COMS 4701 Artificial Intelligence

Homework 1 - Conceptual

Due date: Thursday September 30, 2021

Please review the **lectures and the required materials** before answering these questions.

1. **AI History**

   What is the correct order of the events given below?

   a. Alan Turing published "Computing Machinery and Intelligence".

   b. McCulloch and Pitts proposed a model for the neuron.

   c. Deep neural networks were invented and deep learning took over!

   d. AI research slowed down in a period known as the AI Winter.

   e. Frank Rosenblatt invented the Perceptron.

   [ ] a → b → d → e → c

   [ ] b → a → d → c → e

   [ ] b → a → e → d → c

   [ ] a → e → b → c → d

2. **McCulloch & Pitts (MP) vs. Perceptron**

   The main differences between McCulloch & Pitts (MP) and Perceptron models are (check all that apply):

   [ ] Inputs to the MP are boolean (0 / 1), whereas inputs to the Perceptron can be any real value.

   [ ] MP has a threshold that can be adjusted, whereas Perceptron has a fixed threshold.

   [ ] Inputs are equally weighted in MP, whereas Perceptron can weigh inputs differently.

   [ ] As opposed to the Perceptron, MP has a well-defined learning procedure.

3. **Interpretability**

   Why is interpretability an important requirement to develop an ethical AI (check all that apply)?

   [ ] Ensure AI models are as complex as possible so they perform well

   [ ] Understand AI predictions

   [ ] Ensure AI is fair

   [ ] Advance science and our knowledge in general

   [ ] Ensure AI is free

   [ ] With transparent models, AI is more trusted and hence more used

4. **PEAS and environments**

   Consider "DishMe", a revolutionary robotic AI agent to fill the dishwasher machine. DishMe can move around the kitchen. You put dirty dishes on the counter or in the sink or on top of the stove, and say no more, just push the button and DishMe will retrieve the dishes, pick them up, organize them in the dishwasher machine, and start a washing cycle. DishMe can handle all types of dishes and does a nifty good job at optimizing the space usage in the machine. In this question, we will assume the robot can move around the room between the counter, the sink, the stove, and the dish washer. We also assume that it is not connected to other devices. It plays a nice tune when it is done loading and starting the dishwasher.

1. What kind of AI applications is DishMe (check all that apply)?

   [ ] Robotics
   [ ] Computer vision
   [ ] Spoken language processing
   [ ] Natural language processing
   [ ] Planning [ ] Games

2. Do a PEAS analysis of DishMe.
3. Discuss the robot's environment, using the properties of: (1) observability, (2) number of agents, (3) deterministic/stochastic, and (4) discrete/continuous.
4. Discuss possible functionalities that could be implemented in this agent's program to make the "dishing" job easier. Feel free to add hardware that goes with your functions.