Brenda Guadalupe Flores Parada A01206527
Daniel Gámez Serna A01206539
Report Lab 5

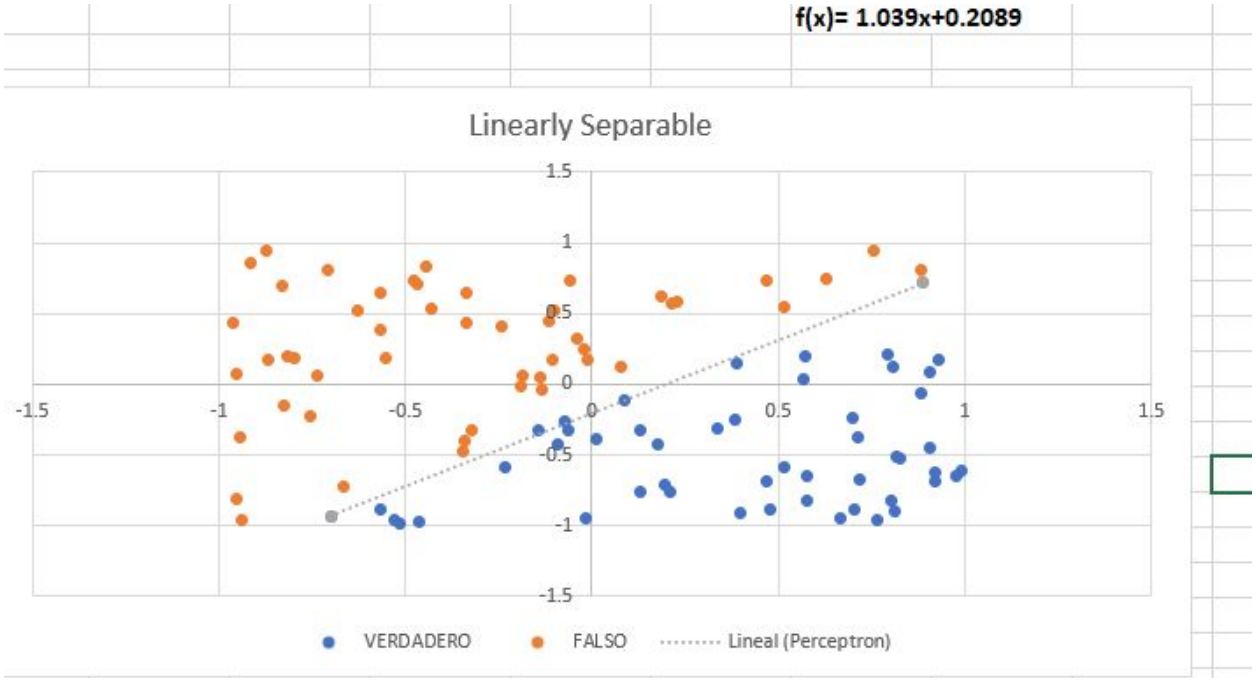
Neural Networks

Introduction

The following text shows the result of applying the knowledge about neural networks, in this lab a single layer network was implemented with only one perceptron.

PART 1

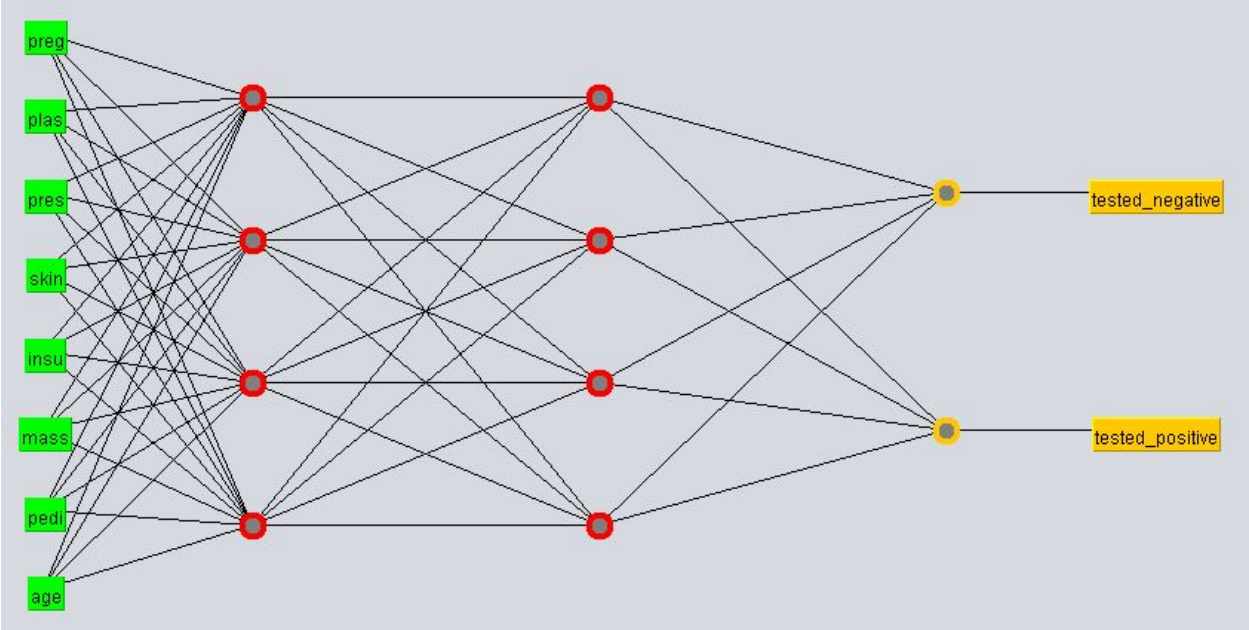
For this first part we plotted all the points for the training set. The blue points are for the TRUE value and the orange ones are for the FALSE value.



