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Predictive Policing with Neural Networks: A Big Data Approach to Crime Forecasting in Sri Lanka

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The surge in crime rates, particularly in urban regions, has underscored the importance of predictive policing within law enforcement strategies. This research introduces a neural network-based crime prediction model, specifically tailored to address the complexities of Sri Lanka's crime landscape. By combining big data analytics with advanced machine learning methods—including ensemble models such as Random Forest and Gradient Boosting, alongside Artificial Neural Networks (ANNs)—our study presents a robust framework to forecast crime incidents, locations, and time spans. While neural networks excel in predictive accuracy, their "black-box" nature can hinder practical applications in critical fields like law enforcement. To address this, our model integrates Explainable AI (XAI), making the decision-making process of the system transparent and interpretable for end-users. XAI helps break down complex neural network predictions, ensuring trust and clarity in the model's insights. With a prediction accuracy rate of 85%, this approach demonstrates substantial potential to improve crime prevention efforts and optimize resource allocation. Our research not only highlights the predictive strengths of neural networks but also showcases the essential role of interpretability for deploying these models effectively in real-world policing.

Keywords: *Big data analytics, Crime forecasting, Explainable AI, Machine learning, Predictive policing.*

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