

Machine Learning Assignment 3 Part 1

Which Pokemon Are Legendary

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For this assignment, the training and test data were read from CSV files and converted into a dataframe with the orders randomised. Slight changes were made to the training and test dataframes such as renaming certain column names and converting legendary column values in the training dataset to be in binary form.

Each model was created using TensorFlow with various hyperparameters tested. The model chosen was a sequential model and had one hidden layer of 12 neurons with a dropout of 20% in order to try and reduce overfitting. Early stopping was also used to stop training the model once it stopped improving its validation score. This model had very high training and test accuracy however this was due to it mostly predicting non legendary Pokemon correctly and it did not correctly predict any legendaries. When a scaler was applied to the model, it reduced the accuracy of the model slightly but still remained above 90% and then started to correctly predict legendary Pokemon. The training and validation loss of the model (Figure 1) also shows that there is a good correlation and has decreased to a point of stability with a small gap between both, indicating that the model is a good fit.

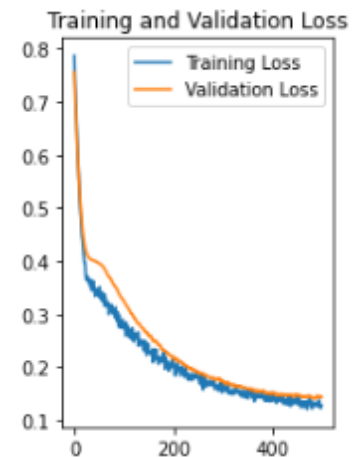


Figure 1: Training vs Validation Loss

For the training data, this model had a 94% accuracy score. It struggled to find all correct legendary Pokemon in particular with a recall score of 45%. The mean value of legendary pokemon features in the training set was 106, while the mean score of all false positive Pokemon predicted was 108. This indicates that Pokemon can have high average stats but may not be Legendary, making it harder for the model to accurately predict them.

For the test data, the model had a 96% percent accuracy score and 100% precision for non-legendary Pokemon. Although it correctly predicted the three legendary Pokemon of Zacian, Eternatus and Xamazenta, it struggled with correctly predicting legendary Pokemon with a precision score of 18%. The mean value of the features of false positive legendary Pokemon predicted was 93 which is quite high and once again shows that the model struggles in incorrectly classifying legendary Pokemon when their stats are high.

Overall, this model performed well with its predictions for non-legendary Pokemon but struggled more for accurately predicting Legendaries.

	precision	recall	f1-score	support
0	1.00	0.96	0.98	397
1	0.18	1.00	0.30	3
accuracy			0.96	400
macro avg	0.59	0.98	0.64	400
weighted avg	0.99	0.96	0.98	400

Figure 3: Model statistics

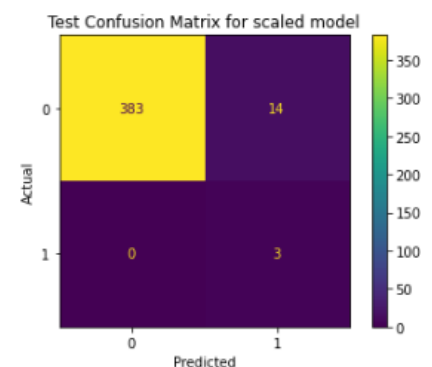


Figure 2: Model Confusion Matrix