

CS 4100/5100 – Foundations of AI

Assignment 5: Machine Learning

Due: December 6th, 11:59pm

Learning Objectives

- Classify a learning task into the kind of learning that will be performed
- Demonstrate understanding of the concept of decision tree learning
- Informally discuss the design of a learning agent

Assignment Description

This is a written assignment with no programming involved. Answer the first question **in your own words**. These answers must be typed (or digital scans of *clear* handwriting).

1. Consider the problem of learning how to play tennis (or some other sport or game with which you are familiar). Explain how this process fits into the general model of a learning agent. Describe some of the percepts and actions taken by the player, and the types of learning the player must do. What are the functions the player is trying to learn in terms of inputs, outputs, and example data? Is the learning task supervised learning, unsupervised learning, or reinforcement learning? [Based on question 18.2 from the textbook]
2. Consider the following data set. Each data point has three attributes: task deadline, task interest, and task importance. The deadline might be <1 day, 1-2 days, or 3-7 days; task interest can be low or high; task importance can be low or high. The outcome is whether or not the agent should procrastinate on performing the task.

Data Point	Deadline	Interest	Importance	Procrastinate?
x ₁	3 – 7 days	High	Low	No
x ₂	1 – 2 days	Low	High	Yes
x ₃	< 1 day	Low	High	No
x ₄	1 – 2 days	Low	Low	Yes
x ₅	< 1 day	High	Low	No

What decision tree is learned from this data, given the algorithm we discussed in class? Show why each attribute is chosen at each decision point in the tree. Do you think this is enough data, or might more data help refine the learned decision tree?

Submission Instructions

Create a PDF document that contains your answers to these questions, your name, how many late days you intend to apply to the assignment, and the names of anyone you worked with to come up with a solution. Upload the PDF to Blackboard by December 6th at 11:59pm. All materials must be submitted through Blackboard. **Assignments emailed to me will not be accepted.**