

Summary:

The dataset is an Algerian Forest Fire classification that classifies if there is or is not a fire. The program takes the dataset, splits it into input and output matrices, and further splits it into training and testing data. It runs through all 24 combinations of hyper-parameters to build a model for each of them. It builds the model from the training data and tests it on the testing data to see how well it was built. The confusion matrix and classification report of each model for the train/test data is displayed. These show you where the error predictions were made and the calculated accuracy/performance of the models.

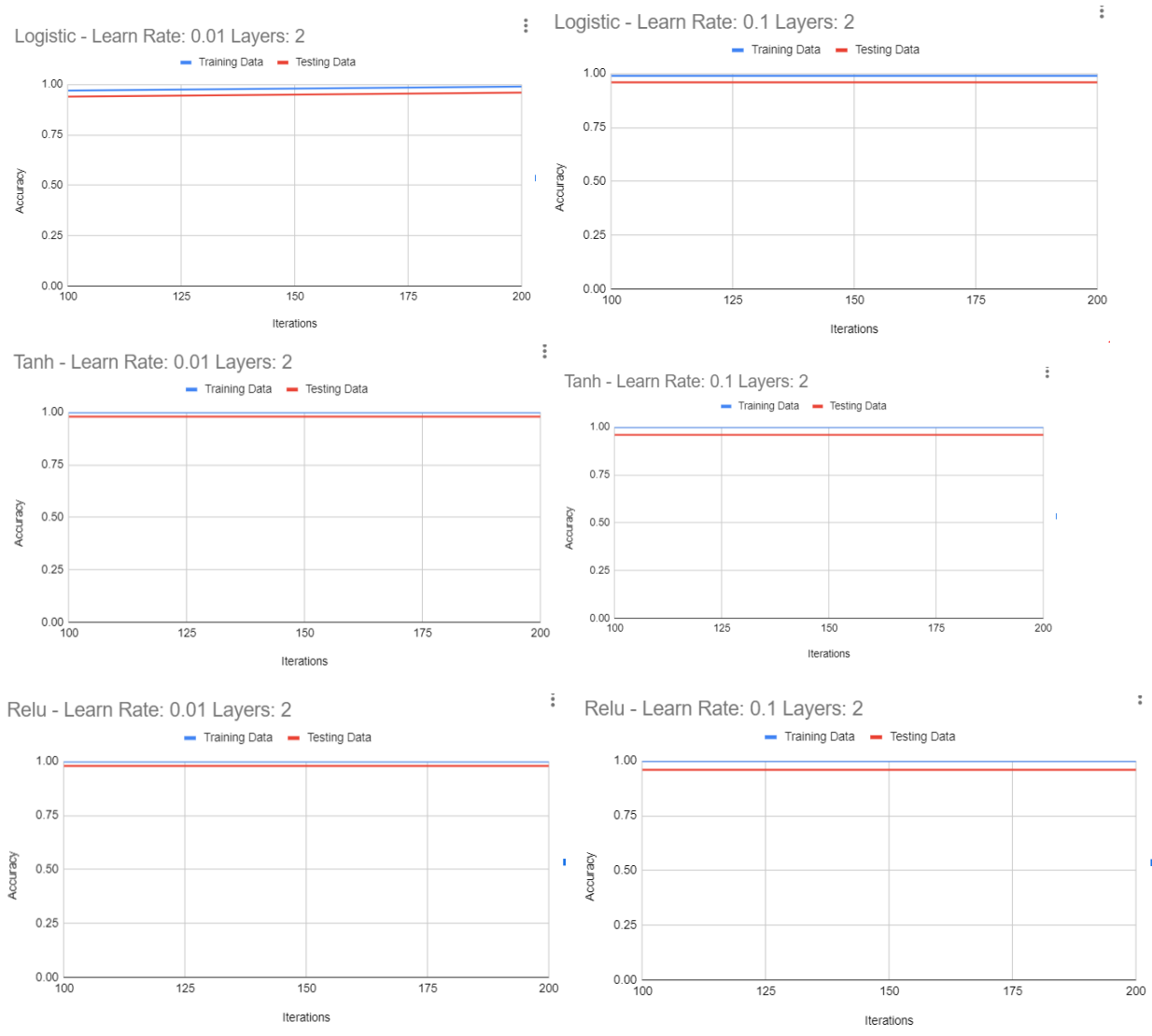
ReLU and Tanh produced more accurate results than Logistic and were faster as well. ReLU was faster than Tanh and seemed to perform better. ReLU doesn't have the vanishing gradient problem so this was a factor.

