
QUANTSAAS: AN INTELLIGENT FINANCIAL ANALYTICS AND ADVISORY PLATFORM USING PREDICTIVE INTELLIGENCE AND OCR AUTOMATION

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ABSTRACT

The rapid adoption of digital payment systems, including online banking, UPI, and mobile wallets, has significantly increased the complexity of personal financial management. Although numerous expense-tracking applications are available, most primarily focus on recording transactions and generating reports, offering limited intelligent insights or personalized financial guidance. This paper presents an Artificial Intelligence (AI)-powered Financial Analytics and Advisory Platform designed to enhance personal finance management through intelligent automation and predictive analytics. The proposed platform integrates expense tracking, OCR-based receipt scanning, automated transaction categorization, subscription monitoring, and AI-driven financial advisory into a unified ecosystem. Machine learning models analyze users' spending behavior to forecast future expenses, identify potential budget overruns, and provide personalized recommendations for effective financial planning. Additionally, the system incorporates conversational AI for interactive financial assistance, financial stress testing to evaluate budget sustainability under different scenarios, and gamification features such as rewards and achievement badges to encourage responsible financial habits. The platform also provides interactive dashboards and visual analytics that enable users to monitor spending patterns, savings, recurring expenses, and overall financial health in real time. By combining automation, predictive intelligence,

and user-centric financial guidance, the proposed system reduces manual effort while improving financial awareness and decision-making. Experimental evaluation demonstrates that the platform effectively enhances expense management, budgeting accuracy, and user engagement compared with traditional financial tracking applications. The proposed solution represents a scalable and intelligent next-generation financial management ecosystem capable of supporting modern digital financial lifestyles.

KEYWORDS: Personal Finance Management, OCR, Machine Learning, Predictive Analytics, Financial Advisory System, Artificial Intelligence, FinTech, Budget Prediction.

INTRODUCTION

In today's world managing our money is harder than it used to be. With many online banking options, UPI transactions, digital wallets and cashless payment systems it is tough to keep track of what we spend every day. Even though digital transactions are convenient and fast they make it difficult for us to keep a record of how we spend our money. A lot of people still use methods like notebooks or spreadsheets to manage their money, which can be time-consuming and hard to keep up with.

When we have many financial transactions happening on different platforms it can be hard to know where our money is going. If we do not keep track of our money well we might spend much not manage our budget well and not save enough. This can cause us a lot of stress. There are apps that help us track our expenses. They often do not have smart features like automation, predictive analysis and personalized advice.

New technologies like Artificial Intelligence, Machine Learning and Financial Technology have made it possible to create financial systems. These systems can look at how we spend our money give us advice and even predict what we will spend in the future. They can also help us by scanning receipts and warning us if we are spending too much.

This project is about creating a financial platform that uses Artificial Intelligence to make managing our money easier. The platform will help us track our expenses, scan receipts and even give us advice on how to manage our budget.

The platform will not help us record our financial transactions but also act like a smart financial advisor. It will give us personalized budgeting suggestions predict risks and help us

avoid unnecessary expenses. It will also have features, like warnings if we go over our budget, financial stress testing and spending analysis.

The main goal of this project is to create a financial system that combines automation, predictive analysis and conversational Artificial Intelligence. By using technologies the platform aims to help us manage our money better make smarter financial decisions and reduce financial stress in a world where digital transactions are becoming more common.

LITERATURE REVIEW

Managing money has become really tough in the few years. Most of the time we do things online like using UPI apps, online banking, cards and mobile wallets. A lot of people still use ways like notebooks, spreadsheets or just doing the math in their head to keep track of what they spend. These old ways are time-consuming and often wrong.

Because of this many researchers have worked on making systems to help us with our money. One of the studies called "Income and Expense Tracker" suggested making an app for Android phones to record how money we make and spend. This app had features like adding what we spend looking at what we spent each month reminders and putting things into categories. The main idea was to stop using ways and switch to something digital. This system did not have analysis or ways to predict what might happen.[1]

The paper "Spend Analyzer AI" introduced a system that can predict what we will spend using machine learning models like ARIMA, Random Forest and Gradient Boosting. This system was made not just to record what we spend but to predict how we will spend our money in the future and help us make decisions about our budget. The research showed that predicting what might happen can help us plan better and avoid spending much.[2]

Another paper "Expense Tracker Management System Using Machine Learning" used machine learning to predict what we will spend in the future. The study looked at dashboards putting things into categories automatically notifications and predicting our money. It also said that having insights and predicting our budget is important for systems that track what we spend.[3]

Researchers also looked at using OCR to automate things and reduce how much we have to enter by hand. The paper "Citizen ID Card Detection Using Image Processing and OCR" talked about how OCR and image processing can get text from pictures using Tesseract OCR.

