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REAL-TIME FINANCIAL TRACKING AND BUDGET RECOMMENDATION SYSTEM

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ABSTRACT

An AI-Based Personal Finance Manager is an intelligent system designed to assist individuals in effectively managing their financial activities through automation, data analysis, and personalized recommendations. The system leverages advanced technologies such as machine learning, natural language processing, and predictive analytics to analyze users' income, expenses, spending habits, and financial goals. By integrating with banking APIs and financial platforms, it provides real-time tracking of transactions and categorizes expenditures automatically.

The proposed system enhances financial decision-making by offering smart budgeting suggestions, expense forecasts, and savings plans tailored to individual user behavior. It can detect unusual spending patterns, generate alerts for potential financial risks, and recommend investment opportunities based on market trends and user risk profiles. Additionally, the system incorporates a conversational AI chatbot interface that allows users to interact using natural language for queries related to budgeting, savings, and financial planning.

Keywords: Artificial Intelligence, Personal Finance Management, Machine Learning, Predictive Analytics, Expense Tracking, Budgeting, Financial Planning, Natural Language Processing, Chatbot Interface, Investment Recommendation, Data Security, User Behavior Analysis, Real-time Transaction Monitoring, Smart Savings, Risk Detection.

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I. INTRODUCTION

In today's fast-paced digital world, managing personal finances has become increasingly complex due to multiple income sources, diverse spending patterns, and the growing availability of online financial services. Traditional methods of financial management, such as manual budgeting or basic spreadsheet tracking, are often time-consuming, error-prone, and lack real-time insights. As a result, individuals frequently struggle to maintain financial discipline, track their expenses effectively, and make informed decisions regarding savings and investments.

The emergence of **Artificial Intelligence (AI)** has revolutionized various sectors, including finance, by enabling intelligent data processing, automation, and predictive analysis. An AI-Based Personal Finance Manager aims to address the limitations of conventional systems by providing a smart, automated, and user-centric solution. This system utilizes advanced technologies such as machine learning algorithms and natural language processing to analyze user financial data, identify spending habits, and generate personalized financial recommendations.

The proposed system integrates with digital banking platforms and financial applications to collect real-time transaction data. It automatically categorizes expenses, tracks income, and provides detailed insights into spending patterns. Furthermore, it helps users set realistic budgets, achieve savings goals, and plan investments by offering predictive analytics and risk assessment. The inclusion of an AI-powered chatbot enhances user interaction by allowing users to query financial information and receive instant guidance in a conversational manner.

II. LITERATURE REVIEW

Recent studies highlight the rapid growth and significance of **AI-based personal finance management systems** in modern financial technology. According to Talasila (2024), AI-driven systems such as MyFinanceAI utilize machine learning algorithms to provide real-time financial analysis, personalized recommendations, and predictive insights, significantly improving users' savings behavior and financial well-being . This demonstrates the potential of AI to transform traditional budgeting methods into intelligent, automated systems.

Research by Liu (2023) emphasizes the role of **AI as a personal financial advisor**, where deep learning and big data analytics enable accurate market trend prediction and personalized financial guidance. The study shows that AI-based financial assistants can

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offer 24/7 support and improve decision-making by analyzing complex financial data . Similarly, Agarwal (2025) highlights the integration of behavioral analytics with AI, which enhances the relevance of financial recommendations by understanding user spending habits and financial goals .

Several studies focus on system implementation and functionality. An AI-based finance management system using machine learning and Flask provides features such as expense tracking, budget prediction, and financial alerts, helping users maintain financial discipline . Another study explains that AI systems can automatically categorize transactions, predict future expenses, detect abnormal spending behavior, and generate savings suggestions using algorithms like Random Forest and Linear Regression

EXISTING SYSTEM

The existing system for personal finance management primarily consists of traditional tools such as manual record-keeping, spreadsheets, and basic mobile or web-based budgeting applications. These systems allow users to track income and expenses, create budgets, and monitor financial activities. However, most of these solutions are rule-based and require significant manual input from users, making them less efficient and time-consuming.

Conventional finance management tools like spreadsheets (e.g., Excel) depend heavily on user accuracy and consistency. Users must manually enter transaction details, categorize expenses, and update records regularly. This process is prone to human errors and often leads to incomplete or inaccurate financial tracking. Additionally, these systems do not provide real-time insights or automated updates, limiting their effectiveness in dynamic financial environments.

Basic financial applications and digital wallets offer some level of automation, such as transaction tracking and simple categorization. However, they often lack advanced intelligence and personalization. These systems typically follow predefined rules and do not adapt to individual user behavior or provide predictive analysis. As a result, users receive generic recommendations that may not align with their financial goals or spending patterns.

PROPOSED SYSTEM

The proposed AI-Based Personal Finance Manager is an intelligent digital platform

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designed to help users manage their income, expenses, savings, budgets, and investments in a smarter and more personalized way. Unlike traditional finance management systems, this system uses Artificial Intelligence, Machine Learning, and Predictive Analytics to analyze user financial data and provide useful recommendations.