Logs:

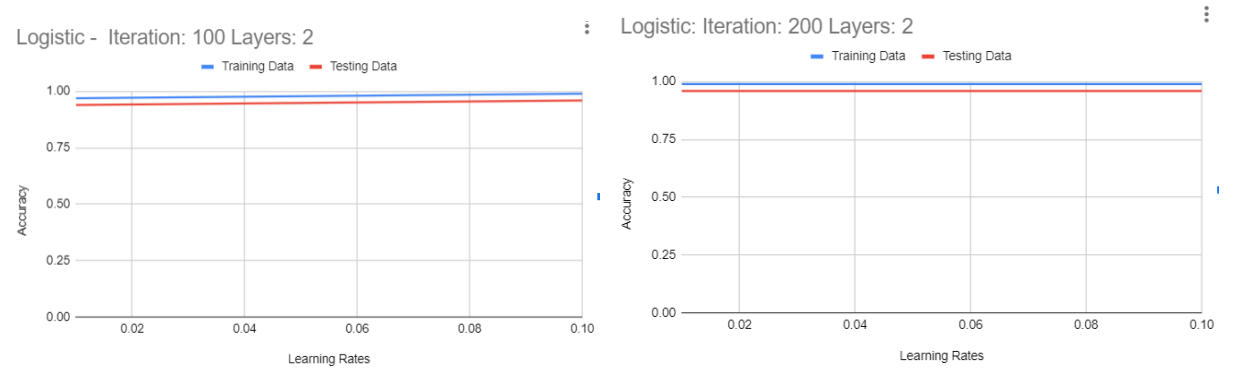
Logistic								
LR:0.01 Layer:2	Training Data	Testing Data	Epoch 100	Training Data	Testing Data	LR 0.01	Training Data	Testing Data
Iterations	Accuracy	Accuracy	Learning Rate	Accuracy	Accuracy	Layers	Accuracy	Accuracy
100	0.97	0.94	0.01	0.97	0.94	2	0.98	0.95
200	0.99	0.96	0.1	0.99	0.96	3	0.99	0.98
Logistic								
LR:0.1 Layer:2	Training Data	Testing Data	Epoch 200	Training Data	Testing Data	LR 0.1	Training Data	Testing Data
Iterations	Accuracy	Accuracy	Learning Rate	Accuracy	Accuracy	Layers	Accuracy	Accuracy
100	0.99	0.96	0.01	0.99	0.96	2	0.99	0.96
200	0.99	0.96	0.1	0.99	0.96	3	1	0.98
Tanh								
LR:0.01 Layer:2	Training Data	Testing Data	Epoch 100	Training Data	Testing Data	LR 0.01	Training Data	Testing Data
Iterations	Accuracy	Accuracy	Learning Rate	Accuracy	Accuracy	Layers	Accuracy	Accuracy
100	1	0.98	0.01	1	0.98	2	1	0.98
200	1	0.98	0.1	1	0.96	3	1	1
Tanh								
LR:0.1 Layer:2	Training Data	Testing Data	Epoch 200	Training Data	Testing Data	LR 0.1	Training Data	Testing Data
Iterations	Accuracy	Accuracy	Learning Rate	Accuracy	Accuracy	Layers	Accuracy	Accuracy
100	1	0.96	0.01	1	0.98	2	1	0.96
200	1	0.96	0.1	1	0.96	3	1	0.94
Relu								
LR:0.01 Layer:2	Training Data	Testing Data	Epoch 100	Training Data	Testing Data	LR 0.01	Training Data	Testing Data
Iterations	Accuracy	Accuracy	Learning Rate	Accuracy	Accuracy	Layers	Accuracy	Accuracy
100	1	0.98	0.01	1	0.98	2	1	0.98
200	1	0.98	0.1	1	0.96	3	1	0.94
Relu								
LR:0.1 Layer:2	Training Data	Testing Data	Epoch 200	Training Data	Testing Data	LR 0.1	Training Data	Testing Data
Iterations	Accuracy	Accuracy	Learning Rate	Accuracy	Accuracy	Layers	Accuracy	Accuracy
100	1	0.96	0.01	1	0.98	2	1	0.96
200	1	0.96	0.1	1	0.96	3	1	1

