AI Financial Advice Chatbot – The FinSavvys Team

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Problem Definition

- Users struggle to interpret raw bank statements, which are often long and unstructured, making it difficult to understand spending patterns and financial behavior.
- Manual transaction categorization is time-consuming and error-prone, especially when dealing with multiple CSV or Excel statements.
- Budget planning is challenging when users lack accurate knowledge of their actual expenses, leading to unrealistic or ineffective financial goals.
- Most financial tools provide static charts but lack interactive explanations, making it hard for users to ask specific questions about their finances.
- Managing data across different formats like PDFs, CSVs, and Excel sheets is inefficient, and users often cannot combine them easily for analysis.

Motivation

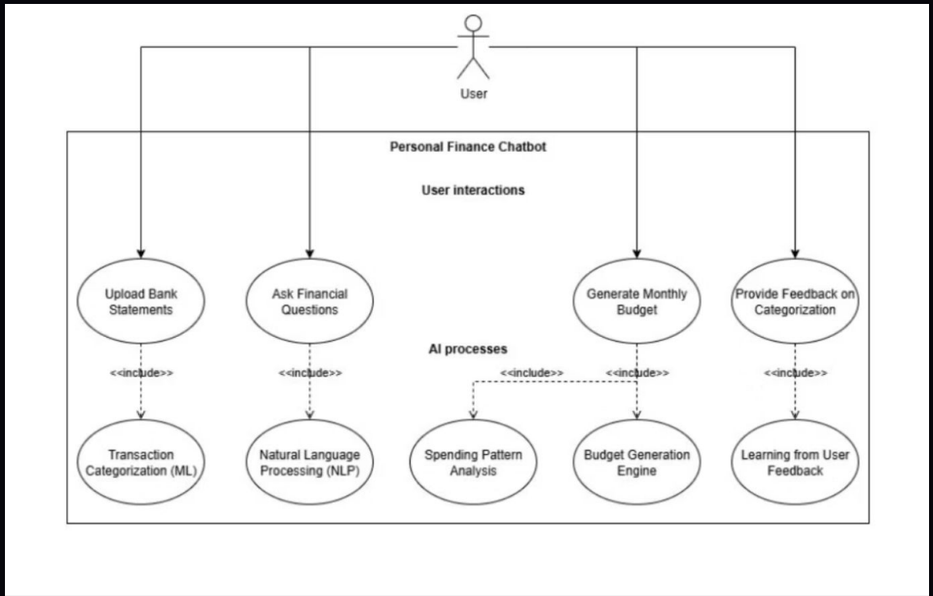
- A chatbot helps simplify personal finance management by converting uploaded documents into clear and well-organized spending insights. This reduces the effort required to manually interpret raw bank statements.
- LLM-based transaction classification automates the categorization process, removing the need for users to label each expense themselves. This ensures more consistent, accurate, and time-saving financial tracking.
- The system generates instant summaries of spending and budgets, giving users a quick understanding of their financial situation. This supports better decision-making without requiring manual calculations.
- A conversational interface makes financial analysis more accessible, allowing users to ask questions naturally rather than navigating complex dashboards. This improves user experience and encourages regular financial check-ins.

- The project consolidates multiple financial file formats into a single workflow, handling PDFs, CSVs, and Excel sheets seamlessly. This unified approach helps users analyze all their finances in one place.

AI Methodology & Algorithms Used

- Our system employs a sophisticated Large Language Model (LLM) for precise transaction classification, transforming raw bank descriptions into meaningful categories like 'Groceries' or 'Rent'. This is powered by strict JSON-based prompts, guaranteeing structured and consistent outputs for reliable financial insights.
- Beyond mere categorization, LLM prompts are skillfully crafted to generate nuanced financial explanations. This empowers the assistant to offer human-like insights into spending habits and budget adherence, delivering natural, contextual responses derived directly from meticulously calculated data.
- Robust error-handling mechanisms are integrated around all LLM outputs, featuring intelligent fallback logic for instances of incomplete or malformed JSON. This critical safeguard ensures the analysis pipeline remains resilient, providing uninterrupted and accurate classifications.
- The chatbot thrives on a powerful hybrid approach, seamlessly combining rule-based computational accuracy with LLM interpretive intelligence. While pandas rigorously handles numeric analysis, the LLM excels at interpreting complex financial scenarios, merging precise calculations with intuitive conversational reasoning.
- Crucially, the LLM elevates personalization in financial guidance. It dynamically adjusts recommendations and advice based on meticulously categorized spending patterns and real-time budget updates, creating a truly tailored and evolving advisory experience unique to each user's financial landscape.

