

An Intelligent Financial Management System Using Artificial Intelligence

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Abstract - Managing money is tough these days. We have many ways to spend and get money thanks to the internet and all. Old ways of keeping track of money just record what we spend, they do not really help us understand what is going on. That is why we made Smart Plan AI. It is a system that uses Artificial Intelligence and looks at all the data to help us make good choices about money.

Smart Plan AI lets people see what they make and what they spend, make a budget and get emails when something is wrong. It also gives us ideas about what to do with our money, based on what it learns from the data. We even added a helper that gives us advice just like a real person. This helper uses something called GPT to make sure the advice is good for each person.

Using Smart Plan AI helps people know what is going on with their money saves time and makes it easier to make choices. We tried it out. It works well. It can show how people spend money and give us ideas on what to do. This makes it a great tool, for anyone who wants to manage their money.

Keywords:

Artificial Intelligence helps with Financial Management.

It improves Expense Tracking too.

Machine Learning and GPT make it smarter.

A good Budgeting System uses Data Analytics.

This is all part of FinTech.

* Artificial Intelligence

* Financial Management

* Expense Tracking

* Machine Learning

* GPT

* Budgeting System

* Data Analytics

* FinTech

1. INTRODUCTION

In today's world people are doing a lot of financial transactions. This is because of banking, mobile payments, credit cards and subscription services. As a result, people often have time to manage their money, which leads to problems like spending too much, not budgeting well and not knowing much about money.

People used to use notebooks, spreadsheets or simple financial apps to track their money. These methods are okay for keeping records, but they are not very helpful. They do not automatically do things for you, they do not give your ideas, and they do not help you see how you are spending your money. So, people must look at their information themselves, which takes a lot of time and can be wrong.

Now that we have Artificial Intelligence and data analysis we can make personal finance management better. Artificial Intelligence helps systems look at a lot of information, find patterns, see if something is wrong and give good advice. New financial technologies are using Artificial Intelligence to make things better for users and help them make decisions.

With these new technologies most financial management systems only help you track your transactions and give you reports. They do not have features like predicting what you will spend sending you alerts and giving you personalized money advice. Also, many systems do not have one place where you can track, analyze and get advice on your money.

To fix these problems I want to tell you about Smart Plan AI. It is a financial management system that uses new web technologies and Artificial Intelligence. The system helps you manage your money by doing these things:

* Tracking your income and expenses on time

* Helping you make and track a budget

* Giving your ideas and advice based on Artificial Intelligence

* Sending you automated email alerts

* Giving you personalized money advice from a smart financial advisor

Smart Plan AI uses a set of technologies called the stack to make sure it works well and is easy to use. The Artificial Intelligence part uses rules and sentiment analysis to understand how you spend your money. The smart financial advisor helps you in your language.

The main goal of Smart Plan AI is to take the information about your money and turn it into something you can use to make decisions. By automating how you track your money and using analysis the system helps you understand your money better and makes it easier to manage.

Also, the system is designed to be easy to use and works well on any device. This makes it good for all kinds of people like students, workers, freelancers and small business owners.

In short Smart Plan AI wants to fill the gap between financial tracking systems and new Artificial Intelligence solutions. It does this by giving you one place to manage your money that smartly works well and is easy to use. Smart Plan AI is a finance management system that uses Artificial Intelligence to help you with your money.

II. LITERATURE REVIEW

Financial management systems have been studied by researchers to see how they can be improved with Artificial Intelligence.

Patil and Patil did a study in 2021 on systems that help people manage their personal finances. They found out that most of these systems only help people keep track of how money they make and spend. However, these systems are not very smart because they do not look at the user's data to give them advice or ideas. This means these systems are only good for keeping records and not for planning finances.

Jain and Kumar came up with a way to use machines, learning to predict how people will spend their money in 2022. Their study showed that models can be used to forecast expenses based on what happened in the past. This helps people make budgets and good financial decisions. This system needs a lot of data to work and cannot change quickly when things happen in real time.

Cumming and Johan looked at how robots can give people advice in 2023. They said Artificial Intelligence is very important for giving people automated advice about money. Their research showed that systems that use Artificial Intelligence can give people personalized advice and help them get more involved. These systems use Natural Language Processing to talk to people, which makes getting financial advice easier. Many of these systems are not fully connected to the systems that track people's personal finances.

Bing Liu introduced a way to analyze how people feel about things in 2012. This can be used to look at what people say and figure out if they are being good or bad with their money. In the context of systems this can help find patterns like saving money or spending too much. This adds a layer of intelligence to how financial things are analyzed.

