CSCE 876 **FALL 2017**

HOMEWORK 1

1. Loebner Prize:

The Loebner Prize for AI is the first formal instantiation of turing test, which is named after Alan Turing. He suggests that if the responses from a computer program were undistinguishable from that of a human, then that computer is said to have passed Turing test. The contest for Loebner Prize is conducted under aegis of AISB.

Every year, a computer which is most human like is awarded the prize. The program will interact with judge program under the loebner prize protocol. The program is tested on questions ranging from general knowledge to questions demonstrating memory for preceding parts of the same conversation up to 25 minutes. This competition is said to have increased research in the field of AI. If a system can fool half the judges that it is human, then a silver medal and $25000 is awarded to the winner.

In 2016, the loebner prize is won by Mitsuku program developed by Steve Worswick which is also a finalist in the 2017 competition. The Mitsuku program claims to be a chatbot, her intelligence includes the ability to reason with specific objects. It mainly uses the technique of AIML, a determinate of XML. The purpose of AIML is to simplify the job of conversational modelling. The AIML objects of Category, Pattern, Template are used by Mitsuku. It also consisted of a sophisticated database of common objects as well as their attributes and relationships to each other. It uses a vast knowledge graph in order to improve relevance and humanness.

2.

a. Barcode Scanners cannot be considered as AI because it simply reads barcode and doesn't perform any computations.
b. Search Engines can be considered as an AI system because it uses optimization, Natural Language Processing, Clustering and several techniques related to AI.
c. Voice Activated Telephone Menus can be considered as AI to some extent as it recognizes accents and voices of users but doesn't involve much computational AI work.
d. Internet Routing Algorithms that respond dynamically to the state of network can be considered as AI as it consists of some intelligent activity. In this activity knowledge about network changes is partial and the network is dynamic so the routing can be done by an AI agent but cannot be usually done by a human.

3.

a. False, an agent can be rational even in cases of uncertainty. A simple reflex Vacuum cleaner agent can be rational even if it's partially observable.
b. True, there may exist an environment where a pure reflex agent cannot behave rationally because it doesn't have any prior knowledge. A simple reflex agent in dynamic/unknown environment may not be rational.
c. True, an environment where every agent is rational may exist. Any agent in a closed box is rational because it's work is to do nothing.
d. False, an agent program takes the percept of present environment where as an agent function may take entire percept sequence till date.
e. False, an agent function may be complex enough to implement as a program. If an agent function is to predict future, then no program can implement that function.
f. True, an agent may be rational in a deterministic environment even it chooses actions at random. Consider an agent where any random action leads to same state, then the agent is considered rational.
g. True, an agent can be perfectly rational in two different task environments. A Roomba vacuum cleaning agent which does household cleaning can also act as a perfect rational agent in a simple environment.
h. False, an agent cannot be rational in an unobservable environment. An agent without any learning capabilities in an unknown environment cannot be rational.
i. False, a perfectly playing poker agent can lose because the game of poker depends on luck which is unforeseen.

4.

Robot Soccer Player:

Performance measure: Score goals, Defend, Assists, Playing by rules.

Environment: Field, Other Players, Referees.

Actuators: Throwing, kicking, catching using legs and hands.

Sensors: Cameras, Motion sensors, detecting the ball, speech recognition to converse with other players.

Characteristics: Fully observable, Multi agent, sequential, dynamic, stochastic, continuous, known environment.

A goal based agent design may be used.

Internet Book-shopping agent:

Performance measure: Predictions to users, ease of use

Environment: Internet, users, database

Actuators: displaying results, HTTP request, Checkout and billing

Sensors: keyboard search, HTML parser

Characteristics: Partially observable, Multi agent, sequential, dynamic, stochastic, continuous, known environment.

An Utility based agent is best suited for implementing it.

Autonomous Mars Rover:

Performance measure: Move independently, analyze details, make conclusions.

Environment: Unknown environment.

Actuators: Robotic arms to interact etc.,

Sensors: Motion sensors, thermal, accelerometer, GPS

Characteristics: Partially observable, Single agent, sequential, dynamic, stochastic, continuous, unknown environment.

A learning agent is best suited for this system.

5.

a. Yes, there can be several agent programs which implement the same agent function. For example, an agent function of changing colors can be done either by an agent program which uses RGB notation or by another agent program which uses color names.
b. Yes, there are certain agent functions which cannot be implemented by any agent programs. For example, an agent function which determines an unknown sequence or requires some complex computations cannot be implemented by any agent program.

6.

a. A simple reflex agent cannot be perfectly rational in an environment where the agent is penalized for each movement because the agent doesn't have any information whether the room is clean or not, so it continuously moves from one room to another room even if it's clean.
b. A reflex agent with state can be perfectly rational because it has information about the room's state. So, it doesn't unnecessarily move if the room is clean.

c. A reflex agent whose percepts give it the clean/dirty status of every square in the environment can be rational because it knows the status of each square and move accordingly to clean only dirty squares.

References:

1. Artificial Intelligence, A Modern Approach (AIMA), Third Edition, by Russell & Norvig.
2. www.mitsuku.com
3. www.i-programmer.info
4. www.aisb.org.uk