

# Personal Finance AI System

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**Abstract:** Personal finance AI system is a platform that is developed to guide individuals to monitor, analyze, and predict financial transactions and expenses using modern data analytics and artificial intelligence techniques. The system detects the information from the bank statements, organises unstructured financial data and converts them into meaningful insights that a user can understand easily. This system consist of various intelligent modules including a automated expense classification unit also a prediction model based on time series analysis and a AI advisor based on natural language processing. Overall it makes user track their expenses, get assistance from the AI advisor and predict future spending trends. This platform is implemented using python and streamlit, also consisting of machine learning libraries such as Scikit learn and sentence transformers. It has a modular design and a secure database authentication mechanism. This system enhances the user experience by integrating automation, predictive modelling and user interaction and also supports informed decision making.

**Keywords:** Artificial Intelligence, Budget System, Data Visualization, Expense Tracking, Financial Analytics, Machine Learning, Personal Finance, Predictive Modeling, Recommendation System, Transaction Classification

## I. INTRODUCTION

In everyday life thousands and lakhs of financial data are being created due to online stuff, like transactions and bill payments with apps and e-wallets. It creates a large amount of data or records from shopping or whatever, but a lot of data is unused or jumbled.

Banks show us all the transaction history, but figuring it out is not easy and straightforward at all. The bank statements come in simple formats and do not tell about where the money is spent daily or the pattern of spending. We think that this really makes it hard for people to understand their daily spending habits and plan further for savings.

Many people are still dependent on old ways to track expenses, with spreadsheets or books or any normal mobile apps. Those ways used for expense tracking are manual and time

consuming. It can go through many human errors as it is manual. Also they do not do smart work, like guessing the useless spending of the month or what an individual might spend on and save money on.

So, by using the artificial intelligence and machine learning models the Personal Finance AI System changes this to handle the data automatically and easily. It takes and goes through bank statements, extracts details from transactions and sorts expenses into categories and the mess into meaningful insights, charts and summaries that make sense.

It also predicts the future spending based on the previous spending and gives tips about the best fit for your spending through a user friendly interface. This seems like it could help in getting a better grip on finances and help in tracking spending and provide tips on spending and savings in a smart way.

So, through analytics and AI it helps in making financial decisions simple and more organised.

## A. LITERATURE REVIEW

In the area of automated Personal finance management there is an impressive progress by using artificial intelligence and machine learning techniques. Various applications like automated expense classification, budgeting tools, spend analysis and forecasting models have been explored by the researchers. Though there are many advancements still researchers have been concentrated on few features only, rather than delivering complete financial management system. Various systems supports only few limited banking sources, minimal user interaction and also do not have real time personalised financial insights. So, there is a research gap in the development of an integrated, scalable, and user-focused platform that makes a gap in the automated data processing, predictive modelling and financial advisor in a single system.

**Smith et al. (2021)** designed a machine learning driven framework for automatically categorizing the financial transactions in personal finance system. In classification across various users accounts the system showed better accuracy, but

however there were some limitations when processing unstructured transaction descriptions and did not support learning based on users corrections. This helps in understanding the need of automation in managing personal financial data. [1]

**Kumar et al. (2022)** designed an expense tracking system that uses earlier transaction records to forecast monthly expense trends. This approach made users improve budget efficiency but it could not deliver personal financial guidance based on individual user. This study helps understand the importance of predictive modeling for improving financial management. [2]

**Wang et al. (2021)** proposed a system which is based on natural language processing. This system extracts data from bank statements. The system has been successful in increasing the accuracy of data extraction. While using the system to extract various formats of documents used by banks, problems were faced by the model. This gives us a sense of the importance of natural language processing. [3]

**Patel et al. (2023)** presented a financial assistant tool which made saving recommendations based on observed spending patterns. Yet, this tool does not allow real time integration with financial services. The accuracy of this tools recommendation gets impacted by this. This paper shows the necessity and opportunity of recommendation engines in finance system. [4]

