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**Homework five**

**Neural network with backpropagation rule for a bank dataset**

Initially we saw that all the data with the same label appeared sequentially. There was a list of data with label 1 followed by 0. So, we used the shuffle function to randomly arrange the dataset.

We tuned the threshold parameter for the final output according to the validation set prediction which is 0.79 in this case

**1)Using sigmoid function**

We started with input node=4(same as number of parameters as stated in the assignment) and hidden nodes=4.

Every time the program is run, the shuffle is done in different ways, so the results were varying every time. However, this combination of nodes gave us the best accuracy out of all the combinations. This gave us an accuracy of 95.7% for validation and 96.66% for the test data.

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**Sigmoid function with input node=4, hidden node=3.**

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**Sigmoid with input node=4, hidden node=2**

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We saw that with the decreased number of neurons in the hidden layer, the accuracy decreased. So, a greater number of neurons in the hidden layer gave us more accuracy.

We noticed that sigmoid function gave us more accuracy than tanh function and the threshold tuning was much easier for sigmoid.

Tanh activation function had significantly less accuracy for input nodes, hidden nodes=4 in our assignment.

So, we chose sigmoid function

**Tanh activation**

Background pattern

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