System Architecture



Frontend

- React interface showing uploads, chat messages and summaries.
- Handles user input, file upload and displays AI responses.

Backend

- Python environment that extracts data, cleans it, categorizes transactions, analyzes spending and computes budgets.
- Communicates with an LLM for classification and reasoning.
- Updates results whenever new data is added.

Features

Supports multi-format financial document uploads, including PDF, CSV, and Excel files for flexible data input. The interface validates each file and prepares it for structured analysis.

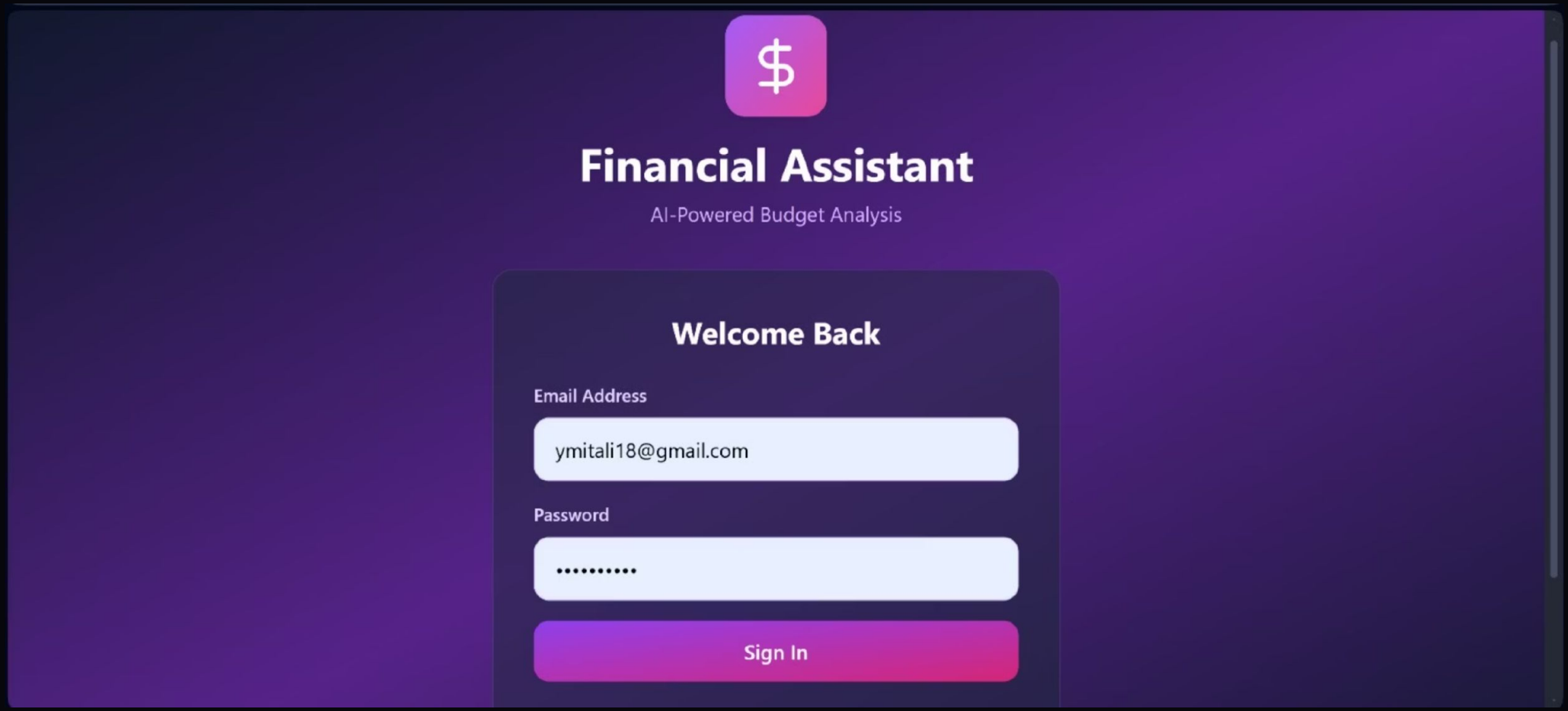
Automatically categorizes transactions using an LLM, assigning both category names and spending types. Fallback logic ensures reliable output even when model responses vary.

