

Improving Credit Card Fraud Detection using CNN/GAN

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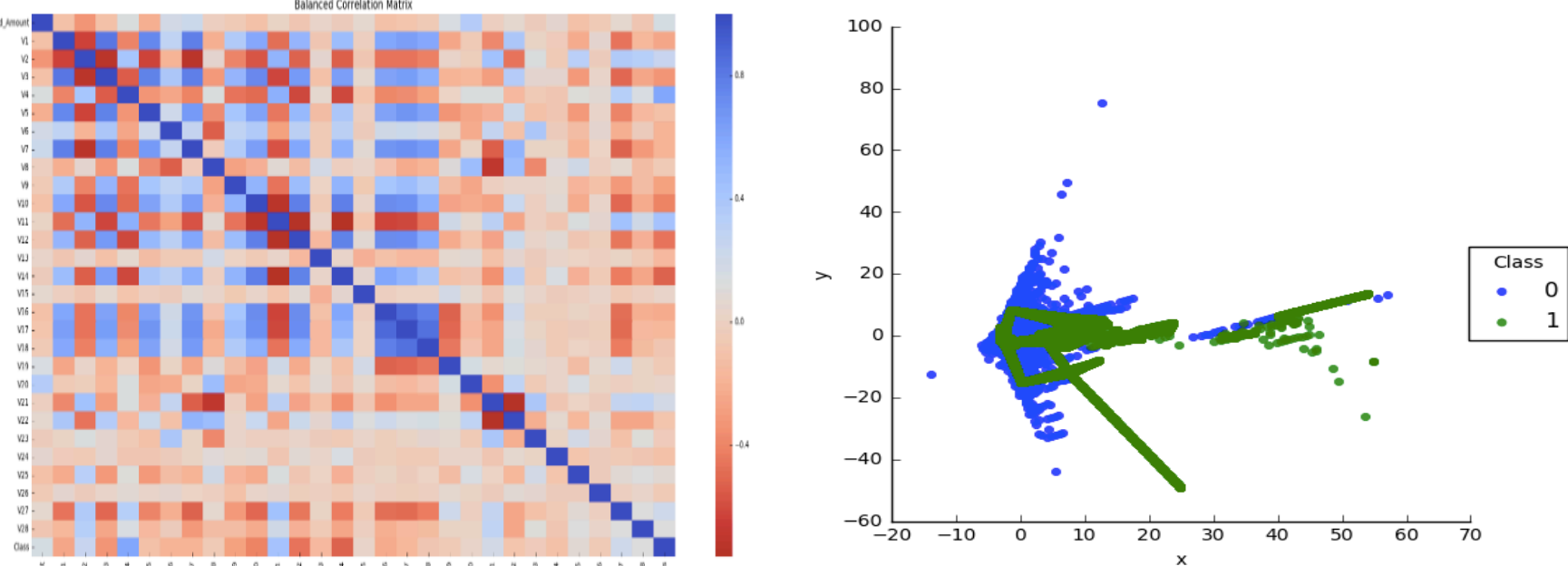
Motivation/Summary



Using GAN for 5000 rounds pitting the generator network against the discriminator network, making use of the cross-entropy loss from the discriminator to train the networks for improving classification effectiveness in Credit Card Fraud Detection. The augmented image is passed through 1x29 convolutional layer followed by a fully connected dense layers to finally have a Softmax predictor

