**Project Proposal / Synopsis**

**Title: Fraud Detection Using Machine Learning**

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**Abstract**

Fraudulent financial transactions are a growing challenge for institutions due to their high economic impact and the difficulty of detection. This project aims to develop a machine learning–based fraud detection system capable of identifying anomalous transactions in near real time. Using historical transaction datasets, the solution will apply supervised learning algorithms to classify transactions as fraudulent or legitimate, with emphasis on minimizing false negatives.

**Objectives**

- To preprocess and analyze transaction data to identify fraud patterns.

- To build and evaluate machine learning models for binary classification.

- To deploy the trained model as a user-friendly application (Streamlit/web).

- To optimize model performance for high recall while maintaining precision.

**Problem Statement**

Manual fraud detection processes are slow, error-prone, and ineffective at handling the scale of modern digital transactions. An automated, accurate system is essential for timely identification and prevention of fraudulent activity.

**Scope of Work**

- Data preprocessing and feature engineering.

- Model training, tuning, and evaluation using various ML algorithms.

- Building a deployment-ready pipeline with user interface.

- Testing on real-world-like datasets for performance validation.

**Tools and Technologies**

- Languages:

Python- Libraries: Pandas, NumPy, Scikit-learn, Matplotlib, Seaborn, Streamlit

- Deployment: Streamlit, GitHub

- Data Source: Kaggle “Credit Card Fraud Detection” dataset

**Methodology**

- Data collection and cleaning.

- Exploratory data analysis and visualization.

- Feature engineering and class imbalance handling (SMOTE/undersampling).

- Model training (Logistic Regression, Random Forest, etc.) and evaluation.

- Integration into a Streamlit web application.

- Deployment and testing.

**Expected Outcome**

A fully functional fraud detection web app capable of classifying transactions with high recall and providing clear usage instructions for integration in financial systems.