Sharma and Singh made a website in 2021 that helps people keep track of what they spend their money on. This system is easy to use. Help people manage their finances. It does not use Artificial Intelligence and does not give people advanced analysis or predictions about their money.

Identified Research Gaps

From these studies we can see that there are some problems:

Lack of Intelligent Insights:

Most systems just. Show financial data without looking at it to give people good ideas.

Limited Personalization:

These systems give people advice rather than suggestions that are just for them based on how they handle their money.

No Real-Time Alert Systems:

People are not told away when they spend too much money or go over their budget, which makes it harder for them to control their finances.

Absence of Integrated AI Advisory:

Systems that use Artificial Intelligence to give advice and systems that track finances exist separately. There is no single platform that combines both things. Financial management systems and Artificial Intelligence can be used together to make a system. Artificial Intelligence can help financial management systems by giving people advice and helping them make good financial decisions. Financial management systems can help Artificial Intelligence by giving it the data it needs to make predictions and give good advice.

III. PROBLEM STATEMENT

People have a lot of trouble managing their money even though there are tools available to help them. Most of the apps there only do simple things like record what you spend and show you a basic summary. This is not enough to help you make decisions about your money.

One big problem is that it is hard to keep track of where your money's going. You can write down what you spend. It is hard to understand what it all means. If you do not really look at your spending, you will not know what you are wasting your money on or how you can spend it better.

Another issue is that people do not really know how they spend their money. The systems we have now do not tell you things like what you spend the money on or if you are spending more than you used to. So, people do not really know their spending habits. That can cause problems with their budget.

Financial management tools also do not warn you when you are spending much money. If you go over your budget or get close to it, you will not get a warning. This means you might spend a lot of money because you do not know any better.

Most financial apps do not give you advice that's just for you. They just give you reports that are the same for everyone. If you do not get advice that is tailored to your situation you will not be able to make the choices about your money.

The thing is the tools we have now to manage our money are not very good. They do not help you keep track of what you spend, they do not analyze what you do. They do not give you good advice.

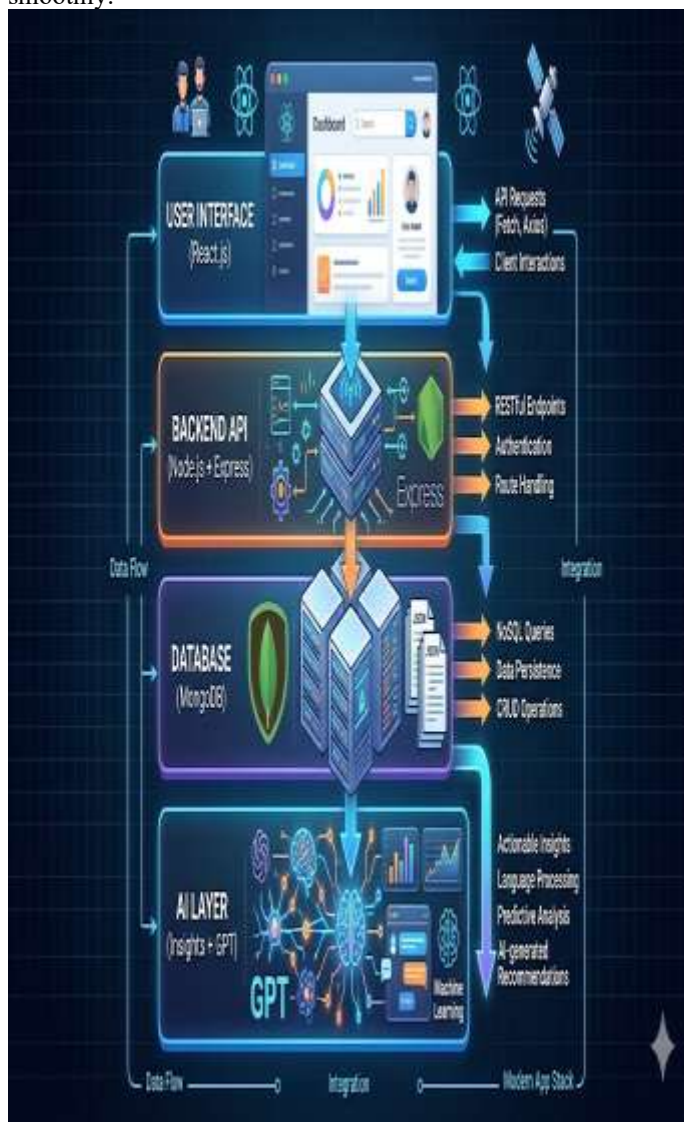
We really need a system that can help us manage our money better. Financial management systems should be able to track what we spend looking at how we behave, give us useful information and tell us what we can do to make better choices about our money. This would really help people make decisions about their financial management.