Although this research was about ID cards the OCR workflow and automated extraction are very useful for scanning receipts and getting transaction data in expense tracking apps.[4]

Apart from that some studies also looked at how people behave and manage their money. The paper "The Efficiency and Adoption of Expense Tracker Applications in Enhancing Student's Financial Management" said that expense tracker apps can help students manage their money better save and be more aware of their finances. The study also said that features like reminders, dashboards, analytics and making it fun improve how much people use these apps and encourage them to check their money.[5]

Another study, "Online Income and Expense Tracker" made a website to help with money using PHP. This website let people record what they spent make graphs set limits for each month and get notifications when they spent much. This research showed how digital systems can make it easier to keep track of our money and reduce mistakes. This system only looked at things like tracking and making pictures of the data.[6]

As technology got better researchers started making websites to help with money. The paper "A Web-Based Personal Financial and Expense Tracker for Efficient Money Management" talked about how important it's to have a system that works well on all devices alerts us when we go over our budget helps us manage our accounts and keeps our money safe. The study also looked at keeping our money safe with things like password protection, secure sessions and protecting the database which are important for modern money systems.[7]

The paper "Personal Finance Tracker with Budget Exhaustion Prediction" made financial forecasting systems better by using machine learning and deep learning models like Random Forest, XGBoost, LSTM and GRU. This system looked at how we spend our money predicted if we would go over our budget before the month ends. The research showed that predicting what might happen can help us be more careful with our money and avoid spending much.[8]

The paper "Personal Finance Tracker" also tried to make a system with dashboards tracking what we spend in categories and making graphs. This system gave us summaries each month and year to help us understand how we spend our money. The research said that knowing our money and seeing it in a way can help us save and manage our money better.[9]

Later research went beyond just tracking what we spend and started using intelligence and predicting what might happen. The paper "FinTrack – Tracking Personal Finances" suggested making a system with intelligence that can put things into categories predict our budget track our savings and analyze our money. The study explained how using machines and analyzing data can help us understand how we spend our money and make plans.[10]

The paper "Spending Tracker: A Smart Approach to Track Daily Expense" talked about making a computer program to help people track their expenses. This program was made using Java and MySQL. Had features like categorizing expenses tracking expenses by date sending notifications supporting many languages and having a user-friendly interface. The study showed that traditional ways of tracking expenses are time-consuming and not very reliable. The new program made it easier to keep track of finances by providing an digital way to record transactions and keep financial records.[11]

The paper "Full-Stack Expense Management System" proposed an scalable platform to track expenses using React.js, Spring Boot and SQL databases. This platform had features like categorizing transactions, financial dashboards, authentication, real-time analytics and budget monitoring. The research said that modern financial systems should not help people record expenses but also provide interactive analytics and be able to support Artificial Intelligence and advanced financial insights.[12]

Recently many studies have focused on using Artificial Intelligence and Machine Learning in finance management. The paper "Smart Financial Tracker with AI-Based Budget Prediction" introduced a financial tracking system that can analyze user expenses and predict future budgets using machine learning techniques. This system used algorithms like Linear Regression and K-Means clustering to identify spending patterns and forecast expenses based on past transaction data. The study showed that predictive analytics can really improve planning, budgeting accuracy and spending awareness.[13]

The paper "Personal Finance Tracker with AI Based Expense Prediction" proposed a finance tracking platform powered by Artificial Intelligence. This platform was made using Python, Flask and MySQL. The research used Random Forest and LSTM models to analyze spending behavior automatically categorize expenses and predict monthly expenditures. The study also included ways to detect spending patterns and improve user financial awareness. The

authors said that machine learning models can turn expense trackers into smart financial assistants that can provide predictive insights and behavioral analysis.[14]

