FinTech Homework 1

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1. Classification

1.1 The model structure of DNN consists of three layers of Neural Network with 28, 8 and 2 nodes respectively. During the grid search, I found that deeper network gets better results. But to avoid overfitting, I decided to pick 3 layers to be the basic model structure of the DNN. Furthermore, the minibatch used for training is 512. The training accuracy and loss are shown below.

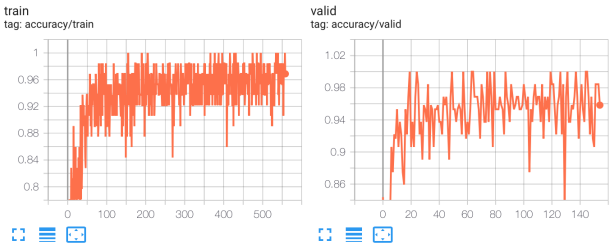

Figure 1: Accuracy

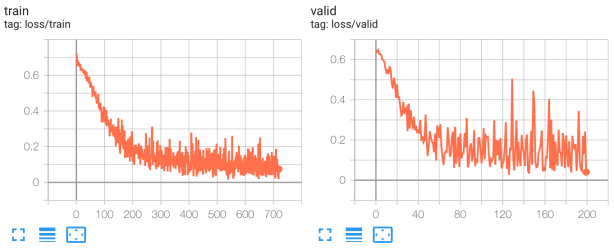

Figure 2: Loss

1.2 The confusion matrix is plotted by one minibatch.

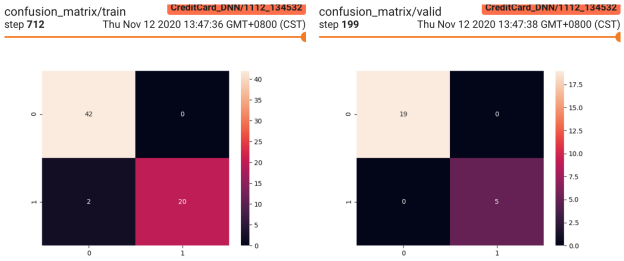

Figure 3: Confusion Matrix

1.3 Precision: 0.95, Recall: 0.87, F1 Score: 0.9

1.4 Decision tree uses a tree to classify the training data into different leaves according to the condition. Random forests are an ensemble learning method that operates by constructing a multitude of decision trees.

1.5 Decision tree: accuracy: 0.91, precision: 0.86, recall: 0.89, f1-score: 0.88 Random forest: accuracy: 0.95, precision: 0.99, recall: 0.86, f1-score: 0.92

