” definitions are a manner to cope with vagueness. Fuzzy sets are often represented via a diagram as shown below:



- a) What is represented by the y-axis of such a diagram?
- b) Suppose that the diagram above defines the concept “smart”. Show in a drawing how you could express the concept “very smart” using a “hedge” (modifier).

Question 4: Configuration

- a) Explain what a functional abstraction hierarchy of parts is, and why such a hierarchy can be useful for configuration tasks. Give an example as well.
- b) Describe the “propose-and-revise” method for configuration (MCF3).

Question 5: Diagnosis

- a) Explain what can be the role of calculating the “information value” (*Shannon entropy*) in a diagnosis process.
- b) Explain what successive fault-models (*concentric closed-world assumptions*) are. Give an example of a diagnosis tasks for which such a fault model is useful.

End of exam.