**Garcia et al. (2022)** have developed a long short term memory model. To forecast future expenses based on historical financial data this model has been implemented. The model has produced significant results in short term prediction. During extended forecast analysis the accuracy of the model has reduced significantly. This has ensured the impact of deep learning on the model. [5]

**Sharma et al. (2024)** proposed a personal finance system using AI, which also included features such as expense classification, forecasting and visual analytics. However the problems still existed related to the security and complexity of the system. This study highlights the importance of developing a financially intelligent system that is aware of security and scalability. [6]

**Rahul et al. (2023)** suggested an optical character recognition system which can be helpful in extracting transactional details from scanned bank documents and receipts. Although this system reduced the workload of manual data inputting, it had difficulties in performing when it came to unclear and handwritten text. The importance of document digitization in improving the efficiency of expense tracking systems was showed by the research. [7]

**Zhang et al. (2022)** presented a model based on the combination of rule based and machine learning based systems for the detection of unusual spending behavior and financial fraud. Although the model was successful in the detection of such behavior there was a high dependence on rules. This paper discusses the need for anomaly detection methods in the development of personal finance applications. [8]

**Kulshrestha et al. (2025)** suggested a machine learning based system for real-time tracking of expenses and making financial forecasts. The authors applied predictive analytics and deep learning to examine user expenses and make financial predictions. However the authors encountered issues in data quality and integrating real time data sources for financial data. The study illustrates the use of machine learning to improve financial planning systems. [9]

**Kharat et al. (2025)** presented a smart AI based personal finance assistant, which incorporates various machine learning models such as BERT for expense categorization, reinforcement learning for budgeting, LSTM for savings forecasting and Isolation Forest as an anomaly detection model. This increases the computational requirements of the system, as the more AI models are used, the more complex the system becomes even in automated financial management systems. This study highlights the significance of employing various AI models to develop a smart financial management system. [10]

## B. PROPOSED SYSTEM

When the user uploads a bank statement or submit a query until the insights are shown to the user, the data flow in the Personal finance AI system is designed as a simple, flexible and user-centred. It supports the real world financial behaviour and not like a idealized banking setup. Users can access the data from multiple sources, consisting password protected pdf statements, scanned documents, or digital transactions data. This makes sure that users using traditional banking formats are not left behind with the benefits from intelligent financial analysis.

In the initial phase of development, it became clear that if there are limitations in the system to direct bank integrations than that would reduce usability for many users who depends on the downloaded bank statements or shared files from their banks. So, this system processes both the structured records and unstructured documents using document processing and text extraction techniques. This increases the adaptability of the system.

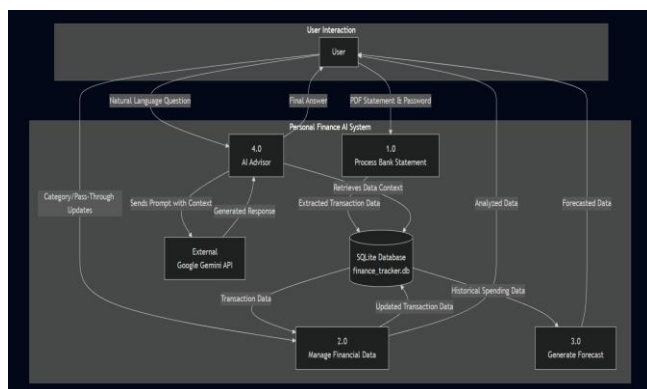
When the data is once collected, it passes through various stages of analysis. The first stage in analysis focuses on the

transaction processing and categorization, where the data that is extracted is then cleaned and grouped into meaningful expense categories, like food, utilities, travel and shopping. This helps users to understand their money expenses.

Thereafter the second stage consist of forecasting and spending analysis, where historical data is used to identify patterns and predict future expenses. Various machine learning models are used that helps analyse past records to predict monthly expenses and analyse trends that can affect decision-making.

