Project Architecture Document

Credit Card Default Prediction Table of Contents

1. Introduction

Welcome to the documentation for our Credit Card Fault Detection project. In this document, we provide an overview of the system, its purpose, and its key components. Our project is designed to enhance the security of credit card transactions by detecting and preventing fraudulent activities. Let's explore how this system works and its significance in safeguarding financial transactions.

2. System Architecture

The project is meticulously designed with a modular and layered architecture to ensure flexibility, scalability, and maintainability .The primary components of the system architecture are as follows:

. User Interface (UI): The UI component serves as the front-end of our system, managing user interactions. It offers an intuitive interface for users to input essential information and receive predictions.

. Application Layer: Acting as a bridge between the UI and the backend components, the Application Layer handles user input processing, data validation, and orchestrates the seamless flow of information within the system.

. Back-End Services: The Back-End Services encompass a variety of essential functionalities needed for the prediction process. These include data ingestion, data transformation, data validation, model training, and model prediction.

. Machine Learning Model: At the core of our system, the Machine Learning Model component takes center stage. It is responsible for making predictions regarding whether a user's financial activity appears suspicious for potential money laundering crimes. Leveraging trained models, advanced algorithms, and statistical techniques, this component delivers accurate predictions..

. Data Storage: The Data Storage component plays a crucial role in preserving input data, predictions, and other pertinent information. It encompasses a range of storage solutions, including databases and file systems, to efficiently manage and store data.

DagsHub Integration: Integrated within our architecture is DagsHub, a collaborative platform for data science and machine learning projects. DagsHub streamlines version control, collaborative development, and project tracking, enhancing the overall project management experience.

MLflow Experiments: MLflow Experiments, another integral part of our architecture, enables us to efficiently track, organize, and manage machine learning experiments. It provides a structured approach to versioning models and tracking experiment results, contributing to reproducibility and continuous model improvement.

3. Communication Protocols

To enable smooth communication and data flow between the system components, the following protocols can be employed:

- HTTP/HTTPS: Used for communication between the UI, Application Layer, and Back-End Services.
- RESTful APIs: Allow for standardized and stateless communication between components.
- Database Protocols: Facilitate data storage and retrieval operations between the Back-End Services and the Data Storage component.

4. Technologies and Frameworks

This project utilizes the following technologies and frameworks:

- Front-End: HTML, CSS, JavaScript, Bootstrap and Jinja2 templates for building the user interface.
- Back-End: Python as the primary programming language for implementing the Application Layer and Back-End Services.
- Web Framework: Flask for building the application server and handling HTTP requests.
- Machine Learning: Python library scikit-learn for implementing the Machine Learning Model.
- Data Storage: NoSQL databases i.e MongoDB for storing data.
- Data Processing: Python libraries like pandas, numpy, imblearn for data manipulation.
- Data Visualization: Python libraries like matplotlib, seaborn, pandas to visualize the data using python.

5. Project Deployment

This project is deployed on streamlit share cloud. [deploy link]

6. Conclusion

The System Architecture section of this document provides a comprehensive overview of the architecture and design principles underpinning our Credit Card Fault Detection project. It has shed light on the key components, their intricate interactions, and the sophisticated technologies harnessed to fortify the system.