

BLG 435E, Artificial Intelligence, Fall 2013-2014

Assignment #1

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Due: October 29, 2012, 23.00 PM

Submission type: An archive file including all files (source code files and soft copy report).

Q1. For each of the following agents, develop a PEAS description of the task environment:

- a) Mars rover
- b) A personalized music recommender system
- c) Autonomous vacuum cleaner robot
- d) Activity recognition and anomaly detection software agent in a hospital

For each of these agent types characterize the environment according to the properties of the environment (observability, dynamism, etc.) and PEAS components. Then, determine the appropriate type of the agent architecture with reasonable arguments.

Q2. Prove that if a heuristic is consistent, it must be admissible. Construct an admissible heuristic that is not consistent.

Q3. In this section, you are asked to solve the route finding problem for public transportation in Istanbul. In this problem, the objective is to find the optimal sequence of bus routes that connect the source stop to the destination stop. As an example: for the problem instance of reaching from Maslak to Söğütluçeşme; the solution should be sequences of the routes as 40B(maslak,zincirlikuyu), 34Z(zincirlikuyu,söğütluçeşme). The bus stops should also be given. Formulate this problem in a well-defined form.

- (a) Implement and run breadth first search and depth first search algorithms for both tree and graph search versions. Analyze the results. Give a detailed discussion in terms of both time and space requirements.
- (b) Implement the A* algorithm to solve the route finding problem.
- (c) Run A* program with two different admissible heuristic functions and give a detailed analysis of the results in your report.

The problem description will be given in three text files. The routes file contains the identity number and the name of the bus routes. The stops file contains the location, identity number and name information of them. Lastly, the route stops file shows the stops of the routes in

order. All the text files are in the csv (comma-separated values) format. The content of files are given as follows:

routes.csv: route_id(int),route_name(string)

stops.csv: stop_id(int),latitude(double),longitude(double),stop_name(string)

route_stops.csv: route_id(int),stop_id(int)

Note: If you have any questions about the assignment, contact me via e-mail (kocca@itu.edu.tr) or in person (Res. Lab. 3).

Academic dishonesty including but not limited to cheating, plagiarism, collaboration is unacceptable and subject to disciplinary actions. Any student found guilty will get negative grade.