PART 2

For this second part we used a data set based on the positive/negative result of a diabetes test. We implemented different 2 layer ANN variating the number of perceptrons on each layer, also we make variations on the Learning Rate and Momentum parameters of WEKA making steps of 0.2 for each parameter. We made a total of 16 iterations with each ANN

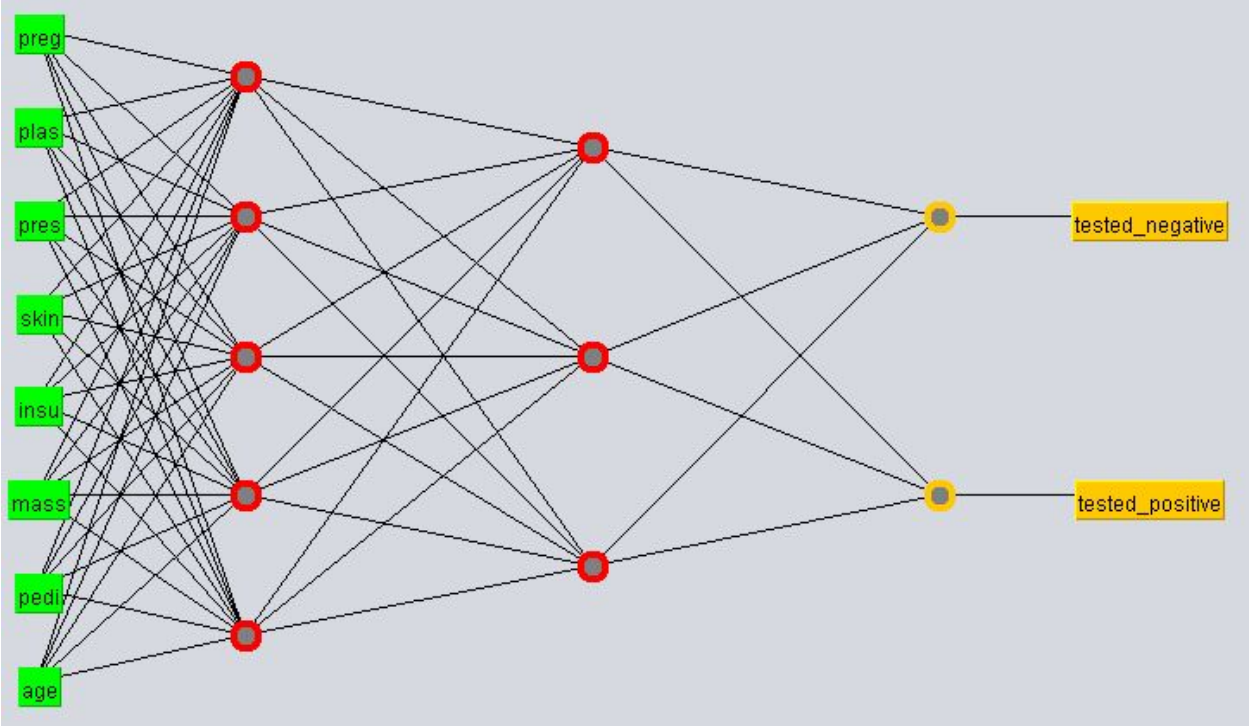
2 layer 4-4 (LearningRate = 0.5, Momentum = 0.4, Epochs = 500)