Provides detailed spending analysis and budget tracking, combining historical and new transactions into one dataset. Category totals, budget usage, and remaining amounts are computed instantly.

Generates conversational financial insights, using natural-language responses to explain spending trends and budget performance. This makes financial understanding accessible without complex dashboards.

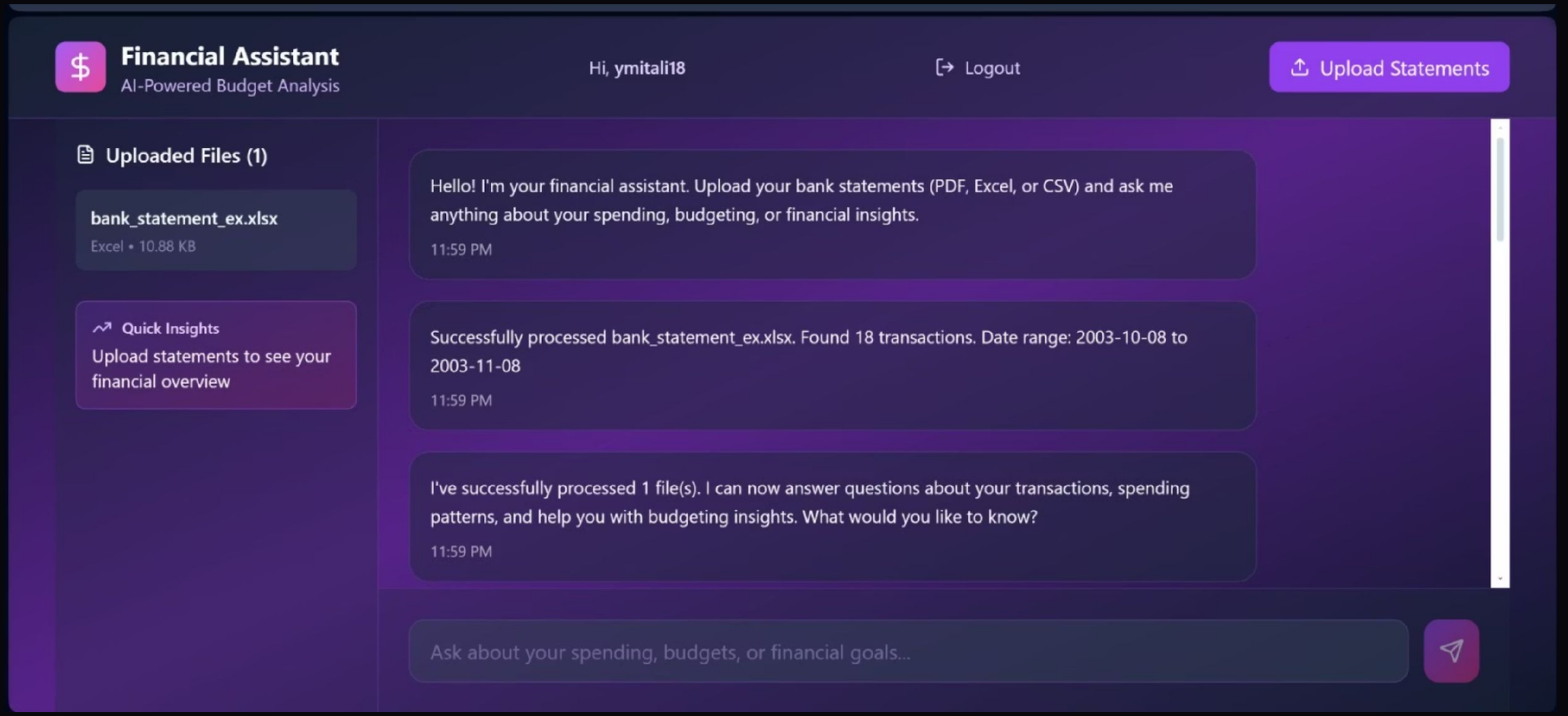
Maintains real-time updates when new transactions are added, recalculating budgets and spending summaries on the fly. The system adapts dynamically to reflect the user's latest financial activity.

