



Graduation Project Report

Anti-Money Laundering (AML) Predictive Analysis

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Anti-Money Laundering (AML)

Overview:

The Anti-Money Laundering (AML) project aims to develop a predictive analytics system designed to detect and prevent potential money laundering activities within financial transactions. By analyzing transaction patterns, customer behavior, and geographic data, the project seeks to identify suspicious activities that may indicate money laundering.

How AML Works:

In Anti-Money Laundering (AML) project, the system works by employing a combination of data integration, analysis, and visualization techniques to identify suspicious financial activities that may be linked to money laundering. Here's how it works:

- **Data Collection and Generation:**

The project simulates real-world financial transaction data using Python libraries like **Pandas** for data manipulation and **Faker** for generating synthetic data (e.g., customer profiles, transaction amounts, locations). This data includes critical elements such as transaction amounts, customer details, account information, and geographical locations.

- **Data Warehousing:**

A **SQL Server**-based **Data Warehouse** is designed using a **Star Schema**, which consists of a central fact table connected to dimension tables (such as customer, transaction, and bank dimensions). This structure enables efficient querying and reporting of transactional data. The data warehouse serves as a centralized repository where all transaction data is stored and managed for analysis.

- **ETL Process (Extract, Transform, Load):**

The ETL Process involves:

- Extracting transaction data from various simulated sources.

- Transforming the data using SQL Server Integration Services (SSIS) to clean and standardize it. This includes operations like removing null values, formatting dates, and handling slowly changing dimensions to ensure historical accuracy.
- Loading the cleaned and transformed data into the data warehouse, where it can be queried and analyzed.

- **Data Analysis Using SQL Queries:**

SQL queries are used to identify suspicious transaction patterns. For instance:

- Detecting unusually large transactions by filtering transactions over a set threshold (e.g., \$40,000).
- Identifying repeated transactions within a short period (e.g., multiple transactions in 24 hours).
- Tracking transactions from high-risk locations (such as sanctioned countries) to identify high-risk accounts.

- **Visualization with Power BI:**

The cleaned and analyzed data is visualized using Power BI, which provides interactive dashboards that highlight:

- Total transaction amounts and frequencies for each customer or account.
- Transactions above set thresholds and those from high-risk countries.
- Key trends over time, such as the average duration between transactions or comparisons between deposits and withdrawals.

- **Outcomes:**

The system can detect suspicious behaviors, such as:

- Transactions linked to sanctioned countries.
- Unusual transaction amounts or patterns indicative of money laundering schemes.
- Frequent or high-value transactions over a short time frame.



This framework helps financial institutions identify potential money laundering activities and report them for further investigation. The system also offers flexibility to incorporate machine learning models for real-time fraud detection and enhanced accuracy in a real-world setting.

Summary:

The AML project focuses on identifying potential money laundering activities by analyzing financial transactions. It looks for patterns that may indicate illegal activity, such as unusually large transfers or frequent transactions in a short time. The project aims to help financial institutions detect suspicious activities and prevent financial crimes. By using data analysis and visualization, it provides insights that support better decision-making and compliance with regulations.