IV. PROPOSED SYSTEM

The Smart Plan AI system is a web application that uses web technologies and Artificial Intelligence to help people manage their money. It is built with a stack, which includes MongoDB, Express.js, React.js and Node.js and it has a special AI layer that analyzes data and makes recommendations.

A. System Architecture

The system is made up of different layers each with its own job and they all work together to make sure everything runs smoothly.



Architecture Explanation

The User Interface, which is built with React.js, is where people interact with the Smart Plan AI system. It is easy to use and helps people manage their money by looking at dashboards and getting insights from the AI.

The Backend API, which is built with Node.js and Express, handles all the business logic processes, requests from users and talks to the database. It also makes sure that authorized people can access the system.

The Database, which is MongoDB, stores all the user data, including transactions, budgets and settings. It is good at storing and retrieving data.

The AI Layer, which includes Insights and GPT, looks at data to find patterns, make recommendations and power the AI financial advisor.

B. System Components

1. Authentication Module

This module makes sure that authorized people can use the Smart Plan AI system.

It lets people register and log in. It uses a special kind of authentication called JWT to keep sessions secure.

It also makes sure that each person can only see their data, which helps keep everything secure and personalized.

2. Transaction Module

This module is the core of the Smart Plan AI system, where people can manage their data.

People can add, edit and delete transactions. They can categorize them like food or travel.

The data is. Linked to each individual user, which helps with financial analysis.

3. Budget Module

This module helps people control their spending.

They can set budgets for each month, or category, and the Smart Plan AI system will track their spending and alert them if they go over their limits.

This helps people avoid overspending and be more disciplined with their money.

4. Insights Module

This module is part of the Smart Plan AI system.

It looks at how people spend their money and find patterns.

It can detect high expenses and make smart suggestions for saving money.

It turns data into useful financial insights.

5. Email Alert Module

This module sends automated notifications to people.

It alerts them if they go over their budget limits and it sends them a summary of their finances each month.

It also notifies them about updates to the Smart Plan AI system.

V. METHODOLOGY

The Smart Plan AI system follows an step-by-step approach to turn financial data into useful insights and advice. The process has five stages: data collection, data processing, data analysis, prediction and AI interaction.

1. Data Collection

The first step is to gather data from users.

Users manually enter their transactions through the interface.

Each transaction includes:

- * Amount
- * Type (income/expense)
- * Category (Food, Travel, etc.)
- * Description

* Date

This step makes sure all financial activities are recorded properly. The system's accuracy depends on the data entered by the user. This data is the foundation for analysis.

2. Data Processing

The system then. Organizes the data.
Transactions are grouped by type and category.
Data is. Validated.

Information is stored in a MongoDB database.

The system also calculates totals (income, total expenses, etc.).

This step turns data into a format that's easy to analyze. Proper grouping helps identify spending patterns. Make further calculations simpler.

3. Data Analysis

The system analyzes data to generate insights.

There are two types of analysis:

* Rule-Based Analysis:

- * Identifies overspending

- * Finds the spending category

- * Shows trends

* Sentiment Analysis:

- * Uses transaction descriptions to understand behavior

- * Classifies behavior as saving, necessary spending) or negative (impulsive or high spending)

This stage makes the system smarter. It doesn't just show data; it interprets it to provide insights and suggestions for better financial management.

4. Prediction

The system estimates future financial behavior using data.
It uses transaction data.

It calculates monthly expenses.

It predicts expected spending.

Prediction helps users plan their finances effectively. Although simple statistical methods are used (like averages) they provide an estimate for budgeting and financial planning.

5. AI Interaction

This stage enables interaction between the user and the AI system.

Users can ask questions.
The GPT-based advisor processes queries.

The system generates responses based on:

- * User data

- * Financial patterns

This feature makes the system more user-friendly by providing a conversational interface. It acts as a financial assistant offering real-time advice and recommendations.

VI. IMPLEMENTATION

The Smart Plan AI system is made using the stack. This gives us an efficient way to build modern web applications. Each part of the stack does a job, so everything works together smoothly.

