

What is Machine Learning? In-class Exercise 2

EL-GY 6143 Intro Machine Learning. Prof. Sundeep Rangan

Question

For each machine learning problem below (Problem 1 to 5), determine which type of ML algorithm would be best:

- A. Supervised learning: Classification
- B. Supervised learning: Regression
- C. Unsupervised learning
- D. Reinforcement learning

For supervised learning problems, state possible predictors and target (There is no single correct solution).

Num	ML Problem	Algorithm: A to D
1	Estimate the increase in sales from attributes of an advertising campaign.	Regression
2	Predict if a tissue sample is cancerous or not from an image of the tissue.	Classification
3	Train a computer to steer a car from camera data. For training, you have recorded the steering actions of an expert human driver along with the camera data that the human saw.	Regression
4	Train a computer to steer a car from camera data. In this case, there is no labeled data. The computer must learn how the steering affects the motion of the car.	Reinforcement learning
5	Classify survey data into groups with similar responses.	Unsupervised learning

Solution

1. Regression. The target is the increase in sales, and the predictors could be any attributes of the advertising campaign such as money spent or type of campaign (Internet or print). It is regression since
2. Classification. The target is whether the tissue is cancerous or not (binary classification). The predictor is the image of the tissue.
3. Regression. The target is to match the human steering command. The steering command is generally continuous-valued (e.g. the amount you turn the wheel). The predictor is the camera input. In supervised learning, you will train the computer to match the human commands given the camera data.
4. Reinforcement learning. In this case, you do not have a direct target to match. Since the computer must learn the effects of steering over time, this is reinforcement learning. For RL, the action is the steering command and the observations of the state are from the camera data. The reward could be something like whether you stay in the lane. Note that there is a delay between steering actions and the car position.
5. Unsupervised learning. This is a classic clustering problem.