

Mid-Term Exam (Open Book)

4190.408 Artificial Intelligence
Department of Computer Science and Engineering
Seoul National University

Tuesday, October 18, 2012

Answer the following 6 questions. Use no more space than one page for each question. Attempt to address the general theme of each problem using the subquestions as guidelines, rather than give fragmented answers to each subquestion.

1. (20 points) How can the computer understand a camera image? Describe the entire procedures of computer processing of images from early vision through late vision to scene understanding. Explain what are the major problems and technical difficulties in each step and as a whole.
2. (20 points) What kinds of grammars can you use for understanding natural languages? Give a set of grammar rules and a set of example sentences to show how these grammar rules can be used to analyze the syntactic structure of the example sentences.
3. (20 points) What is heuristic search? Describe the general idea of the A* search algorithm. Is it possible that A* can find an optimal solution? If yes, under what conditions? Give a general idea on why this can be possible. Specifically, use the 8-puzzle problem to illustrate the idea.
4. (20 points) What is a neural network (or multilayer perceptron)? What properties of the neural network are interesting, especially in comparison to conventional computer programs? How does a neural network learn from a training data? Describe how you can use a neural network to develop a self-driving car that imitates human driving behavior.
5. (20 points) In early 1980's, several AI projects of a large scale launched internationally. What kinds of projects have been there in different continents? What did they aim to achieve in terms of AI research? How did they differ in their focuses?
6. (20 points) What are the shortcomings of the symbolic AI approaches? What is GOFAI? What is the role of logic in AI? How can we deal with uncertainty in human knowledge? What is fuzzy logic? What are Bayesian probabilistic networks? How do the probabilistic approaches deal with uncertainty?

(Total 120 points)