The system automatically collects and processes financial information such as salary, daily expenses, bill payments, online transactions, savings, and investment details. Using machine learning algorithms, it categorizes expenses into groups such as food, travel, shopping, education, health, rent, and entertainment. This helps users clearly understand where their money is being spent.

The proposed system also provides personalized budgeting by studying the user's previous spending behavior. It can predict future expenses and suggest monthly budget limits to avoid overspending. If the user spends more than the planned budget, the system sends alerts and gives suggestions to control unnecessary expenses.

METHODOLOGY

The methodology for the AI-Based Personal Finance Manager involves a systematic approach to collecting, processing, analyzing, and utilizing financial data to provide intelligent insights and recommendations. The process begins with data collection, where user financial information such as income, expenses, transaction history, and savings data is gathered through manual input or integration with banking APIs and digital payment platforms.

Next, the collected data undergoes data preprocessing, which includes cleaning, normalization, and transformation. Missing or inconsistent values are handled, and transactions are structured into a standardized format. After preprocessing, the system performs feature extraction, where relevant attributes such as spending categories, frequency of transactions, and time-based patterns are identified.

The core of the system lies in machine learning and predictive modeling. Classification algorithms are used to automatically categorize expenses into predefined groups like food, rent, travel, and entertainment. Regression and time-series models are applied to predict future expenses and income trends. These models analyze historical data to generate accurate forecasts and budgeting suggestions.

The system also incorporates behavioral analysis, where user spending habits and financial patterns are studied to provide personalized recommendations. Based on this analysis, the system suggests optimal budget

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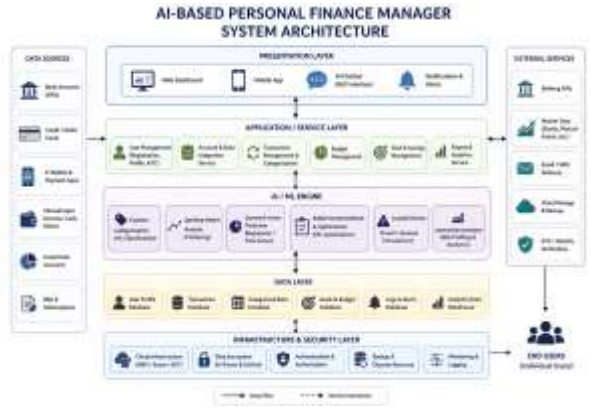
limits, savings plans, and investment strategies tailored to individual user profiles.

An AI-powered chatbot using Natural Language Processing (NLP) is integrated into the system to enhance user interaction. It allows users to ask questions related to their finances and receive instant, meaningful responses. The chatbot interprets user queries and retrieves relevant information from the system database.

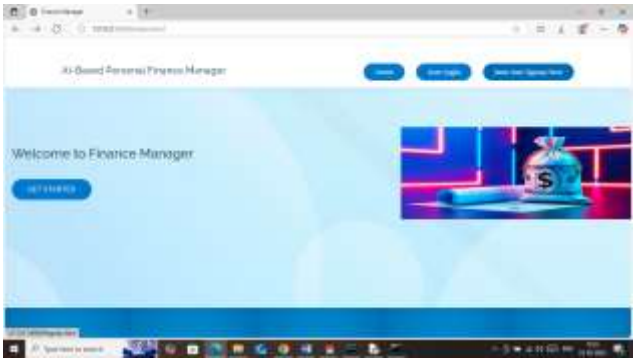
Additionally, the methodology includes a real-time monitoring and alert mechanism.

VI. SYSTEM MODEL

System Architecture



III. RESULTS AND DISCUSSIONS



In above screen click on 'New User Sign up' button to get below page

In above screen user is entering sign up details and then press button to get below page

In above screen user sign up completed and now click on 'User Login' link to get below page

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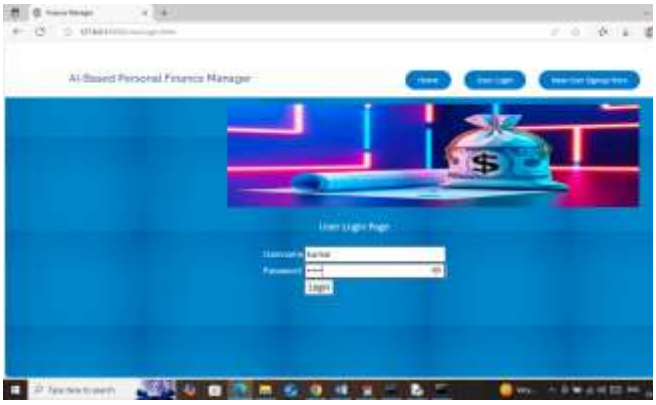
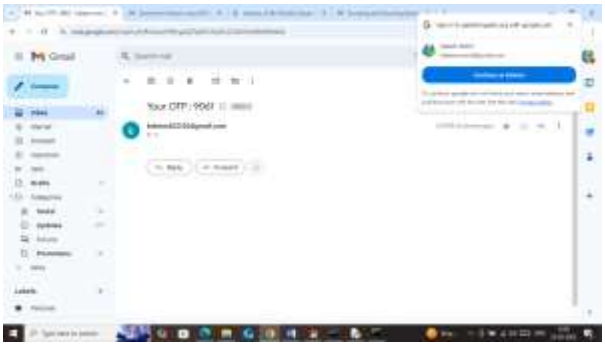