Another important study was presented in the paper "AI-Driven Personal Finance Management: Revolutionizing Budgeting and Financial Planning." This research introduced MyFinanceAI a finance management system powered by Artificial Intelligence. This system provided real-time analysis, predictive budgeting, smart categorization, anomaly detection, OCR-based bill management and personalized financial recommendations. The system used machine learning techniques like LSTM networks, ARIMA models, reinforcement learning, OCR and deep neural networks to improve budgeting and financial planning. The study showed that Artificial Intelligence-driven financial systems can really reduce stress improve savings habits and support better financial decision-making through smart automation and personalized financial guidance.[15]

The studies we looked at show that modern financial management systems are changing from expense trackers to smart financial advisory platforms. Traditional systems mainly focused on recording expenses and generating reports.. Modern Artificial Intelligence-driven systems use predictive analytics, automated categorization, anomaly detection, OCR automation and personalized recommendations to improve financial awareness and budgeting discipline.

However most existing systems only focus on things like budgeting, prediction, dashboards or expense categorization. Few systems combine OCR-based receipt processing, Artificial Intelligence-driven financial advisory, predictive analytics, conversational Artificial Intelligence, subscription analysis, gamification and scalable SaaS architecture into one platform.

So our research aims to develop an Artificial Intelligence-Powered Financial Analytics and Advisory Platform. This platform will have expense tracking OCR automation, predictive analytics, conversational Artificial Intelligence support, budgeting assistance, behavioral engagement mechanisms and scalable SaaS architecture all in one comprehensive financial management ecosystem.

In the end the Artificial Intelligence-Powered Financial Analytics and Advisory Platform will be a tool, for personal finance management. It will help people manage their finances in a

way and make better financial decisions. Personal finance management is really important. This platform will make it easier for people to do it.

PROBLEM STATEMENT

A lot of people have trouble keeping their money in order because they do transactions so much and there are not enough good tools to help with money management. The old ways of keeping track of what we spend require us to be doing something. They do not really help us understand where our money is going. Most apps just help us record what we buy and make budgets but they do not have advanced features like automatically reading receipts predicting what we will spend giving us money advice based on artificial intelligence looking at what we subscribe to and helping us make good money choices.

This means that people often spend much money make bad budgets forget about things they pay for every month and do not know much about their money. So we need a money management system that can automatically keep track of what we spend look at how we spend our money predict if we will have money problems and give us personalized advice on how to manage our money all, in one place.

OBJECTIVES

The main goals of the proposed research are to make a financial management platform that's safe and easy to use for users.

The objectives of the financial management platform are:

1. The financial management platform should be secure and user-friendly.
2. The platform will use OCR to scan receipts and automatically extract transaction information.
3. The financial management platform will use machine learning to look at how people spend their money.
4. The platform will try to guess what people will spend in the future and if they are at risk of running out of money.
5. The financial management platform will give people suggestions on how to manage their money using intelligence.
6. The platform will help people keep track of how much they spend on things they subscribe to.
7. The financial management platform will use charts and pictures to help people understand their money better.

8. The platform will try to get people more interested, in managing their money by making it fun.
9. The goal is to make a system that can be used by a lot of people and is based on a subscription service the financial management platform will be a scalable SaaS-based financial ecosystem.

PROPOSED SYSTEM

The proposed system is an analytics and advisory platform that helps people manage their finances easily. It uses automation, predictive analysis and AI recommendations to make financial management simple.

The system has modules, including transaction management, OCR automation, predictive budgeting, conversational AI assistance, financial simulation, subscription analysis and gamification. All these modules work together in one system.

Major Features of the Proposed System:

1. Authentication Module

The platform has a way for users to register and log in. It uses JWT authentication. Manages sessions securely.

2. Expense Tracking Module

Users can add, edit, categorize and monitor their expenses and income records. They can do this through a dashboard.

3. OCR Receipt Scanning Module

Users can upload receipts. The OCR system then automatically extracts details from the receipts, such as:

- * Merchant name
- * Amount
- * Transaction category
- * Date

4. AI Financial Advisor Module

The AI financial advisor analyzes how users spend their money. It provides:

- * financial suggestions
- * Budget breach warnings

- * Spending analysis
- * "What-if" simulations with the AI financial advisor

5. Predictive Analytics Module

The system uses machine learning algorithms, like Random Forest and Ridge Regression. These algorithms:

- * Predict expenses
- * Estimate burn rate
- * Forecast budget exhaustion
- * Analyze spending patterns with analytics

6. Subscription Analysis Module

The platform identifies recurring expenses. It detects subscriptions that affect user savings.