=== Summary ===

Correctly Classified Instances	**633**	**82.4219 %**
Incorrectly Classified Instances	**135**	**17.5781 %**
Kappa statistic	**0.5931**	
Mean absolute error	**0.2892**	
Root mean squared error	**0.3758**	
Relative absolute error	**63.6299 %**	
Root relative squared error	**78.8463 %**	
Total Number of Instances	**768**	

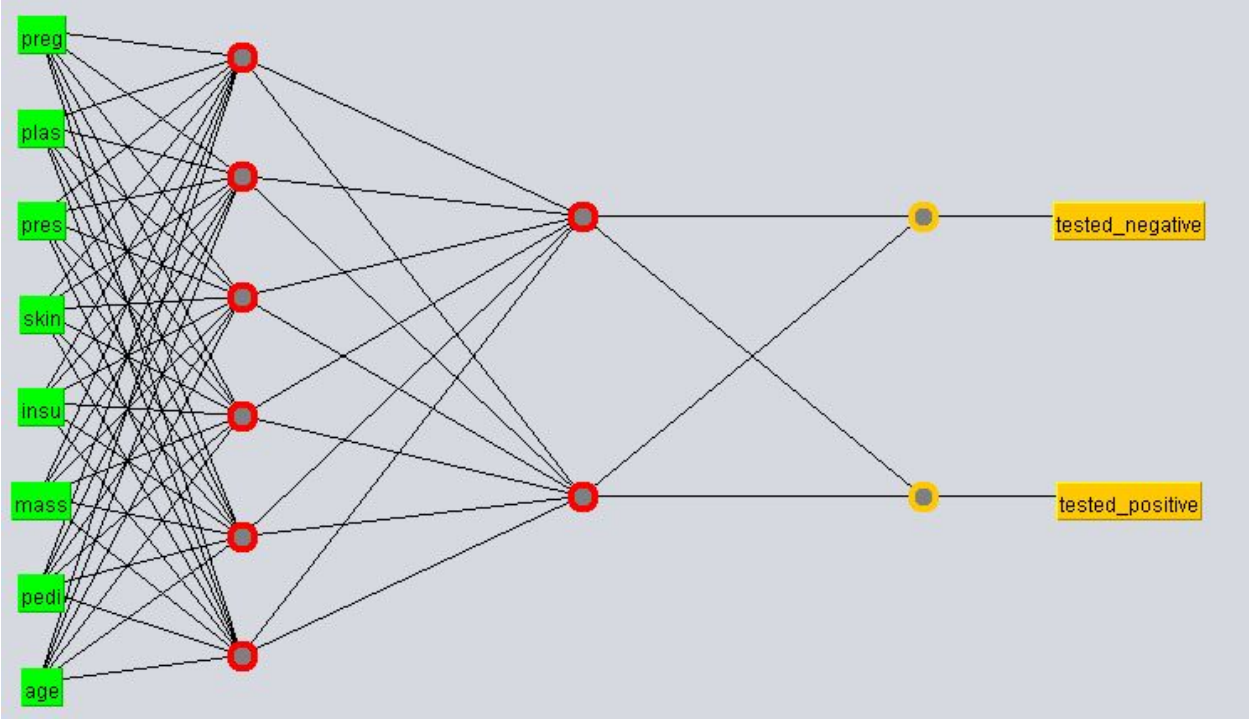
2 layer 5-3 (LearningRate = 0.3, Momentum = 0.6, Epochs = 500)



=== Summary ===

Correctly Classified Instances	**626**	**81.5104 %**
Incorrectly Classified Instances	**142**	**18.4896 %**
Kappa statistic	**0.6093**	
Mean absolute error	**0.2554**	
Root mean squared error	**0.3701**	
Relative absolute error	**56.2036 %**	
Root relative squared error	**77.6574 %**	
Total Number of Instances	**768**	