To identify unusual transactions or financial data the system performs financial oddity detection, such as sudden price increase, duplicate transactions or unspecified withdrawals. When likewise data is detected, notifications are generated which helps users to respond actively.

Finally, the AI advisor offers interactive guidance to the users on their financial data. when the user poses questions to the AI advisor, the AI advisor generates answers with respect to the transaction history with the help of AI models.



**Fig. 1:** Block diagram of the proposed system

The Personal finance AI system processes raw data into more meaningful and actionable information through its structured and intelligent workflow, making personal finance management easy and smarter.

## II. METHODS

The Personal Finance AI System is a combination of data processing techniques, machine learning methods and natural language processing methods to conduct accurate financial analyses and provide financial recommendations. Each of these methods aids in automation, prediction and interaction.

### A. Bank Statement Processing and Data Extraction

Bank statement are processed by the system in PDF and scanned format. To extract important details from the data

different text extraction methods are used which include the date, amount, name of the account holder and type of transactions. To convert scanned documents into text format Optical Character Recognition is used.

### B. Transaction Categorization

Machine learning techniques can automatically classify transactions into categories like groceries, utilities, transportation and entertainment. Text vectorization and its related classification types can be used for better interpretation of user descriptions and supervised learning techniques can be used for better accuracy with the help of previous data.

### C. Data Storage and Management

The SQLite database is used to store the transaction history, categorize records, and user data. Database queries allow the fast recovery of financial content for reporting, analytics, and AI-based instructions. Extracted data and analytical services ensure regular updates.

### D. Spending Analysis and Forecasting

To identify spending trends over time Time-series analysis techniques were applied. Predictive models analyze historical expenses and generate short- and long-term forecasts of monthly expenditures. These predictions help users forecast higher spending periods and effectively plan their budgets

### E. AI-Based Financial Advisor

It becomes possible for the users to ask questions in a simple language with the help of the natural language processing module. The system retrieves relevant transaction data and communicates with the external language model API to get relevant responses. This makes the financial data understandable to the user.

### F. Anomaly Detection

Unusual spendings can be detected by the statistical and machine learning techniques such as sudden large withdrawals or duplicate transactions. When such suspicious patterns are found then alerts are generated to aware the user for further review.

### G. Load Optimization and Scheduling

In Personal Finance AI system the load optimization refers to managing and prioritizing expenses to have better financial control. The system makes analysis on the past records and recommends the spending limits as per the category by

differentiating between essential and non essential expenses. Over the time, the system learns from the users interactions and further improves the accuracy of financial recommendations by supporting the management of the finances.

### H. Performance Evaluation

Based on various metrics the performance of the system is calculated. Precision, recall and F1 score metrics are used to evaluate the expense categorization accuracy on the other hand the forecasting was assessed using the error measures such as mean absolute error and root mean square error. So based on document processing time and response speed the system efficiency was measured. In addition the quality of AI recommendations is evaluated based on the users feedback and consistency checks.