7. Financial Stress Testing Module

This module estimates how long users can financially survive. It does this by assuming their income becomes zero.

8. Gamification Module

The platform includes:

- * Badges
- * Rankings
- * Financial missions
- * Achievement tracking

These features improve user engagement. They encourage discipline.

SYSTEM ARCHITECTURE

The system we are talking about has a lot of parts. It is made up of layers. These layers are:

1. Presentation Layer
2. Application Layer
3. AI and Machine Learning Layer
4. Database Layer
5. Presentation Layer

The front part of the system is built using some tools.

These tools are:

- Next.js
- Tailwind CSS
- Recharts

This layer is where users interact with the system. It shows them dashboards and fancy charts. It also helps with transactions and other things.

● Application Layer:

The back part of the system is built using some tools. These tools are:

- FastAPI
- REST APIs
- JWT Authentication

This layer does all the work. It figures out the business side of things. It talks to parts of the system. It does math for money and other things.

● Machine Learning Layer:

This layer uses some tools. These tools are:

- AI
- OCR processing
- Random Forest
- Ridge Regression
- Predictive analytics models

The AI and Machine Learning Layer is really smart. It helps us guess what will happen next. It gives us ideas. It reads things using OCR. It even talks to us about money.

● Database Layer:

The database part of the system uses some tools. These tools are:

- SQLite, for when we're building it
- PostgreSQL for when it is all grown up

It stores a lot of things. These things are: User records

- Transactions
- Budget data
- Financial analytics

- Subscription history

METHODOLOGY

The proposed system was developed in steps.

The development of the proposed system was carried out in phases to make sure everything works properly.

Phase 1:

Requirement Analysis:

We looked at research papers about expense tracking and other things like OCR automation and predictive analytics and AI-based finance management. We did this to find out what is missing in the systems that already exist.

Phase 2:

System Design :

We designed the architecture and the workflows and the APIs and the database schema and the frontend interface. This was an important step in the development of the proposed system.

Phase 3:

Implementation:

We used Next.js and FastAPI and Gemini AI and OCR integration and machine learning models to implement the system. The implementation of the proposed system was done using these tools.

Phase 4:

Testing:

We tested the parts of the system one, by one. This included testing the OCR extraction and the transaction management and the dashboard functionality and the prediction accuracy and the authentication.

Phase 5:

Evaluation:

We evaluated the performance of the proposed system based on things.

These things were the expense tracking efficiency and the OCR extraction quality and the prediction performance and the user interaction and the financial visualization.

The evaluation of the proposed system was very important to see how well it works.

EXPERIMENTAL RESULTS AND DISCUSSION

User Authentication

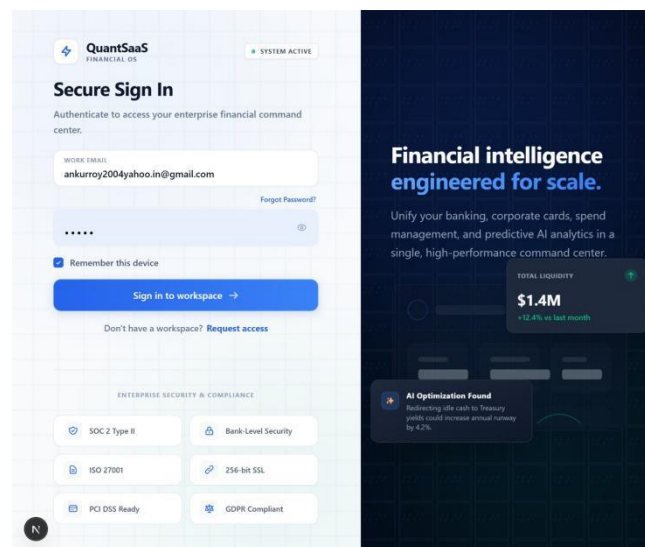


Figure.1.