Technology Stack Used

1. Frontend: React.js with Tailwind CSS

We use React.js to build the front end of the system. React.js is a tool for making interactive user interfaces.

React does an important thing:

It lets us break down the interface into smaller parts

It helps the interface load quickly

It makes it easy to manage the state of the interface

We also use Tailwind CSS to make the interface look good.

Tailwind CSS helps us make the interface work well on devices

It lets us make a dark mode for the interface

Explanation:

The frontend makes it easy for users to manage their money by looking at dashboards and using the AI features.

2. Backend: Node.js and Express.js

We use Node.js and Express.js to build the backend. The backend handles the logic of the system.

Node.js does an important thing:

It helps the system handle many tasks at the same time

It makes the system fast and efficient

Express.js helps us build APIs and handle requests.

It makes it easy to build APIs

It helps us handle routing and middleware

Explanation:

The backend is like the brain of the system. It handles business logic, authentication and communication between the frontend and database.

3. Database: MongoDB

We use MongoDB to store user data. MongoDB is a NoSQL database.

It stores:

User information

Transactions

Budgets

Settings

MongoDB has a good feature:

It can handle a lot of data

It is very scalable

It makes it easy to retrieve data

Explanation:

MongoDB is good at handling data. It makes it easy to change the structure of the data.

4. AI Integration: Sentiment Analysis and GPT API

We use AI to make the system smarter.

Sentiment Analysis looks at transaction descriptions. Classifies spending behavior.

The GPT API makes it possible to have conversations with the system.

It gives users personalized financial advice

Explanation:

The AI component makes the system more than a tracker. It makes it an intelligent financial assistant.

5. Email System: Node mailer / API

We use Node mailer to send automated emails.

It sends:

Budget alerts

summaries

Notifications

Explanation:

This makes sure users stay informed when they are not using the application.

Key Implementation Features

1. RESTful API Design

The backend follows REST principles:

GET means fetch data

POST means to create data

PUT means update data

DELETE means remove data

Explanation:

This makes sure the communication between the frontend and backend is standardized and scalable.

2. Modular Architecture

The system is divided into modules:

Authentication

Transactions

Budget

Insights

AI Advisor

Explanation:

This makes the system:

Easy to maintain

Easy to reuse code

Scalable

3. Secure Authentication

We use JWT to protect API routes.

This makes sure users can only access their data.

Explanation:

Security is very important because financial data is sensitive. This makes sure data is private and protected.

4. Real-Time Data Updates

The interface updates dynamically when data changes.

The dashboard shows the transactions instantly.

Explanation:

This gives users real-time experience. It makes the system more usable. Helps with decision-making.

VII. RESULTS AND DISCUSSION

The system was tested in different situations.

A. Results

- * Tracking of income and expenses
- * Successful generation of insights based on AI
- * Detection of overspending patterns
- * Efficient email alert system

B. Discussion

The system shows:

- * Improved understanding of finances
- * Less manual work needed
- * User engagement

However, there are some limitations:

- * AI insights rely partly on rules
- * No real-time integration, with bank accounts

VIII. CONCLUSION

This paper is about Smart Plan AI, a financial management system that uses Artificial Intelligence and data to help people manage their money. Smart Plan AI does more than store financial information, it looks at the information to find useful patterns and gives users advice on what to do. This helps people understand how they spend their money and make financial decisions.

Smart Plan AI uses a lot of technologies like the MERN stack, Artificial Intelligence to analyze data and automated emails all in one place. This makes it better than financial management tools that are not smart and do not give users personalized feedback. Smart Plan AI has features like Artificial Intelligence insights, budget warnings and a financial advisor that uses GPT, which makes it more useful and easier to use.

Smart Plan AI is also designed to be easy to use and can be used by different people like students, workers and small business owners. The system is made to be flexible so it can be improved in the future, and the interface is simple so anyone can use it even if they are not good with technology.

Overall Smart Plan AI shows how new technologies can be used together to create an automated financial management system that helps people make good financial decisions in the real world with Smart Plan AI.

IX. FUTURE SCOPE

Future enhancements include:

The system will get some features.

These are things like machine learning models.

We will also work on mobile application development and Bank API integration.

The system will be able to do time predictive analytics.

The AI advisor's capabilities will be enhanced too. The AI advisor will be better.

These are the enhancements to the system, including the advanced machine learning models and the enhanced AI advisor capabilities.

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