Project Design Phase-I
Solution Architecture

Date	27 October 2023
Team ID	591843
Project Name	Online Payments Fraud Detection Using ML
Maximum Marks	4 Marks

Designing the solution architecture for an online payment fraud detection system involves defining the components, their interactions, and the flow of data. Here's a high-level solution architecture for our project:

1. **Data Ingestion:**

   Description: Raw transactional data from online payment systems is ingested into the system.

   Components:

   - Data Ingestion Module
   - Data Preprocessing Module

2. **Data Preprocessing and Feature Engineering:**

   Description: Prepare the data for analysis by handling missing values, outliers, and creating relevant features for machine learning models.

   Components:

   - Data Cleaning Module
   - Feature Engineering Module

3. **Imbalanced Data Handling:**

   Description: Implement techniques to address imbalanced data sets.

   Components:

   - Oversampling/Upsampling Module
   - Undersampling/Downsampling Module

4. **Machine Learning Models:**

   Description: Train and deploy machine learning models for fraud detection.

   Components:

   - Ensemble Models (Random Forest, Gradient Boosting)
   - Deep Learning Models (Neural Networks)
   - Model Training Module

- Model Deployment Module

5. **Real-time Processing Pipeline:**

   Description: Process transactions in real-time for immediate fraud detection.

   Components:

   - Real-time Processing Engine
   - Transaction Monitoring Module

6. **User Interface:**

   Description: Provide a user-friendly interface for system administrators and users.

   Components:

   - Dashboard for Real-time Insights
   - Alerting System

7. **Security Module:**

   Description: Implement additional security measures to protect the system.

   Components:

   - Authentication and Authorization Module
   - Encryption Module

8. **Integration with Payment Gateway:**

   Description: Integrate the solution with the existing online payment gateway.

   Components:

   - API Integration Module

Example - Solution Architecture Diagram:

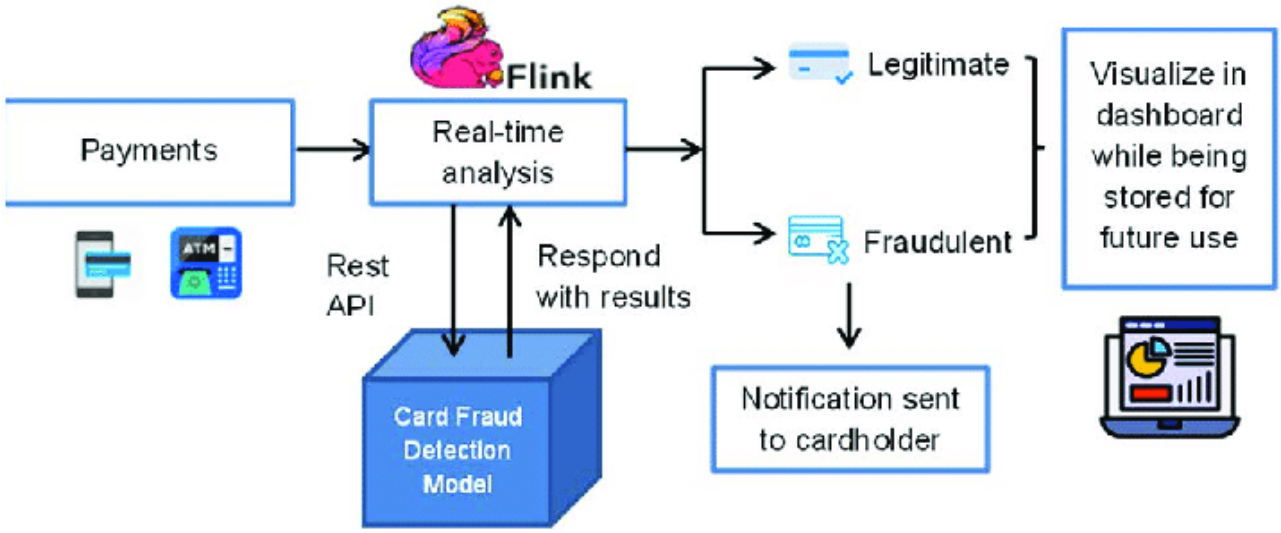

Figure 1: Architecture and data flow of the Fraud Detection Using ML