The user authentication module successfully implemented secure registration, login, and session management using JWT authentication, ensuring secure access to financial information. The transaction management module accurately recorded and categorized income and expense transactions, providing reliable financial data for analysis and forecasting.

2.Dashboard Analytics

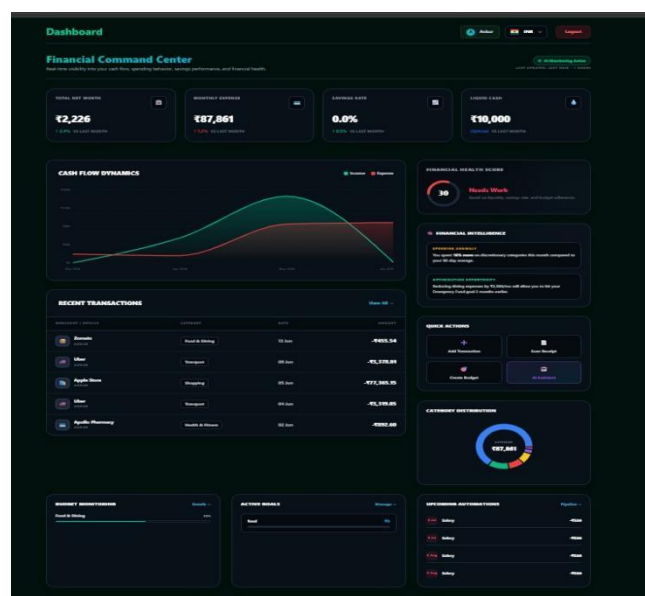


Figure.2

The Dashboard Module is like a control center for your money. It shows you how you are doing with your finances. You can see things like how money you have how much you spend each month how much you save and how much money is available to you. The Dashboard Module also shows you charts that help you see how your money is coming and going. It even gives you a score that tells you how healthy your finances are.

The Dashboard Module uses computer brain power to look at how you spend your money. Then it gives you ideas on what you can do to make your finances better. You can also see the money moves you made recently how you are doing with your budget and how close you are to reaching your savings goals. The Dashboard Module even shows you where your money is going, like what you spend on food or rent. It reminds you about bills that are coming up.

The Dashboard Module is really helpful because it lets you keep an eye on your money and make choices about what to do with it. You can use the Dashboard Module to see what the Dashboard Module is telling you about your money. Then you can use that information to make your finances better. The Dashboard Module is, about the Dashboard Module and how it helps you with your finances.

3.OCR Automation

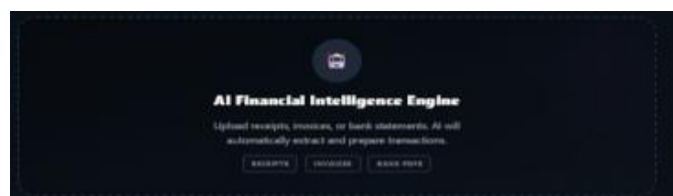


Figure.3

The OCR-based receipt processing module helps to successfully extract transaction information such as merchant names, transaction amounts, and purchase dates from uploaded receipt images, significantly reducing manual data entry efforts. The integration of Machine Learning models, including Random Forest and Ridge Regression, enabled successful prediction of future expenses, budget exhaustion, and spending trends.

4.The AI Therapist:

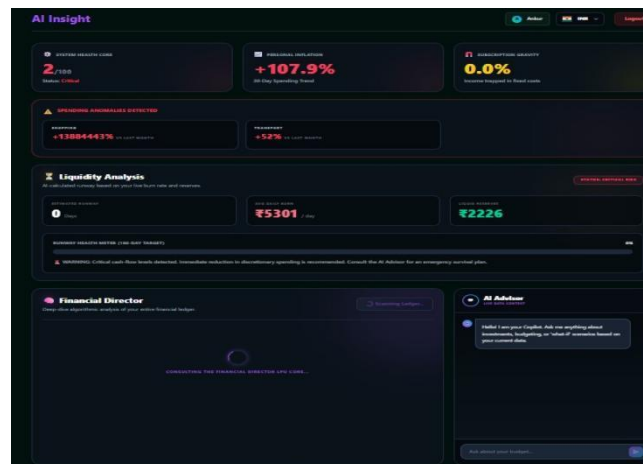


Figure.4.