1.6 The figure of ROC Curve, Precision-Recall Curve and Lift Curve are shown below

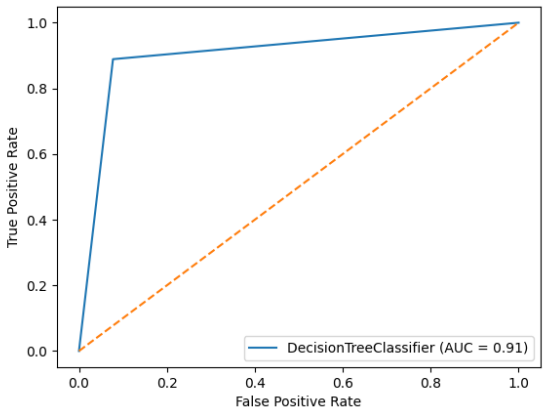

Figure 4: Decision Tree ROC Curve

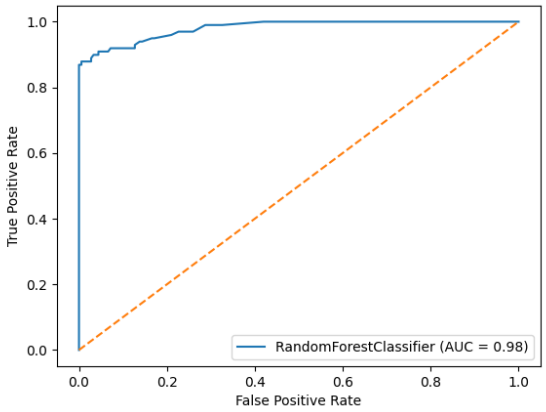

Figure 5: Random Forest ROC Curve

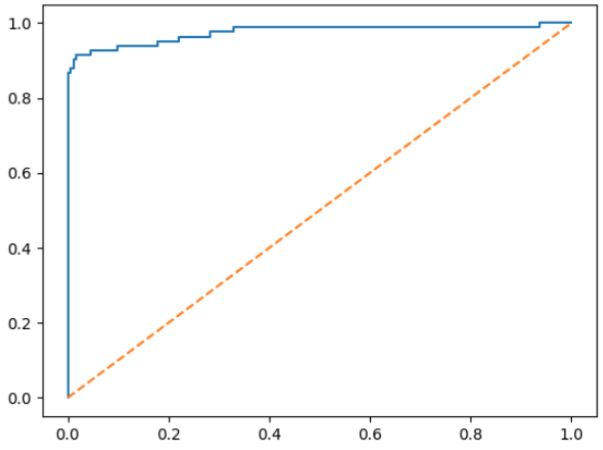

Figure 6: DNN ROC Curve

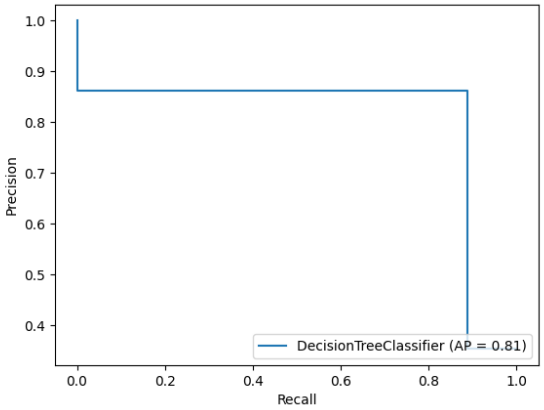

Figure 7: Decision Tree Precision Recall Curve

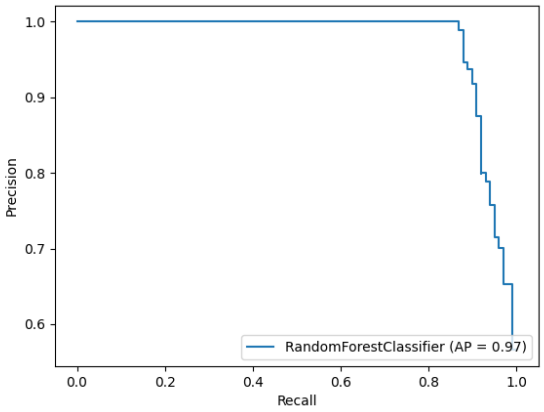

Figure 8: Random Forest Precision Recall Curve

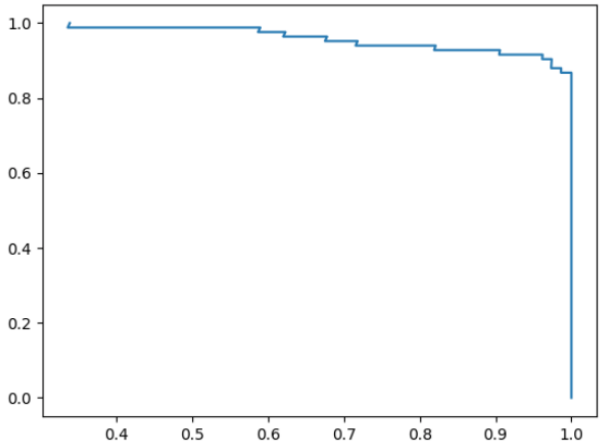

Figure 9: DNN Precision Recall Curve

2. Lift Curve

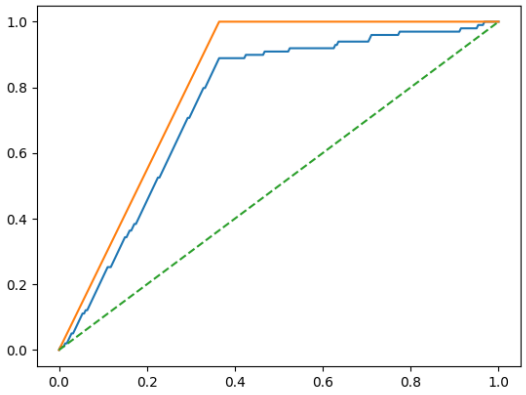

Figure 10: Decision Tree Lift Curve

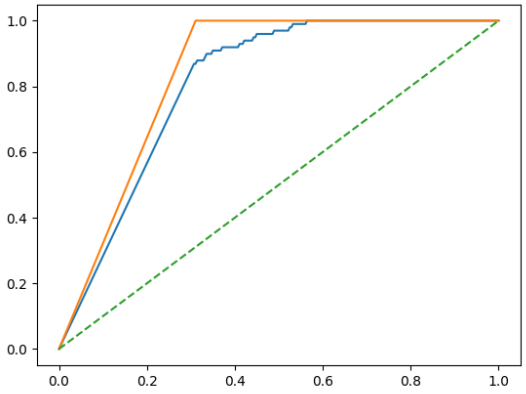

Figure 11: Random Forest Lift Curve

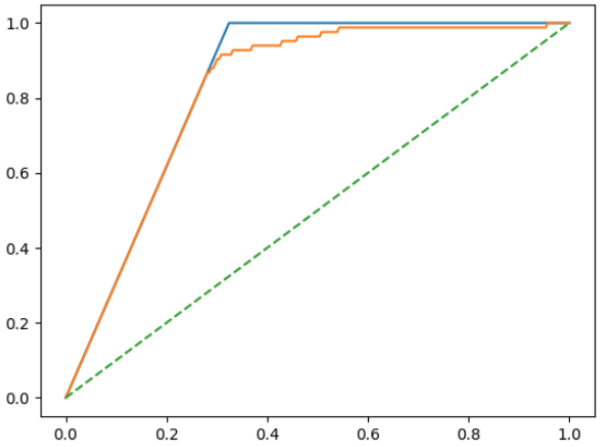

Figure 12: DNN LIFT Curve