MTN MoMo Transaction Analysis – Project Report

1. Introduction

This project focuses on analyzing MTN MoMo transactions to provide actionable insights. The primary objectives were to parse and clean transaction data from XML files, categorize transactions, store the data in a robust database, and visualize key metrics through a user-friendly dashboard. The system was designed to enhance decision-making by identifying patterns and anomalies in transaction records.
Our solution takes the XML transaction data that was provided and transforms it into meaningful insights.

2. Technical Approach

A. Architecture

According to the project requirements, we chose to build the system using:

- **Python (Flask) for the backend :** it's lightweight yet powerful, perfect for our needs
- **MySQL database :** we needed something reliable that could handle large transaction volume.
- **Modern HTML, CSS & Javascript for the front end :** It helped us create a responsive design quickly
- **Chart.js for visualizations:** It's user-friendly and produces beautiful charts.

B. Key Components

1. Smart Data Processing

- We made the file upload process as simple as possible - just drag and drop your XML file.
- Our transaction classifier has learned to recognize different types of transactions from real user data.
- We've optimized the storage system to handle large transactions efficiently.

2. User-Friendly API

- The dashboard responds quickly, even with large datasets
- Users can filter transactions in multiple ways - by date, amount, or type
- We've implemented smooth pagination to handle large transaction histories

3. **Interactive Visualizations**

- We've included different chart types to show various aspects of your transactions.
- The visualizations are designed to be intuitive and easy to understand

3. Challenges and Solutions

1. Making Sense of Complex Data
   - Challenge: We found out that the data being fetched to the frontend are not complete.
   - Solution: We built a flexible parser that can handle these variations while maintaining data accuracy

2. Understanding Transaction Types
   - Challenge: Different transaction types were often described in various ways in the messages
   - Solution: We developed a pattern-matching system that has been trained on real transaction data

3. Congestion in the database
   - Challenge: Alot of data saved in the database started reducing accuracy.
   - Solution: We implemented a clear data feature that clears data in the database from the front end.

4. Keeping the Dashboard Responsive
   - Challenge: Users needed instant feedback when filtering.
   - Solution: We built an asynchronous loading system that keeps the interface snappy.

4. Key Design Decisions

A. Database Design

- We structured the database to make common queries fast and efficient
- Added indexes for the most frequently used search patterns
- Carefully chose data types to optimize storage and performance

B. Security Measures

- Implemented strict file validation to prevent malicious uploads
- Used parameterized queries to prevent SQL injection
- Added proper error handling to advice users

C. User Experience

- Tested the dashboard on various devices to ensure it works well everywhere
- Added intuitive search and filter options based on user feedback
- Created clear visualizations that tell a story about the transaction data

5. Future Improvements

a. Smarter Analytics

- Planning to add anomaly detection to flag unusual transactions
- Working on better trend analysis tools
- Considering adding predictive features for financial planning

b. Enhanced Security

- Planning to implement user authentication
- Adding role-based access for different user types
- Improving system usage tracking

c. New Features

- Adding export options for different file formats
- Adding user account to record Budgets
- Working on integration with popular financial tools

6. Conclusion

Looking back at our journey with the MTN MoMo Transaction Analysis Dashboard, we're proud of what we've accomplished. We've created a tool that makes complex transaction data accessible and understandable. The system is designed to grow with user needs, and we're excited about the possibilities for future improvements.

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