

Mid Term

4190.408 Artificial Intelligence

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Answer to the questions below. Each answer should not be longer than a page.

Use graphs, figures or mathematical formulas for explanation if possible.

1. (30 points) Explain the structure and features of Bayesian network. Give one example of application. Briefly describe how the Bayesian network is learnt from given dataset D.

Explain how the value of unobserved variable is inferred using Bayesian network obtained through learning, when new data is observed.

Explain the probabilistic inference rules used in the process above.

(Sum rule, product rule, bayes rule)

Give one example of bayes rule's application

2. (20 points) Explain the structure and features of Markov network.

Give one example of Markov network's application with detailed description.

What is the difference between Markov network and Bayesian network?

3. (20 points) In order to understand natural language texts, a computer needs analysis techniques based on morphology, syntax, semantics, and pragmatics.

Explain what each analysis is.

Apple Siri and Microsoft Cortana talk to people using voice and work as secretaries. What kind of additional technology could be applied to Siri or Cortana, in order to provide natural service, even though the voice recognition technology is not perfect yet?

4. (20 points) In order to make a computer perform intelligent information processing, it is important to represent knowledge well in the computer and utilize it.

Explain what each method of knowledge representation is, and give examples of using the methods.

(a) semantic networks

(b) frames

(c) scripts

5. (20 points) Let us talk about the brain/cognitive scientific basis of visual ability. Describe what you know about the structure, feature, and principle of visual information processing in the brain. What do you think is the difficulty which we need to overcome, in order to make computer vision reach human level? What could artificial intelligence learn from human brain about visual information processing?

(110 points in total)