Assignment 3, Perceptron Learning Algorithm

CSC736 Machine Learning
Spring 2022
Max Score: 100

Objectives

- Learn and demonstrate knowledge of Perceptron classification.
- Visualize the learning process of Perceptron.

A perceptron is able to classify linear separable dataset. In this assignment, you are required to develop a program that is able to:

1. Generate points in the training set.
    - Arbitrarily define a line (eg. y = ax+b or ax+by+c=0);
    - Generate 20 random data points on a 1000 by 1000 size canvas. Based on the line in the previous step, assign the class (1 or -1) to each points.
    - Visualize the line in green and the points (circles filled or unfilled) on a graphic user interface similar to the attached figure.
2. Implement a perceptron and perceptron learning algorithm.
    - Randomly initialize the weights to a double within (0, 1).
    - Set your learning rate to 0.0001;
    - Train your perceptron by the perceptron learning algorithm with the provided training data generated from the previous step.
    - Define "epoch" as one iteration of training all the training data one time.
    - Visualize the line represented by the current weights at the end of each epoch on GUI. (like an animation.)
    - Output the number of misclassification on the training data at the end of each epoch.
    - Terminate the training process if all the training data are correctly classified by the perceptron.