CMSC 409: Artificial Intelligence

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

Project 1

CMSC 409: Artificial Intelligence
Project No. 1
Due Friday, September 22, 2017, noon

Pr.1.

Create in language of your preference (Matlab, C++, Java) two normally distributed classes for male and female students with following two features:
Feature 1: Height
Feature 2: Weight

Choose centers and standard deviations for these patterns as you wish, but try to mimic your perception of means and variances for these two measurements for the two groups of students. Create samples of 2,000 students for each gender. The two types of patterns will likely overlap to some extent.

Consider scenarios:

a) Where only the first feature (height) is considered.
b) Where both features (height and weight) are considered.

For these two scenarios, do the following

1. Plot the data for male and female students.
2. Estimate and plot (manually) a separation line (linear separator or decision function), which separates female and male students.
3. Determine the equation of this decision function
    a. Contrast the equation with artificial counterpart of biological neuron. Can you determine what would the numerical values of the weights be? Discuss.
4. Report the error, accuracy, true positive rate and true negative rate, also false positive and false negative rate.

c) Consider only the first feature (height).
d) Consider both features (height and weight).

Write report with the code. Prepare to possibly 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. Compile all your deliverables in a single file i.e. include the code (word, pdf, ps, txt format)
4. Project deliverable should be a single file containing:
    a. Written report with answers to the questions above

   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.
6. Please use the subject line [CMSC 409] Family name, Project 1