The AI Financial Advisor - the AI Therapist make suggestions about money and behavior that're just for the user. They look at how the user spends money to do this.

The system that checks subscriptions finds the things the user pays for every month and points out the things the user does not need to pay for. This helps the user manage their money better.

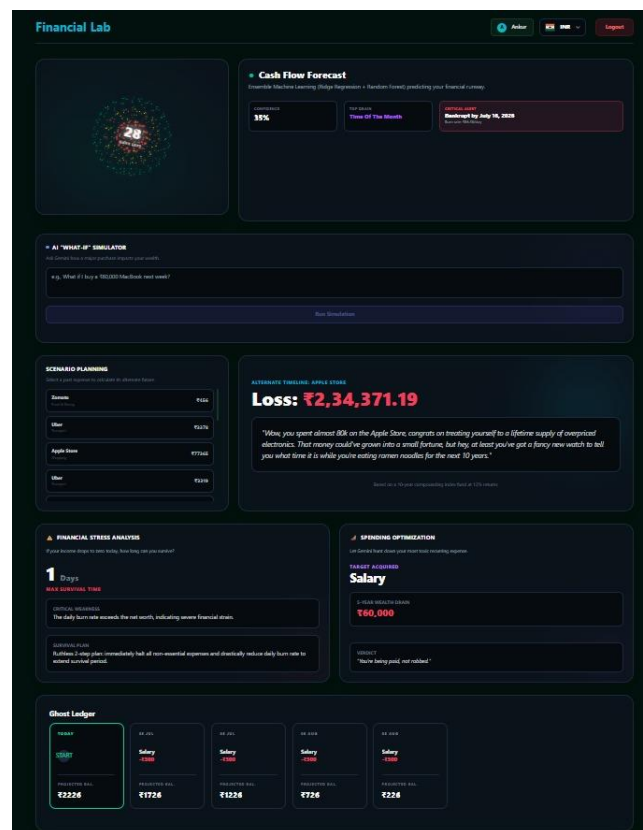
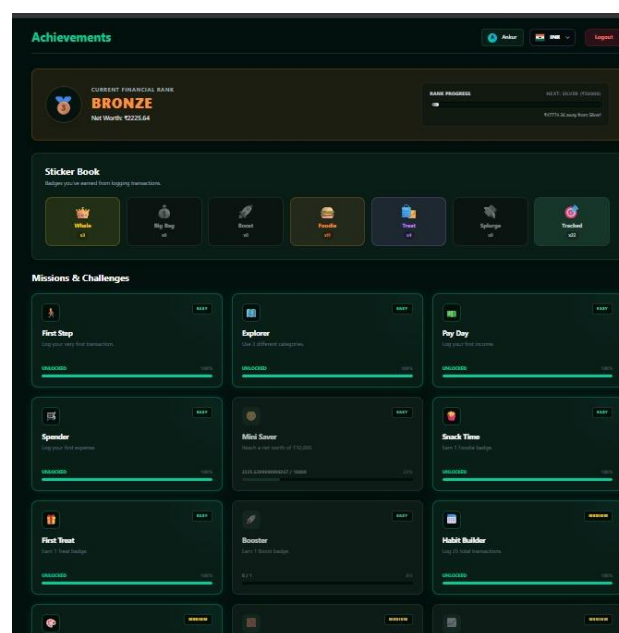
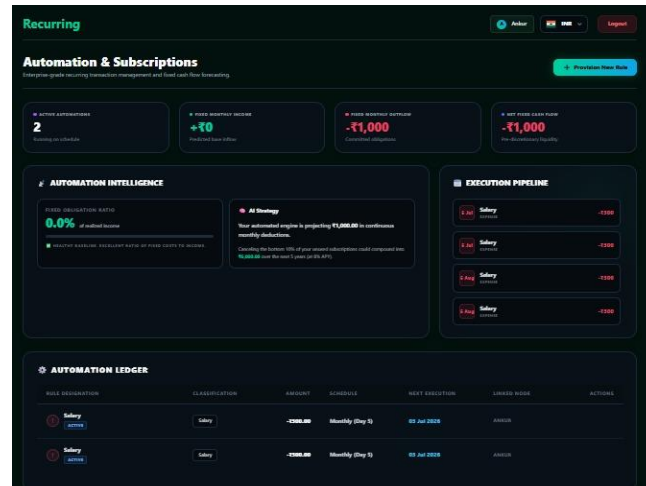


Figure.5.