Plots:

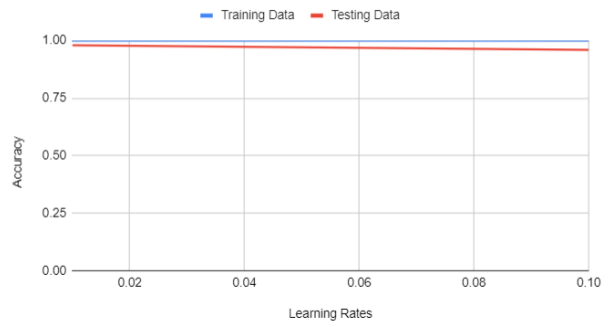
Accuracy vs. Epochs



Accuracy vs. Learning Rates



Tanh - Iteration: 100/200 Layers: 2

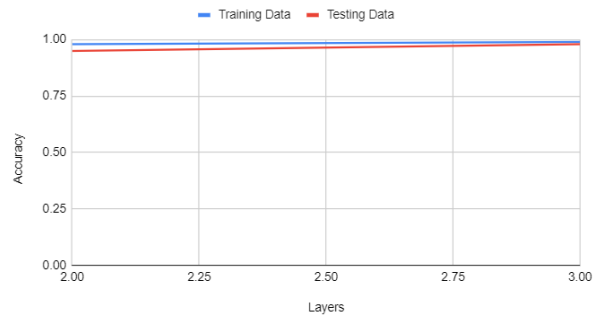


Relu - Iteration: 100/200 Layers: 2

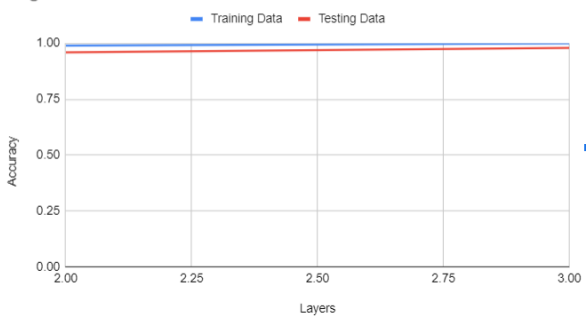


Accuracy vs. Number of Layers

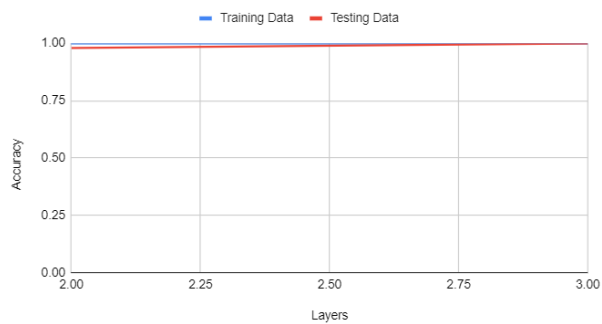
Logistic - Learn Rate: 0.01 Iteration: 100/200



Logistic - Learn Rate: 0.1 Iteration: 100/200



Tanh - Learn Rate: 0.01 Iteration: 100/200



Tanh - Learn Rate: 0.1 Iteration: 100/200



Relu - Learn Rate: 0.01 Iteration: 100/200



Relu - Learn Rate: 0.1 Iteration: 100/200

