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**FlexiSecure - AI-Powered Fraud Detection with Real-Time Alerts
and Customizable Security.**

A dissertation by

Ms. Nooha Mumthas

w1839725 | 20201012

Supervised by

Mr. Banuka Athualiya

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ABSTRACT

The fast growth of online financial transactions has increased the potential of fraud, creating considerable hurdles for banks and financial organisations. Current fraud detection systems in Sri Lanka, particularly those based on traditional rule-based methodologies, frequently struggle to strike a balance between speed and accuracy, making them ineffective against sophisticated and evolving fraud tactics. This research addresses these issues by creating an AI-driven fraud detection model that improves both real-time responsiveness and accuracy, tailored to the demands of Sri Lankan institutions.

To improve detection performance, a machine learning model based on MLP was built. This system handles large-scale transactional data and uses pre-processing techniques like feature scaling and outlier identification to improve data quality. The model is trained and evaluated with supervised learning to improve detection accuracy while adjusting to new fraud trends. Furthermore, explainable AI (XAI) is used to promote transparency in detection conclusions, hence increasing user confidence and regulatory compliance.

Preliminary experiments on the prototype yielded an impressive detection accuracy of up to 95%, an AUC of 0.9895 and a 4% false positive rate. The architecture of the model enables a processing speed of 1000 transactions per second, thereby indicating its capability for wide range deployment in high transaction volume banks.

Subject Descriptor: Financial Fraud Detection, Machine learning , Machine learning approaches, Neural networks

Keywords: Fraud detection, machine learning, real-time processing, decision trees, neural networks, explainable AI, Sri Lankan banking