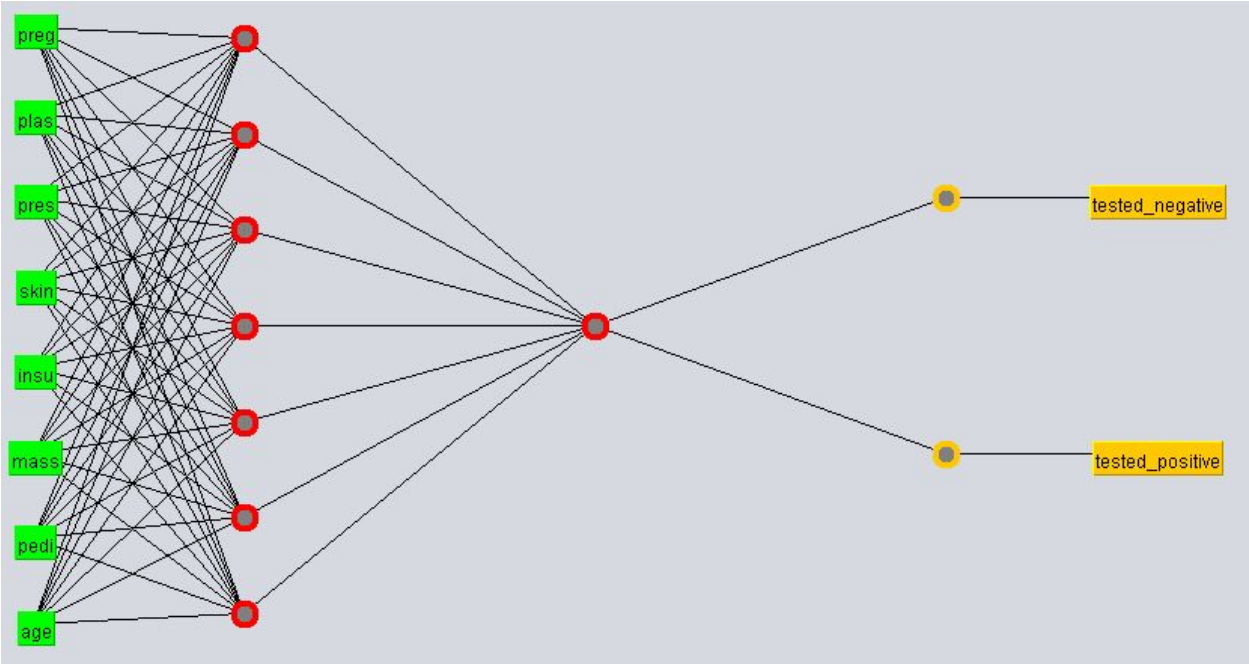
2 layer 6-2 (LearningRate = 0.5, Momentum = 0.8, Epochs = 500)



=== Summary ===

Correctly Classified Instances	**618**	**80.4688 %**
Incorrectly Classified Instances	**150**	**19.5313 %**
Kappa statistic	**0.5873**	
Mean absolute error	**0.2708**	
Root mean squared error	**0.3865**	
Relative absolute error	**59.5877 %**	
Root relative squared error	**81.0815 %**	
Total Number of Instances	**768**	

2 layer 7-1 (LearningRate = 0.3, Momentum = 0.4, Epochs = 500)



=== Summary ===

Correctly Classified Instances	646	84.1146 %
Incorrectly Classified Instances	122	15.8854 %
Kappa statistic	0.6534	
Mean absolute error	0.2547	
Root mean squared error	0.3584	
Relative absolute error	56.0364 %	
Root relative squared error	75.1889 %	
Total Number of Instances	768	

At the time of making each iteration we decided to try some ANN big enough to see the difference between the ones we chose, one of them was having a single layer with 100 perceptrons and the other was having 10 with 6 perceptrons each, having a large network makes it difficult for it to learn taking it more time and also the error is bigger than having less perceptrons and less layers.

We could notice that variating the momentum could make some changes on the error, the momentum can help finding the real minimum values or the local minimum, sometimes this value can vary for each network depending also on the value of the Learning Rate.

- Explanations as to what are ANNs good for.

ANNs are good to solve different types of problems. Some of those are for classification, for optimization and for prediction.

- Where would you use them?

ANNs are useful for classifying data based on the attributes it is given, one use they can have it to classify images

- Are they worth the effort implementing or not?

It takes a lot of time for the Neural Network to learn if you have a lot of data, but it worth the effort because it learn by itself, it is flexible and the structure provide us a good tool for the analysis of the data.

- What kinds of problems do they not solve?

The ones that does not have labeled the data, something important for the ANNs to work correctly is that they need a large amount of data.

References:

Vizcaino P. (2008) APLICACIÓN DE TÉCNICAS DE INDUCCIÓN DE ÁRBOLES DE DECISIÓN A PROBLEMAS DE CLASIFICACIÓN MEDIANTE EL USO DE WEKA (WAIKATO ENVIRONMENT FOR KNOWLEDGE ANALYSIS). Retrieved from http://www.konradlorenz.edu.co/images/stories/suma_digital_sistemas/2009_01/final_paula_andrea.pdf