In above screen user is login and after login will get OTP to email like below page

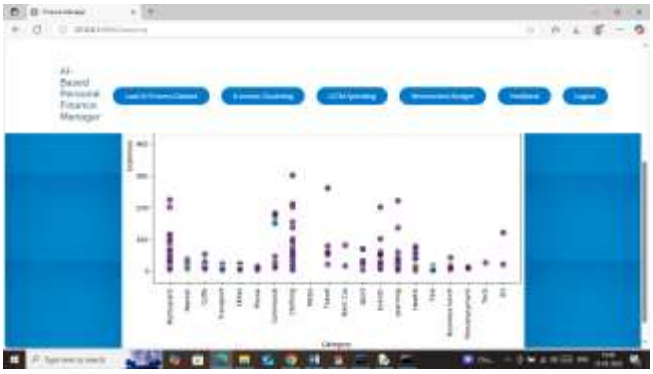


In above screen OTP is received and now enter is application to continue login

In above screen enter OTP and then press button to get below page

In above screen click on 'Load & Process Dataset' link to load dataset and then will get below page

In above screen dataset loaded and now click on 'K-means clustering' link to cluster user expenses behaviour and then will get below page



In above graph x-axis represents categories and y-axis represents expenses amount and then each different colour circle represents one cluster which indicate total amount spends on different categories. Now click on 'LSTM Spending' link to train LSTM algorithm to predict expenses and then will get below page

In above screen in white table format can see LSTM accuracy on test data prediction is 98% and MSE error rate is 39. In prediction graph

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x-axis represents 'Number of Test Data' and y-axis represents 'Expenses Amount' and then red line represents 'True Expenses' and green line represents 'Predicted Expenses' and in above graph can see both lines are fully overlapping with minor gap so we can say LSTM prediction is accurate. Now click on 'Recommend Budget' link to predict future expenses like below page

In above screen I am selecting 1st of April 2025 and then press button to get below page

In above screen can see income amount along with predicted Expenses and then can see recommended amount for investment. Similarly by selecting date you can make prediction for any future month. Now click on 'Feedback' link to get below page

In above screen user will write some feedback and then press button to get below page

In above screen can see 'user feedback accepted' and detected sentiment is 'Positive'. Similarly application will calculate sentiments for all feedbacks.

So above are the modules implemented as per given requirements

VIII. CONCLUSION

The AI-Based Personal Finance Manager provides an intelligent and efficient solution for managing personal financial activities. By using artificial intelligence, machine learning, and predictive analytics, the system helps users track expenses, manage budgets, monitor savings, and make better financial decisions. It reduces manual work by automatically categorizing transactions and analyzing spending patterns.

The system also improves financial planning by offering personalized recommendations, expense predictions, savings suggestions, and alerts for overspending or unusual

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transactions. The AI chatbot makes the system more user-friendly by allowing users to ask finance-related questions and receive instant guidance.

Overall, the proposed system enhances financial awareness, supports disciplined money management, and helps users achieve long-term financial stability. It is a smart and secure platform that can assist individuals in making informed and responsible financial decisions.

IX. FUTURE WORK: Future work for this

The AI-Based Personal Finance Manager can be further enhanced by incorporating more advanced technologies and expanding its functionality. One important area of improvement is the integration of deep learning models to provide more accurate financial predictions and better personalization based on user behavior. Future systems can also include real-time investment advisory features, enabling users to receive dynamic suggestions for stocks, mutual funds, and other financial instruments.

Another potential enhancement is the use of blockchain technology to ensure higher data security, transparency, and trust in financial transactions. This can help in secure data sharing and prevent unauthorized access. Additionally, integrating the system with a wider range of banking and financial APIs will improve data accuracy and provide a unified view of all financial accounts.

The system can also be improved by adding voice-enabled assistants and multilingual support, making it more accessible to a broader range of users. Advanced fraud detection mechanisms using anomaly detection and behavioral biometrics can further strengthen system security.

In the future, the platform may incorporate financial education modules, offering tips, tutorials, and insights to improve users' financial literacy. Integration with smart devices and IoT systems could enable automated expense tracking and bill management**.**

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