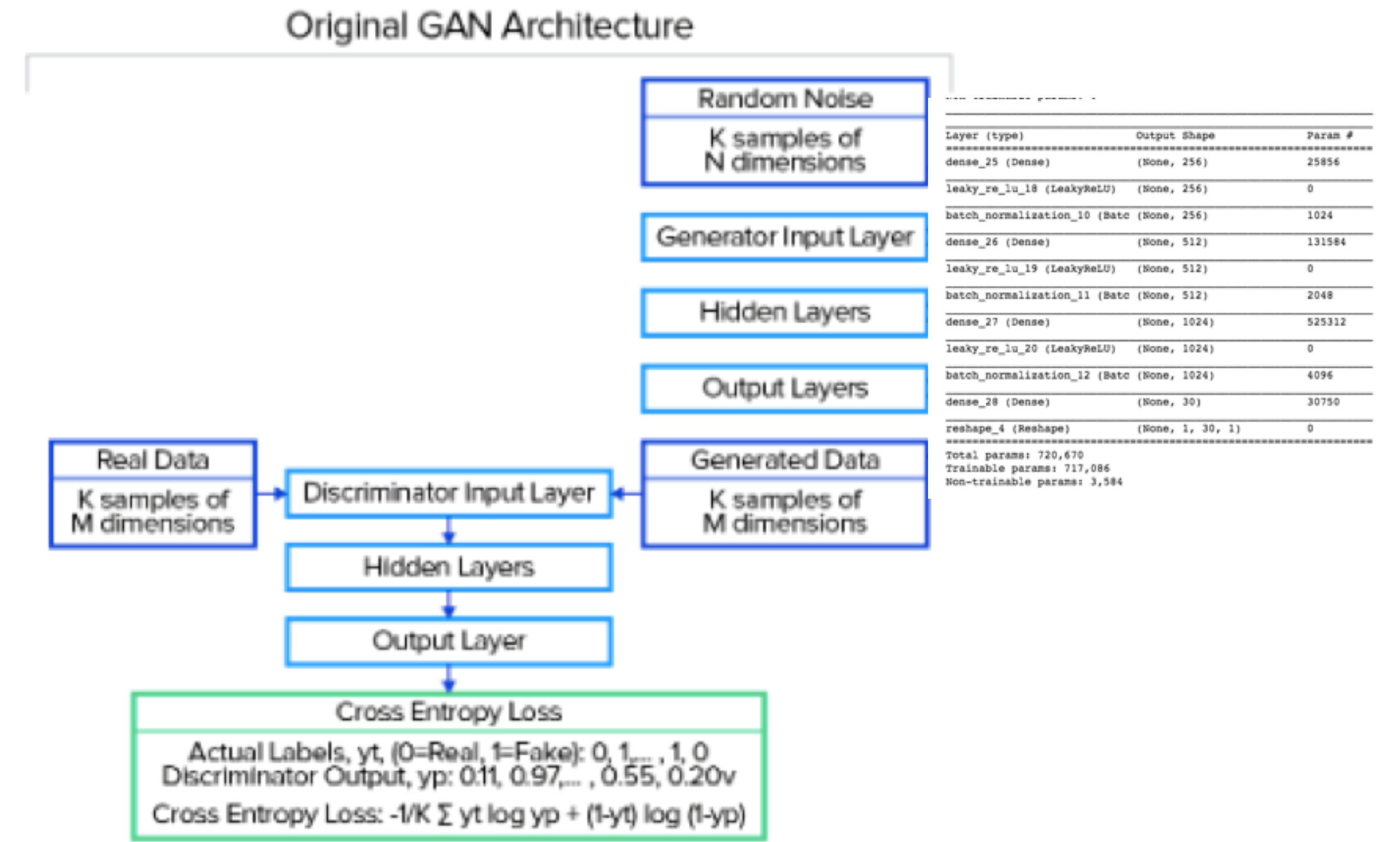
Dataset

Datasets used for training in this project are from Kaggle with 31 features including the time and amount of transaction as well as a label whether that transaction was fraudulent or not. The variables are PCA transformed. 99.83% of transactions in this dataset were not fraudulent while only 0.17% were fraudulent