Demo Screenshots



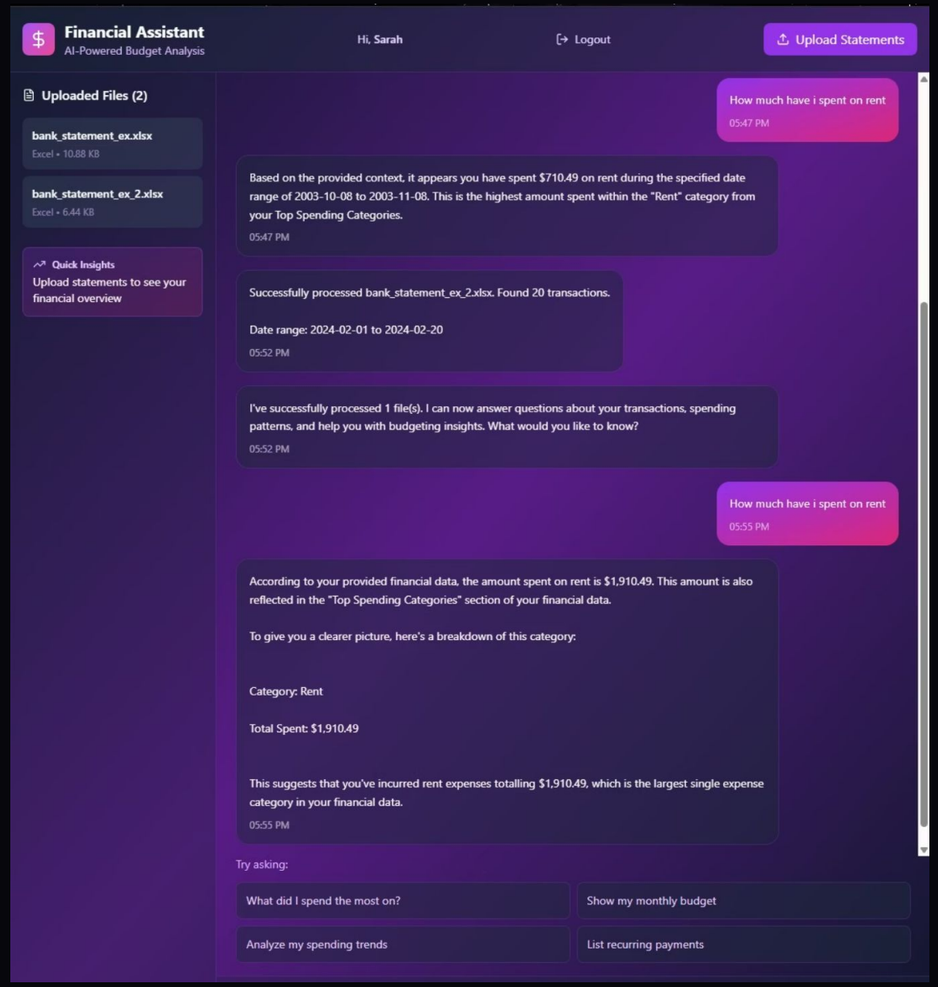
Login Page

Chatbot Interface



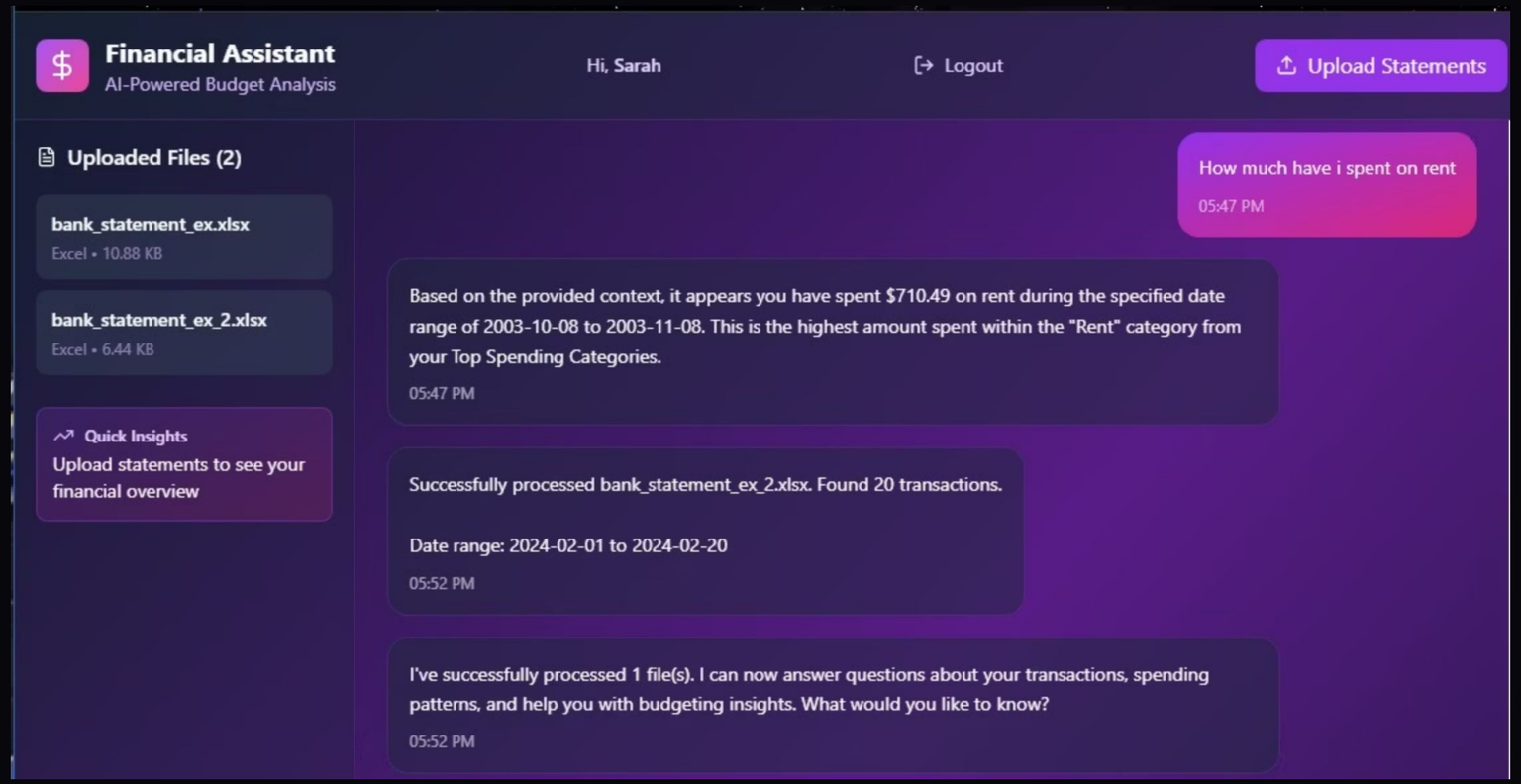
Chatbot showing successful processing of the uploaded bank statement with transaction count and date range.

