Brittany Klose

MLP Results and Analysis

The table below reflects the findings from the running my MLP with various hyperparameters including number of hidden layers and the number of nodes per layer. I ran multiple hyperparameter options though I was unable to increase or change my model's accuracy scores by a significant amount. However, the image folder included in this repository showcases the visual differences in parameters; which are improved greatly by adding an additional third layer, and increasing the number of nodes in each layer. The accuracy and the loss curve of the hyperparameters (200, 250, 300) displayed the greatest improvement in classification. Not included in the table, but additional tests were run for (300, 350, 400) and the results showed too much classification where the accuracy score actually decreased slightly and the visuals showed more random sharp fluctuations in loss and inaccuracies after reaching a low loss. Other additional tests are included as well in the given code. All tests resulted in similar accuracy scores. Overall, the test was very accurate at recognizing an asteroid as non-hazardous but performed very poorly classifying an asteroid as hazardous as seen from the confusion matrices. If I were to run this model again I would narrow more of the pertinent features to see which ones had the biggest correlation to an asteroid being hazardous or not and also run it with a smaller population size. Since there were so many samples and features it's possible the model saw too many examples and it made the classification too strict.

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Hyper Params	(50,50)	(200, 500)	(400, 400)	(100, 100, 100)	(200, 200, 200)	(200, 250, 300)
#Layers & Neurons/ Nodes	2 layers of 50 neurons each	2 layers of with 200 and then 500 neurons	2 layers of 400 neurons each	3 layers of 100 neurons each	3 layers of 300 neurons each	3 layers of 200, 250, 300
Training Accuracy	0.84078	0.83604	0.838075	0.837059	0.83367	0.83570
Test Accuracy	0.85216	0.8486	0.85074	0.84932	0.8486	0.85074
Loss Curve	No curve very choppy. High loss	Sharp decrease in loss after 600 iterations	Presence of a curve much more visible. But loss is still very high until the last 100 iterations.	Loss shows steep decline and is very low after 400 iterations.	Sharp decrease in loss after 200 iterations then remains low. Random spike in loss at 800 iterations then goes back to being low.	Best loss curve with only minor fluctuations. Loss is low after just 100 iterations.
Accuracy Graph	Not classified enough results too scattered. High number of inaccuracies.	Low accuracy until last couple hundred iterations	Better but still a lot of inaccuracies. Though overall accuracy test & training scores are essentially the same if	High accuracy after 400 iterations. Though the overall accuracy scores are about the same.	Steep increase in accuracy after 200 iterations.	Accuracy graph reflects higher accuracy though overall test and training accuracy score only only somewhat better.

			not a little lower.			
Confusion Matrix	Excellent results for true negative (Non hazardous) but a lot of false positives (hazardous)	Good performance on true negatives but still a lot of false positives.	Good performance on true negatives but still a lot of false positives.	See more true negatives but strangely less true positives.	0 false negatives but also 0 true positives.	The matrix reflects the previous ones.
Execution time	1 minute	5 minutes	7 minutes	1 minute	4 minutes	5 minutes