CMSC 409: Artificial Intelligence

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Project 2

CMSC 409: Artificial Intelligence
Project No. 2
Due Tuesday, October 2, 2018, noon

Pr.2.
Use the **both dimensions** of the data set you have created in Project 1. In language of your preference (Matlab, C++, Java), implement a perceptron-based classifier that will iterate until the **total** error is below epsilon ($\varepsilon<10^{-5}$). To implement this criterion, you need to introduce a stopping criterion. You should also introduce a limit on maximum number of iterations (let that be *ni*=1,000). Initialize your neuron using random values.

Please use unipolar version of:

- **a)** Hard activation function
- **b)** Soft activation function

For the scenario a) do the following

1. Choose 75% of the data for training, and the rest for testing for scenarios. Train and test your neuron. Plot the data and resulting separation line. Specify corresponding errors.
2. Choose 25% of the data for training, and the rest for testing for scenarios. Train and test your neuron. Plot the data and resulting separation line. Specify corresponding errors.
3. Compare 1. and 2. and discuss.

Repeat steps 1. through 3. for scenario b).

Pr. 2.1 Extra credit (soft vs. hard activation function)
Compare and discuss results form using hard activation and soft activation solutions for 1. Do the same for 2. and 3.

This assignment may be updated!

Please include in the report all the deliverables from the assignment. Please include the code.

Note:

1. You can consider step-by-step approach. For ex., you can try to answer some of the questions for a smaller, initial data set (at the order of ten patterns). Once you make sure you understand and can explain the behavior of your model, you can use the initial data set as the "seed" to create more data samples.
2. The code must be user friendly. The TA must be able to test it simply by executing the code.
3. If working in teams, please clearly specify workload distribution (who has done what).
4. Project deliverable should be a zip file containing:
    a. Written report with answers to the questions above in word, pdf, ps, or txt format
    b. The data and separation lines in format as specified by Project2_data.zip
    c. The source code.
5. Submit your zip file to Blackboard. Please name the zip file as name it FamilyName_Project2.zip.