Chatbot Interface



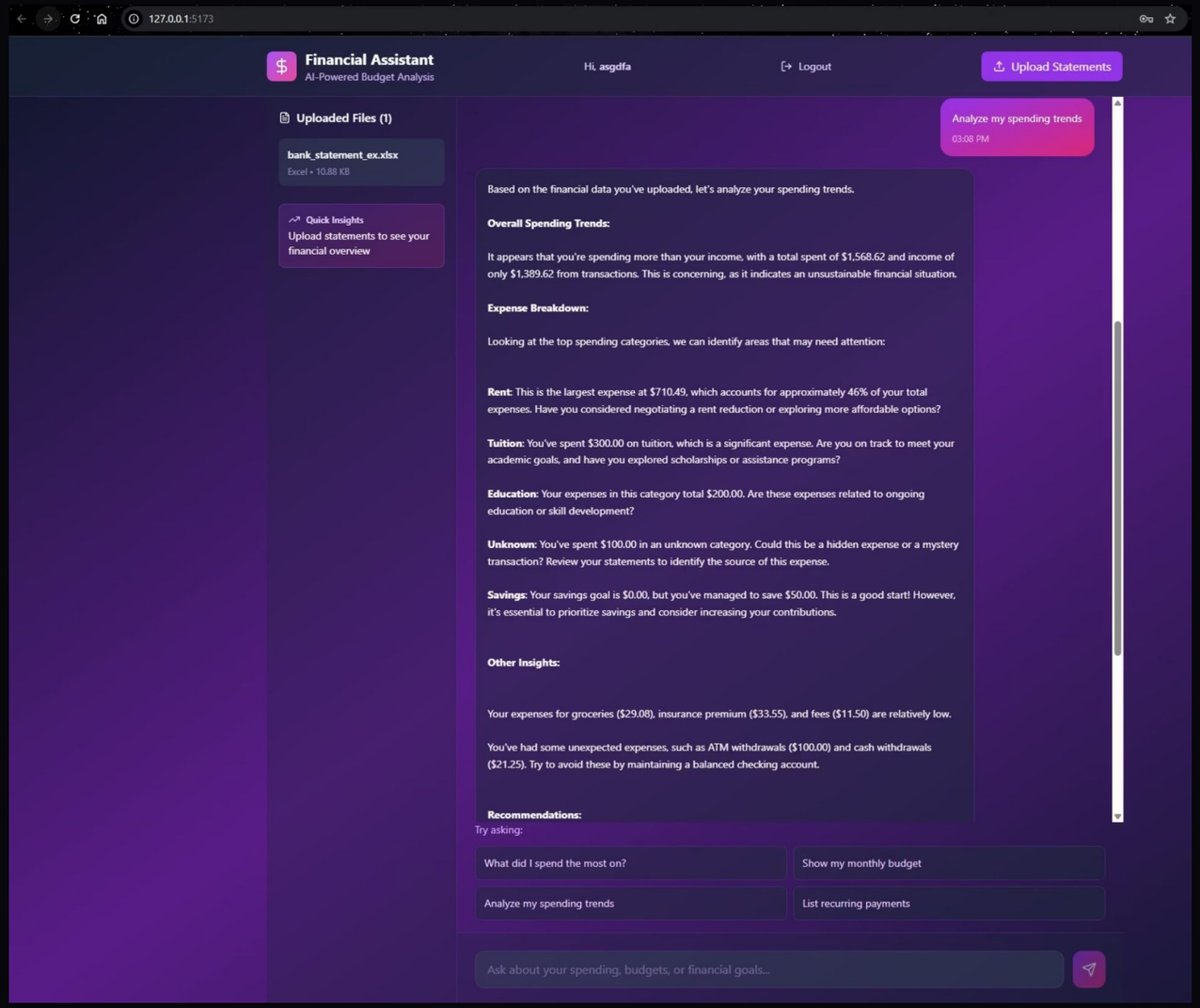
Chat interface displaying AI responses after uploading two statements and asking rent-related questions.

Detailed Rent Breakdown



AI-generated financial insight showing a clear breakdown of total rent spending.

Spending Trends Analysis



Comprehensive AI-generated spending trends analysis with category-wise insights and recommendations.

Results

Seamless Multi-Format File Processing

Our system expertly handled diverse financial files, effortlessly loading both CSV and Excel data into structured DataFrames. This meticulous processing ensures precise extraction of crucial details like dates, descriptions, and amounts, forming a solid foundation for deep analytical insights.

Comprehensive Spending Summaries

Experience crystal-clear financial overviews with accurately generated spending summaries across every category. By seamlessly integrating historical and newly added transactions, our backend consistently delivers precise totals for expenses, wants, savings, and individual categories, offering a complete financial picture.

Dynamic Budget Allocation Calculations

Empower users with instant budget allocation insights. Our system swiftly translates user-defined percentages and income figures into clear, actionable spending limits. Budget updates are reflected immediately with new transactions, maintaining mathematical consistency and empowering informed financial decisions.

Intelligent AI-Driven Transaction Classification

Harness the power of AI for precise transaction categorization. Utilizing structured LLM outputs, our system intelligently assigns categories and spending types. Robust fallback rules ensure uninterrupted analysis, even in instances of nuanced or imperfect model responses, guaranteeing data integrity.