9

It is a way to help people get into good financial habits. It does this by giving them rewards and badges when they do things with their money. The Achievements Module also keeps track of how users are doing and gives them rankings.

It gives users achievements when they reach financial milestones. This helps people want to keep doing things with their money and motivates users to keep spending, budgeting and saving in a way. This is really good at helping people stay engaged, with their finances for a time.

7.Comparative Analysis

Features	Traditional Syatem	Proposed System
Keeping track of expenses	Yes	Yes
OCR Automation	Yes	Yes. Our system is better
Predicting what people will spend	A little	Yes
Giving people ideas based on intelligence	No	Yes
Simulating Finances	No	Yes
Gamification	No	Yes
Analyzing Subscription	No	Yes

ADVANTAGES OF PROPOSED SYSTEMS

1. The Proposed System reduces the amount of time we have to spend on managing our money by hand.
2. The Proposed System uses something called Optical Character Recognition to process receipts for us.
3. The Proposed System helps us make a budget by using analytics to figure out how much money we will have in the future.
4. The Proposed System gives us recommendations that are tailored to our specific needs.
5. The Proposed System helps us understand our money better by using easy to read dashboards.
6. The Proposed System finds subscriptions that we do not need. That are taking our money every month.
7. The Proposed System encourages us to be more careful, with our money by making it fun.
8. The Proposed System is designed to support a lot of users and can grow with our needs.

FUTURE SCOPE

The Financial Analytics and Advisory Platform has a lot of room to grow and get better in the future. As Artificial Intelligence and Cloud Computing get more advanced the platform can

turn into a smart financial system. Here are some things that can be added to the platform in the future:

1. The platform can start using a cloud-based database that automatically backs up data can recover from disasters and is always available. It is reliable can grow and does not fail easily.
2. The platform can help people manage their investments, like stocks, mutual funds and bonds and track how their investments are doing.
3. The platform can have its apps for Android and iOS so people can easily use the financial services get notifications and see financial data in real time on their phones.
4. The Artificial Intelligence algorithms can look at how people spend their money and give them plans to save money, allocate funds and achieve their financial goals.
5. The platform can have security, like encryption to protect peoples financial data and keep it private.
6. The platform can have levels of access so different people can do different things and it can follow the rules of big companies.
7. The platform can automate the process of testing deploying and maintaining the software so it gets better and faster.
8. The platform can show people what is happening in the stock market, news and economic indicators in real time so they can make better investment decisions.
9. The platform can follow the Open Banking standards so it can communicate with banks and other financial institutions securely.
10. People can connect all their bank accounts from banks to one place so they can see everything at once.
11. The Artificial Intelligence can look at peoples investments see what might go wrong and give them advice, on how to manage their money.
12. The platform can be used by companies and it can grow to meet the needs of big organizations.
13. The platform can help teams work together to manage their money make budgets and plan for the future.
14. The platform can use voice recognition and Natural Language Processing so people can talk to it in languages and it can understand what they mean.

CONCLUSION

The platform was made to fix the problems with financial management systems. It uses technologies like Artificial Intelligence and Machine Learning to make things better. This system puts together things like tracking expenses making budgets planning savings goals, predicting finances and giving advice all in one place.

Using technology called Optical Character Recognition really reduces the need for people to do things manually. It automatically processes receipts. This platform platform also uses Machine Learning to predict expenses and look at budget risks. The AI Financial Advisor gives people personalized advice on money matters.

The platform also has cool features like managing regular transactions keeping an eye on subscriptions making interactive charts and syncing with bank accounts. These features help people understand their money better spend wisely and like using the system

When we tried out the platform we saw that it really works well. It makes financial management easier reduces work and gives smart ideas about money. The system is flexible. Can be improved later to include things like helping with investments working with banks finding fraud and managing money for big companies.

In conclusion the AI-Powered Financial Assistant is a way to manage personal finances. It combines Artificial Intelligence predicting what will happen with money and automating tasks. This Platform is a start for making the next generation of smart financial management systems and helps move forward Financial Technology solutions. The AI-Powered Financial Assistant is, about making financial management easier and smarter.

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