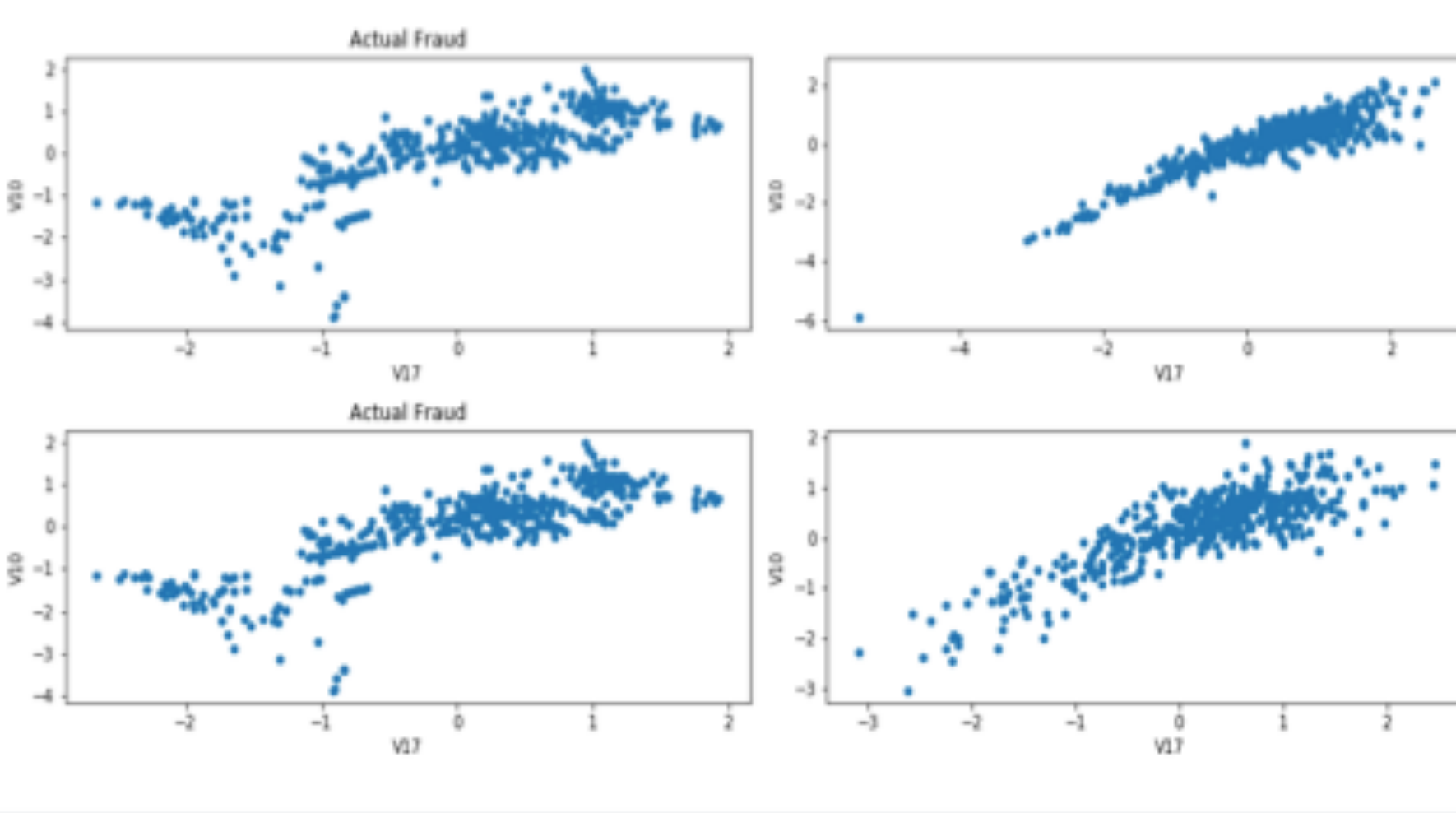
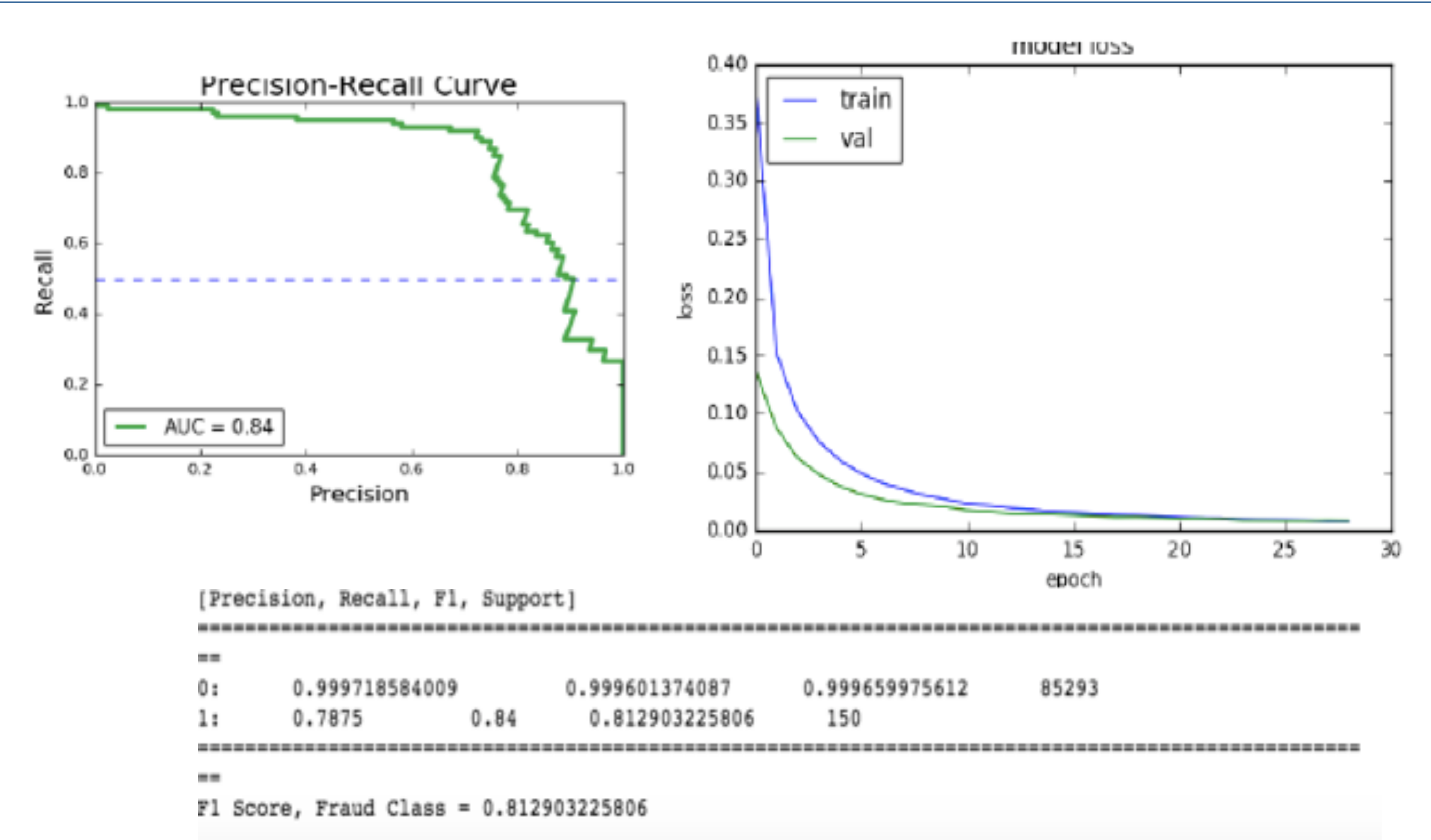


