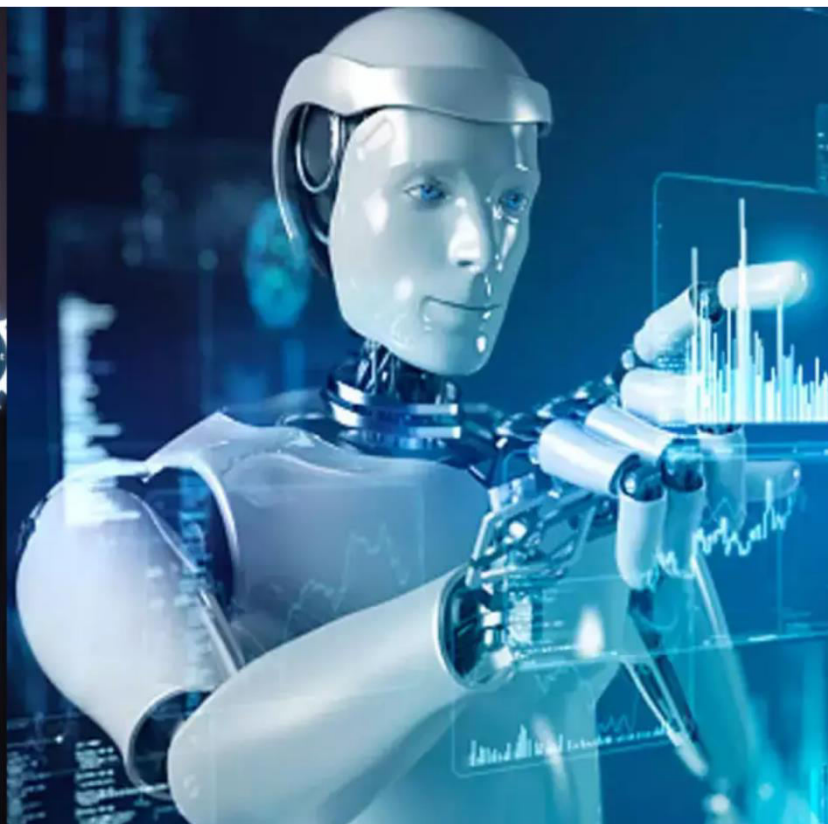




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Personal Financial Risk Management System using AI

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ABSTRACT: Personal finance management has become crucial in an era of increasing financial complexity. This paper proposes an AI-powered Personal Financial Management System (PFMS) developed using Python, Hugging Face APIs, Streamlit, and various Python libraries. The system allows users to manage their expenses, define categories and budgets, visualize data using bar and line charts, and receive personalized insights and savings goal reminders through automated email notifications. The integration of AI provides predictive analysis and intelligent suggestions based on spending habits. SQLite is used for data persistence while a user-friendly dashboard aids in interaction. This system demonstrates how artificial intelligence can transform financial planning into a proactive and intelligent process.

KEYWORDS: Personal Finance, Budgeting, AI Insights, Expense Tracking, Email Notification, Hugging Face, Streamlit, Python.

I. INTRODUCTION

Managing personal finances effectively is a foundational skill for achieving financial stability. With increasing digital transactions and complex financial data, conventional budgeting tools fall short in providing real-time, insightful assistance. This project presents a Personal Financial Management System (PFMS) empowered by AI to provide a holistic and intelligent approach to budgeting and expense tracking.

II. LITERATURE SURVEY

Various tools for expense tracking exist, such as Mint, YNAB, and Pocket Guard. However, these often lack customization, AI integration, or real-time predictive analytics. Recent advancements in natural language processing (NLP) and machine learning (ML) have opened opportunities for intelligent financial tools. Hugging Face APIs provide accessible AI capabilities for insight generation, while tools like Streamlit offer rapid UI development. This system builds on these technologies to bridge the gap between data recording and financial decision-making.

III. SYSTEM ARCHITECTURE AND TECHNOLOGIES USED

A. Tools & Libraries

Development IDE: PyCharm

Frontend & UI: Streamlit

Data Storage: SQLite3

Data Manipulation: Pandas, JSON, UUID, Datetime, OS

Visualization: Plotly

Email Notification: smtplib, MIME Text, MIME multipart

AI & Insights: Hugging Face APIs, load_dotenv for secure API key loading

B. Modules

1. Dashboard: Displays key metrics (total expenses, remaining budget).
2. Settings: Set currency, add categories, and define category budgets.
3. Users: Maintain user profiles and preferences.
4. Add Expense: Input expense entries categorized by type and date.
5. Reports: Visualize expenses via bar and line charts (monthly/quarterly/yearly).
6. AI Suggestions: Insight engine offering spending advice using NLP models.
7. Email Alerts: Notify users of budget overruns and savings goals.

IV. METHODOLOGY

A. Data Flow

1. User Inputs: Collected via Streamlit interface.
2. Data Storage: Logged and stored in SQLite3.
3. Visualization: Real-time rendering using Plotly.
4. AI Insight Generation: Input expense summaries into Hugging Face NLP models.
5. Notification System: Automated alerts triggered by budget thresholds or AI flags.

B. Budget Prediction and Analysis

Bar and line graphs are generated based on historical and real-time data. AI forecasts likely expenditure trends and suggests corrective actions like:

“You exceeded your entertainment budget by 30% this month.”

“Consider reducing dining out to meet your savings goal.”

V. EXPERIMENTAL RESULTS

Testing was conducted on datasets simulating 6-month expense patterns for different user profiles. Insights generated by Hugging Face models accurately reflected user behavior. The email notification system successfully dispatched alerts using Gmail's SMTP server. All modules performed efficiently under simulated real-time conditions.

