Wes Bosman

9/26/2016

Artificial Intelligence

Project One

1. I chose to write this program in Python and I made use of Pythons matplotlib and numpy libraries in order to easily plot the desired data with a normal distribution. Numpy also allowed me to generate the same data every time the program executed based on a seed. The data was seeded based on initial values that I set for mean height and weight, as well as standard deviations for both males and females. I would also like to note that when running my program the graphs will show up on top of one another. I developed this program in a Linux environment and found a function to move the graphs positions on the screen. However, when I moved my program onto my mac I did not get the same results and I commented out the lines to move the graphs. You may need to manually move the graphs by dragging with the mouse and both should be saved in my project file every time the program is run.
2. A) In figure 1 I plotted data for males and females based on height only. The y values for the males was set to 0 and the y values for females were set to 0.1. This was done in order to be able to differentiate between the two sets. When I tried to plot them all with 0 for their y values I ended up with a solid blue line. The linear separator was done based on the midpoint between the mean male height and female height that I picked. This value turned out to be 5.56.

B) In figure 2 I used my cursor to find points on the graph that seemed to split the data points up with the least amount of error. I then wrote a function that would find the equation of the decision function based on the points I had chosen and then plot the line as well as write the equation on the graph. I was then able to adjust the coordinates of the line in order to better fit the data points I had generated. This coupled with some adjustment to my standard deviations and means I was able to get the error down to roughly under 2% for 4000 data points.

3) A) Figure one would have an artificial neuron that’s only input would be height and a bias and the output would be a zero or one indicating whether or not the height was describing a male or female

B) Figure two would have an artificial neuron with inputs of weight and height as well as bias and its output would be zero or one indicating whether the point was a male or female

4) A) Figure one seems less accurate than the second figure. There is a lot more overlap because the graph is only in one dimension. It seems to me that adding dimensions may increase accuracy

B) Figure two has an overall accuracy of 98.75%

True Positive rate of 99.2%

True Negative rate of 98.3%

False Negate rate of 0.8%

False Positive rate of 1.9%

Classes Male Female Total

Male 1984 16 2000

Female 34 1966 2000