CMSC 409: Artificial Intelligence

Fall 2017, Instructor: Dr. Milos Manic, http://www.people.vcu.edu/~mmanic

Project 2

CMSC 409: Artificial Intelligence
Project No. 2
Due Monday, October 9, 2017, noon

Pr.2.
Use 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 error is below epsilon ($\mathcal{E}<10^{-5}$). 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.
2. Choose 50% the data for training, and 50% for testing. Train and test your neuron. Plot the data and resulting separation line.
3. 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.
4. Compare 1., 2. and 3. and discuss.

Repeat steps 1. through 4. 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.

Write report with the code. Prepare to present in class.

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 Project1_data.zip
    c. The source code.
5. Submit your zip file to Instructor mmanic@vcu.edu and cc TA Darshini (Samantha) Mahendran, mahendrand@vcu.edu. Please use the subject line [CMSC 409] Family name, Project 2

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