Visual Results:

Bar Graph: Monthly expenses by category

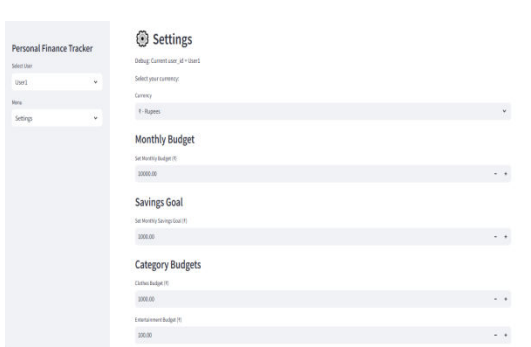
Line Graph: Budget vs Actual over time

Insights: Contextual feedback based on NLP sentiment analysis of descriptions and trends

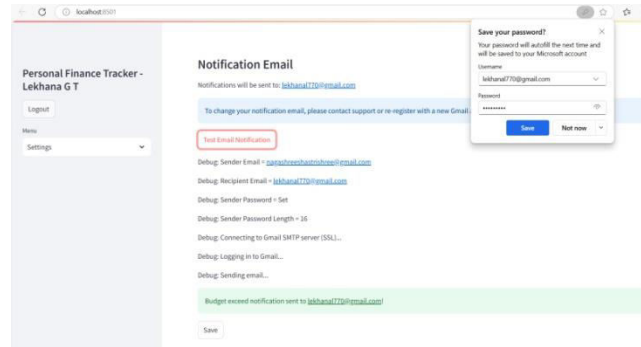


Fig 1 : (a) Secure Login Gateway for Personal Finance Tracker System

- (b) User interface for a Personal Finance Tracker. The form allows users to input expense details such as account, year, month, category, and amount.
- (c) Comprehensive Expense Management Interface for Personal Finance Tracker. The interface includes features for importing, exporting, and managing expense data efficiently.

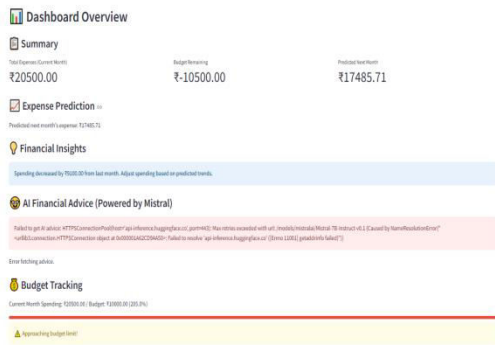


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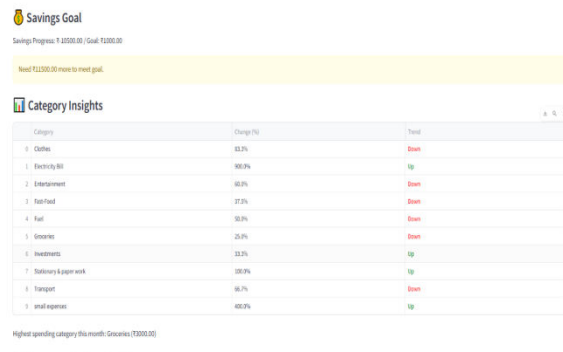


(e)

Fig 2: (d) Settings interface for Personal Finance Tracker application. Provides options to set currency, monthly budget, savings goal, and category budgets. (e) Email Notification Configuration and Debugging Interface. Includes fields for email addresses, debug messages, and error indications for troubleshooting.

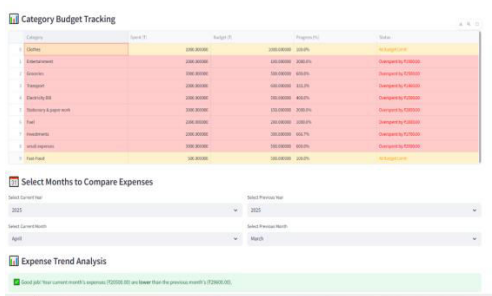


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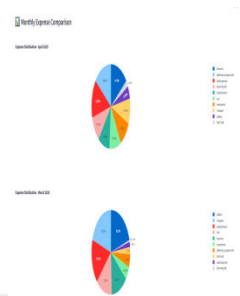


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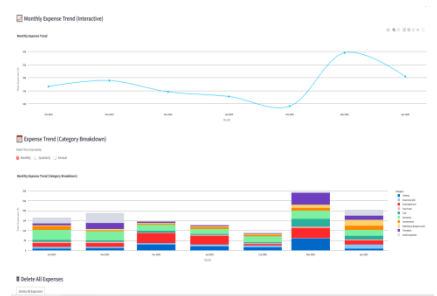
Fig 3 : (f) Financial Dashboard for Expense and Budget Tracking. Displays current month expenses, budget remaining, predictions, insights, and AI-driven financial advice with a focus on budget management. (g) Savings Goal and Monthly Category Insights. Tracks progress toward savings objectives and analyzes spending trends across various expense categories.



(h)



(i)



(j)

Fig 4 : (h) Budget Tracking Dashboard for April 2025. Compares current month's expenses with previous month's data, highlighting overspent categories and expense trends.

(i) Monthly Expense Distribution for March and April 2025. Highlights the percentage allocation of expenses across various categories using comparative pie charts.

(j) Monthly Expense and Category Breakdown Trends (Oct 2024–Apr 2025). Highlights overall monthly expense trends and stacked category-wise contributions for detailed spending insights.

VI. CONCLUSION

This AI-powered PFMS delivers not just data recording but intelligent financial guidance. With modular extensibility, user-focused UI, and real-time AI insights, it addresses common pain points in personal budgeting. Future versions could include voice input, mobile app integration, and dynamic investment tracking.

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