DEEP LEARNING APPROACHES FOR FRAUD DETECTION IN E – COMMERCE TRANSACTIONS

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CHAPTER 5

DISCUSSION AND FUTURE WORK

5.1 Introduction

This chapter discusses the key findings in this fraud detection using deep learning method studies which outline their implications for this sector. Furthermore, it also highlights the limitations identified during the initial modelling and discovers potential areas for future research and improvements. The main objective of this study, which is the performance between RNN and LSTM models in detecting fraudulent activities, also has been discussed in this chapter.

5.2 Summary

This study used the supervised e-commerce transaction dataset which indicates the transactions are fraud or non-fraud. By using the deep learning method, RNN and LSTM help to identify the transactions as fraud or non – fraud. Furthermore, the data has been analyzed through EDA which includes data visualization, data cleaning, feature extraction and balancing the data using SMOTE method.

Overall, the accuracy of RNN model is 75% and the recall for non – fraudulent was higher with 76% same with fraudulent transactions. Meanwhile, the LSTM model performed similarly, total accuracy for non - fraudulent activities showed better 76% but the model still had trouble with the minority class of fraudulent transactions.

According to these findings, the SMOTE method has been used to add more datasets for predicting the results. Even though the synthetic dataset has been added, the RNN and LSTM model still have trouble finding accurate predictions because of imbalance data. Since fraudulent transactions are the minority class, the recall is lower which suggests that model sensitivity and imbalanced data handling need to be further improved.

5.3 Future Works

This study has provided some insights which there are several areas that can be further improved, so the quality of the analysis be better in the future. Some suggestions for future work are as follows:

a. Enhanced the Data Balancing Method

Although SMOTE was used to address class inconsistency, the minority class detection may be further improved by combining SMOTE with methods like cost – sensitive learning or ensemble under – sampling.

b. Model Optimization and Tuning Parameter

Future work should focus on optimizing hyperparameters such as Bayesian Optimization to enhance the performance of RNN and LSTM models. Furthermore, reducing overfitting may also be achieved by implementing the batch normalization or dropout layers.

c. Advanced Architectures

Using advanced neural networks such as Bidirectional LSTM and GRU (Gated Recurrent Units) may identify deeper sequential patterns. Also, time series analysis may better for model fraud patterns.

5.4 Conclusion

Finally, this chapter concludes the results of the deep learning analysis on e – commerce fraud detection has been discussed. Due to imbalance and limited feature complexity, the study showed that both RNN and LSTM models can learn from sequential transaction data but have trouble in correctly identifying the fraudulent activities in the dataset.