Models

The base line models were Logistic Regression, Random Forest and GaussianNB. 3 DL models used are 2 layer MLP, GAN, two 1D Conv layer, max pooling, a fully connected (300 neurons) and softmax classifier (2 classes).

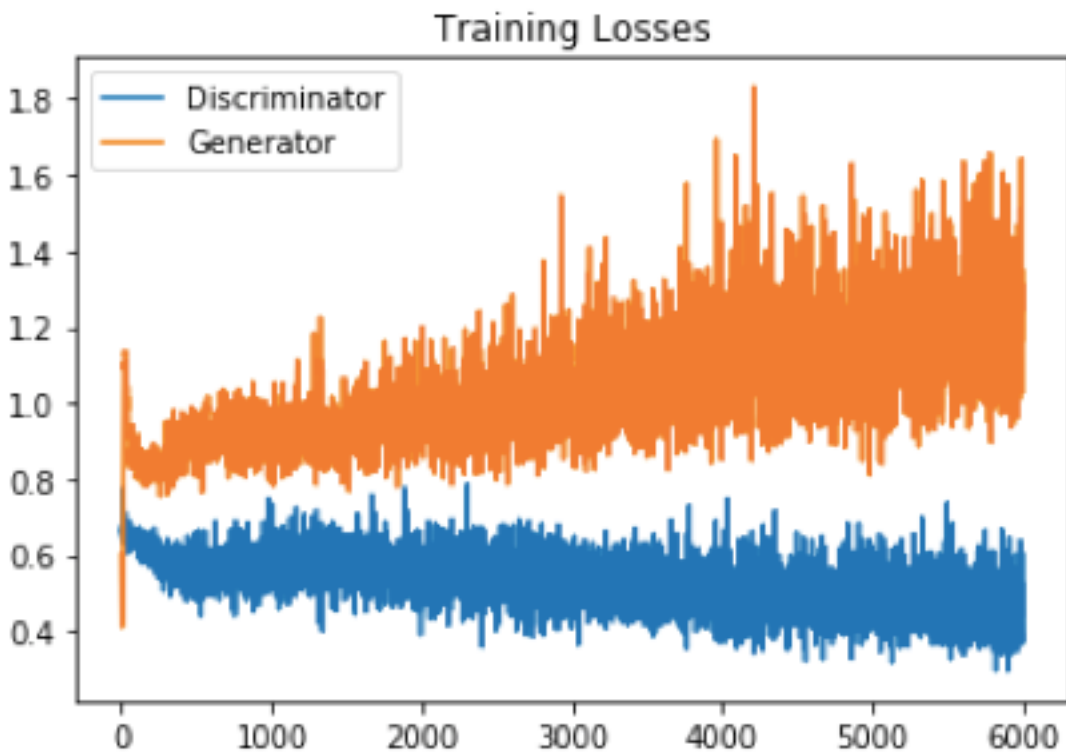


Model Results



Discussion

CNN (best performance): 0.860230099502
RandomForestClassifier: 0.846437 (baseline)
MLPClassifier (2 Layer with drop out): 0.8085106382978723
MLPClassifier (1 Layer): 0.707243346007604



Conclusions

CNN with enhanced fraud dataset through GAN yielded high training and test accuracy on our training and test sets. Adding drop out certainly yielded lower variance and additional layers in MLP enhanced performance. The poor generalization is a result of our dataset not being diverse. By the end of 5000 training iterations the generated fraud imaged pattern started to mimic actual fraud

Contact

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References

- 1.S. Maes, K. Tuyls, B. Vanschoenwinkel, and B. Manderick, "Credit Card Fraud Detection Using Bayesian and Neural Networks,"
2. K. Fu, D. Cheng, Y. Tu, and L. Zhang, "Credit Card Fraud Detection Using Convolutional Neural Networks,"