

# Intelligent Systems

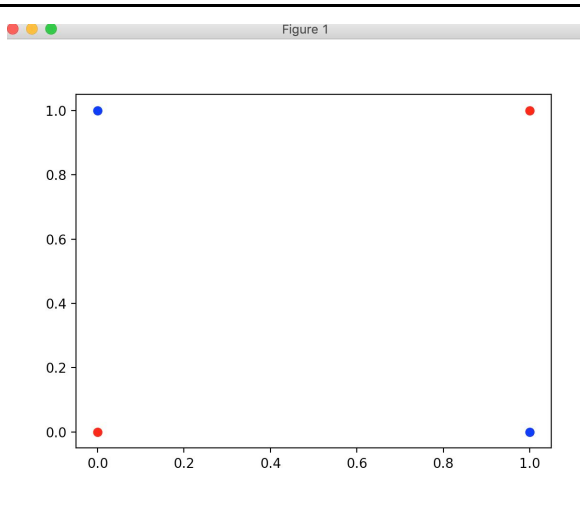
## Assignment: Perceptron / Neural Networks

**José Ramón Romero Chávez (A01700318)**  
**Tecnológico de Monterrey, Campus Querétaro**

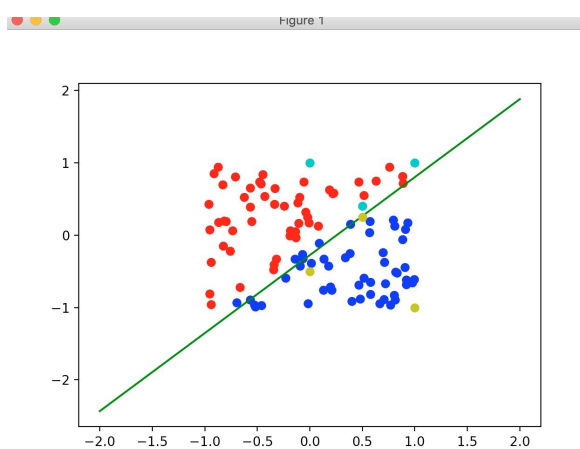
### Part 1

Create a scatter plot of the training set of the linearly\_separable example in the tests section. Use different colors or symbols for the two classes. Draw the line that the perceptron algorithm found. Include the mathematical equation of the line in your report.

| Plots:<br>Blue = 1<br>Red = 0<br>Yellow = evaluated as 1<br>Cyan = evaluated as 0 | Results<br>Weights, Bias<br>Line  |
|---|---|
|   | <div>0</div> <div>1</div> <div>0</div> <div>w, bias = [0.1, 0.1] 0.0</div> <div>y=-1.0x+0.0</div> |



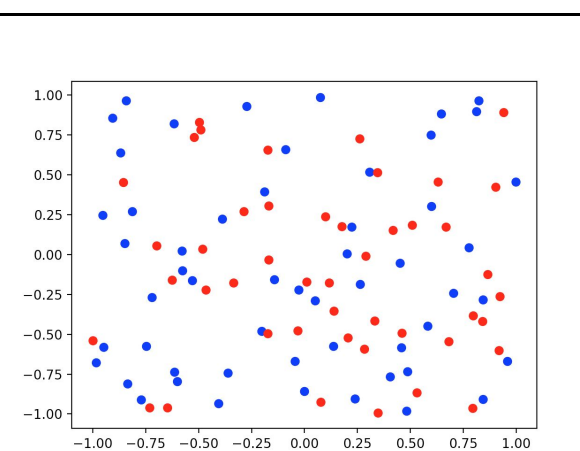
no solution found



0  
1  
0  
1  
1  
0

w, bias = [0.17526799960591485,  
-0.1890277123734792]  
-0.27633639941728766

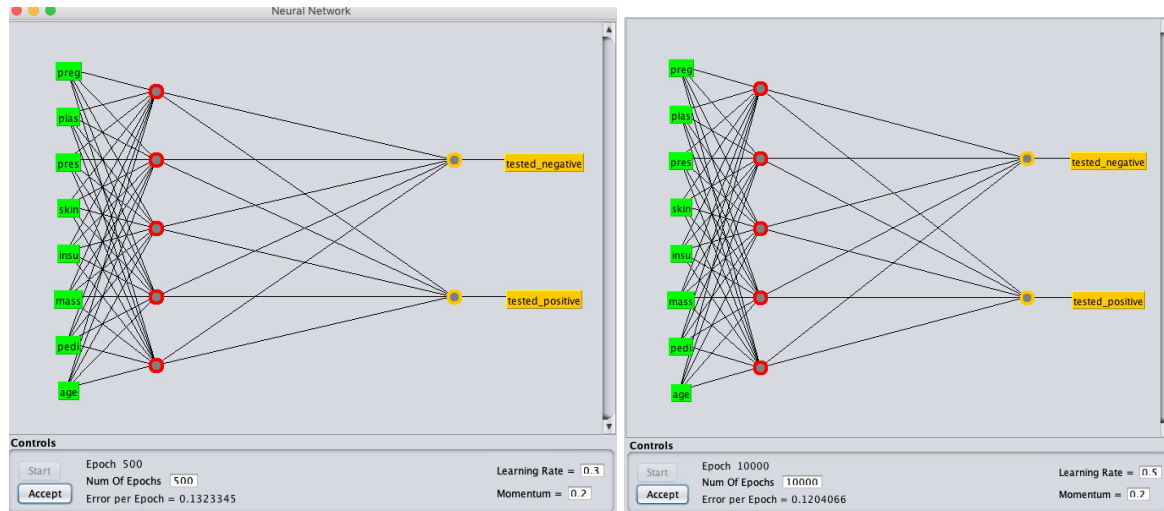
$y = 1.0785067028693354x - 0.27633639941728766$



no solution found

## Part 2

Using WEKA load and run ANN (multilayer perceptron) example and analyse the inputs and outputs.



A Multi-layer perceptron behaviour is very similar to its single layered version, as the output is completely related to the selected hyperparameters, such as the learning rate, epochs, momentum and activation function.

Usually this kind of neuronal networks are used for classification problems, this is because of the activation function that is used, has outputs with a discrete value instead of a continuous variable. They are not useful when we are struggling with a regression problem.

## **Observations.**

- By using a random function, in order to find a converging values, may take a lot of time, it is suggested some kind of improvement function, to find a way to reduce the amount of errors.
- Some aspect that increase the possibility of over fitting or more time of processing are:
  - increasement of epochs
  - small learning rate
  - small error tolerance

## References

- [1]"Perceptrón", *Es.wikipedia.org*, 2019. [Online]. Available:  
<https://es.wikipedia.org/wiki/Perceptrón>. [Accessed: 29- Apr- 2019].
- [2]"Perceptron Learning Algorithm: A Graphical Explanation Of Why It Works",  
*Towards Data Science*, 2019. [Online]. Available:  
<https://towardsdatascience.com/perceptron-learning-algorithm-d5db0deab975>. [Accessed: 29- Apr- 2019].