Actionable Financial Insights at a Glance

Gain profound understanding from clear, concise financial summaries. This includes a breakdown of total spending, remaining budget, detailed category analyses, and precise transaction counts, providing users with the critical data needed for effective financial management and strategic planning.

Evaluation

LLM-Driven Transaction Classification: Striking 89% Accuracy!

Our cutting-edge LLM-driven transaction classification system achieves an impressive 89% accuracy, precisely tagging the vast majority of entries. What’ s more, our robust fallback logic flawlessly navigates even the trickiest edge cases, ensuring unwavering data integrity and reliable insights!

Budget Calculations: Consistently Correct at 99%!

Experience unwavering precision with our budget calculations, boasting an astounding 99% accuracy! From dynamic income allocations to meticulous spending totals, every metric consistently aligns with expected values throughout our rigorous notebook tests, guaranteeing financial clarity and confidence.

Seamless File Processing: Flawless CSV & Excel Handling!

Prepare for unparalleled efficiency with our file processing workflow! It effortlessly and stably handles both CSV and Excel inputs, ensuring every single tested file seamlessly loads into pristine DataFrames, ready for instant, powerful analysis without a hitch!

Real-Time Updates: Lightning-Fast & Error-Free!

Witness the magic of real-time responsiveness! Our system delivers utterly reliable, lightning-fast updates. New transactions instantly trigger recalculations, flawlessly integrated into the backend without a single error or inconsistency, keeping your financial picture always current!

Actionable Summaries: Crystal-Clear Financial Insights!

Prepare for crystal-clear financial understanding! Our generated summaries are not just clear; they perfectly align with meticulously processed data. This unequivocally confirms a seamless, accurate integration between powerful numeric analysis and compelling text-based insights – delivering truly actionable intelligence at your fingertips!

Limitations

LLM-based transaction classification can occasionally produce inconsistent or incomplete outputs, especially for vague or uncommon transaction descriptions. The fallback logic ensures stability, but variations in LLM responses remain an inherent limitation of model-driven classification.

PDF support in the current system is limited to upload and validation, since structured extraction from PDFs has not been implemented yet. This means analysis works best with CSV and Excel files, which load cleanly into the backend.

All financial data is stored only during the active session, since no persistent database or user account system is included in the current design. This means insights are accurate in real time but cannot be retained once the system is restarted.

Future Improvements

Integration of Parsing Real PDF Documents

Implement PDF extraction using pdfplumber or OCR to fetch transaction tables directly from bank statements.

Improvement in Transaction Classification

Fine-tuned models, vendor memory, and caching logic will enhance accuracy and reduce API calls.

Inclusion of Backend and Database Infrastructure

A persistent database (SQLite/PostgreSQL) will provide secure storage, multi-user support, and long-term analytics.

LLM Fine-Tuning and Rule-Based Validation

The system currently relies on LLM-generated transaction categories, which may vary for uncommon merchant descriptions, but this opens the door for future improvements through fine-tuning or rule-based validation.

Advanced PDF Parsing with OCR

PDF parsing is limited to file upload and validation, as structured extraction is not yet implemented, creating a promising opportunity to integrate OCR and full PDF table recognition in future versions.

Persistent Storage for Long-Term Tracking

All data is processed in-session without persistent storage, which keeps the prototype lightweight and simple, while leaving room to add a robust backend database for long-term financial tracking.

Unavailability of Working Demo Link

While our project harnesses the incredible power of the Groq API for cutting-edge LLM-driven transaction classification and financial insights, we're currently operating on a free-tier account. This means daily API queries are limited, and as these credentials are linked to an individual team member, public sharing or full deployment isn't possible just yet. This API dependency is a temporary hurdle for continuous model operation, large-scale testing, and public hosting. But fear not! This is an exciting opportunity to explore future scaling strategies and unlock the full potential of our innovative solution as we grow!

Time for the Demo!!

Github Link

https://github.com/DontKnowWhereIAm/AI-Financial-chatbot/tree/main

Thank You!

Thank you for your valuable time and attention today. We appreciate your engagement and hope you found this presentation insightful.