Homework 1

(Fall Machine Learning)

October 30, 2019

1. How do you define machine learning?

2. Can you name four types of problems where it shines?

3. What are the two most common supervised tasks?

4. Can you name three unsupervised tasks?

5. What type of machine learning algorithm would you use to enable a robot to walk in various unknown terrains?

6. What type of algorithm would you use to segment your customers into multiple groups?

7. Would you frame the problem of spam detection as a supervised or an unsupervised learning problem?

8. What is the difference between a model parameter and a learning algorithm's hyperparameter?

9. Can you name some of the main challenges in machine learning?

10. If your model performs great on the training data but generalizes poorly to new examples, what is happening? Can you name enumerate some possible solutions?

11. Alice wants to write an application to determine if a text is discussing about scientific policy based on the frequency of the words *science*, *public*, *access*, *university*, *government*, *finance*, *education*, *budget*, *justice*, and *law*. She labeled millions of texts according to their subject. What kind of automatic learning problem she must solve?

12. Bob's data set comprises 10 variables. He would like to visualize using two-dimensional representation. What type of algorithm he must use?

13. We have seen that Tom Michell [] defines machine learning as: "A computer program is considered to learn from experience E with respect to some class of tasks T and performance measure P if its performance tasks in T, as measured by P, improves with experience E". Alice is developing an application that uses the historical financial transactions to detect frauds. In this case, what are the E, T, and P?

14. What is meant by the term inductive bias?

15. Why is machine learning considered an ill-posed problem?