Fig. 4. Spending Forecast Graph Real Time Data

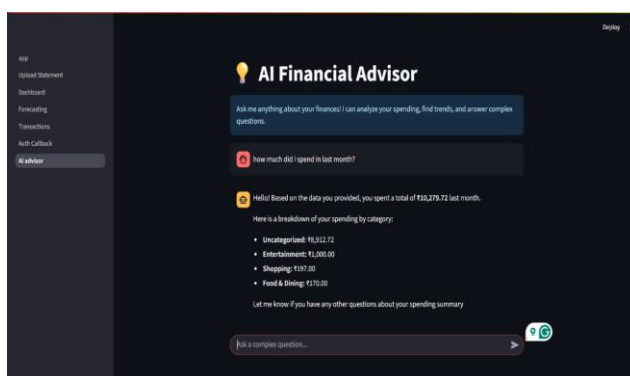


Fig. 5. AI Finance Advisor

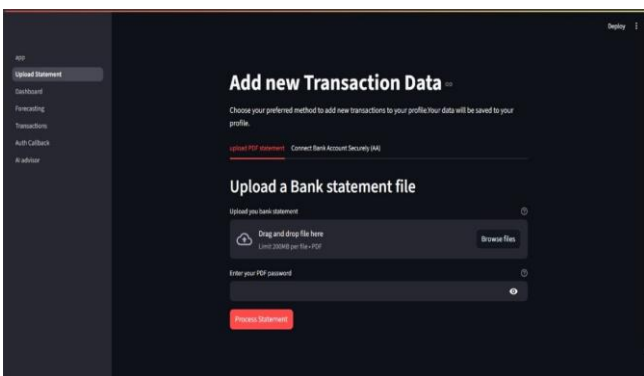


Fig. 2 upload statement

Date	Description	Amount	Category
02 Apr 2025	UPPAY443887781321DR/Google (FCI)gymchargel	800.00	Bills & Utilities
02 Apr 2025	UPPAY443887781321DR/PATH BH/SBN/maadidra.Lip	100.00	Transfers
02 Apr 2025	UPPAY443887781321DR/SARIN A/SARIN/swapamRundhe	15.00	Transfers
02 Apr 2025	UPPAY443887781321DR/SARIN A/SARIN/swapamRundhe	10.00	Transfers
02 Apr 2025	UPPAY443887781321DR/SARIN A/SARIN/swapamRundhe	30.00	Transfers
04 Apr 2025	UPPAY112325570945DR/SODHA ME/HDFC/Chigamredkasta	28.00	Health
04 Apr 2025	UPPAY14527020145DR/NEELANT W/YESA/swapamRundhe	30.00	Shopping
04 Apr 2025	UPPAY443887781321DR/SARIN A/SARIN/swapamRundhe	30.00	Food & Dining
04 Apr 2025	UPPAY443887781321DR/SARIN A/SARIN/swapamRundhe	15.00	Food & Dining
04 Apr 2025	UPPAY443887781321DR/SARIN A/SARIN/swapamRundhe	2000.00	Food & Dining

Fig. 3. Categorizing expenses

## III. RESULTS AND DISCUSSION

The various categories are automatically assigned to transactions based transaction descriptions. The system enables users to make changes in the table to accurate the classification before confirmation. This improves accuracy and maintaining user control over sensitive data. The system identifies the common transaction types as utilities, transportation, food, shopping and healthcare making meaningful insights and summaries.

Using historical data the forecasting helps generate projected spending. The interface shows both future and past spending expenses through interactive visuals. The system successfully calculates average daily spending and predicts future spending over a time period. The use of graphs helps in better understanding of financial trends and highlights spendings.

With the help of uploaded user data the AI advisor generates meaningful results. Queries such as monthly expense summaries and category based categorization are accurately answered. Complex financial data is improved with the help of an interactive interface, user engagement and makes simple explanations. The advisor translates technical summaries into

user friendly outputs and making financial analyses more simple.

The main objective of integrating automation, analysis, prediction and AI interaction is made overall in the system. It results in indicating the improvement of financial management and improves forecasting by making it more reliable. Some limitations include incorrect auto categorization in some cases and forecast sensitivity to limited historical data. These issues can be minimized through model training and including more historical data.

#### IV. CONCLUSION

The Personal Finance AI System shows how artificial intelligence and data analytics can make easy and improve personal finance management. The system automates the extraction of data of transactions from scanned PDFs, categorize expenses, forecasts future spending with the help of previous data and provides intelligent financial guidance via an interactive interface. The system is able to convert raw financial data into meaningful insights for the user through document processing, machine learning models and conversational AI all integrated into one platform. The system has the advantage to improve accuracy in expense tracking, forecasting visuals and improving financial decisions for investment in the future. Categorization errors and dependence on financial management solutions are few minor drawbacks of the system that will be resolved with training of the model. Overall, the project highlights the importance of AI based systems to make financial awareness and support decision making.

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