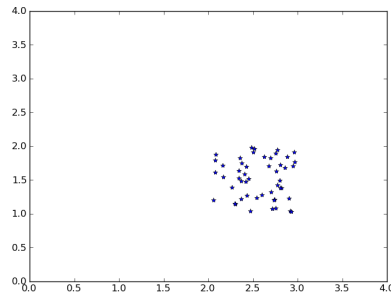


Assignment 5

Submit individually to prof4155@cs.dal.ca with subject line A5 Thursday, October 18, 4pm.

1. Given the data of Assignment 4, question 1 (available through the course web site in file `A4Q1.data.npy`). Use support vector regression (SVR) from the scikit-learn library to fit the data compare your previous solution with the SVR solution by plotting the data and your predictions between $x=0$ and $x=20$.
2. Given are training data shown in the figure below. Provide a probabilistic hypothesis for these data.



3. A bucket contains 10 red marbles, 7 green marbles and 3 white marbles. If a marble is drawn from the jar at random, what is the probability that this marble is red?
4. My desk has 8 drawers, where I randomly (but with equal probabilities) store my documents. Since I am a absent-minded professor, in 2 out of 10 cases I simply forgets to store a document, and eventually these get lost.

When I needs a document I starts a search from the first drawer and proceed sequentially until the document is found or it becomes clear (after checking all the drawers) that the document has not been stored in the desk in the first place.

- (a) I checked and found no documents in the first drawer. What is the probability that the document will be found in the remaining seven drawers?
- (b) I checked and found no documents in the first four drawers. What is the probability that the document will be found in the remaining four drawers?
- (c) The fellow checked and found no documents in the first seven drawers. What is the probability that the document will be found in the last remaining drawer?

5. An economics consulting firm has created a model to predict recessions. The model predicts a recession with probability 80% when a recession is indeed coming and with probability 10% when no recession is coming. The unconditional probability of falling into a recession is 20%. If the model predicts a recession, what is the probability that a recession will indeed come?
6. Alice has two coins in her pocket, a fair coin (head on one side and tail on the other side) and a two-headed coin. She picks one at random from her pocket, tosses it and obtains head. What is the probability that she flipped the fair coin?
7. **(For graduate students only)**
Train a RBM on pattern of your choice and plot the learned receptive fields