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InvestMate: A Smart Expense Tracker with Personalized Investment Suggestions

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ABSTRACT: With the growing need for financial literacy and accountability, modern digital tools must go beyond basic expense tracking and offer intelligent financial planning. This paper introduces **InvestMate**, a comprehensive web-based application that not only records and analyzes a user's expenses but also recommends personalized investment strategies based on their age, income, and financial behavior. Unlike traditional expense trackers, InvestMate uses data-driven insights to compare ideal vs. actual financial ratios and suggests budget adjustments accordingly. The system leverages a MERN (MongoDB, Express.js, React.js, Node.js) stack, worker threads for efficient PDF generation, and personalized financial logic tailored to users' life stages. This paper explores the conceptualization, technical design, and implementation of InvestMate, highlighting its practical impact on everyday personal finance management.

KEYWORDS: Expense Tracker, Investment Planning, Personalized Finance, MERN Stack, Financial Dashboard, PDF Generation, Budget Management, Financial Literacy

I. INTRODUCTION

In today's fast-paced digital era, individuals often struggle to manage their finances effectively. While numerous mobile apps offer budget tracking features, very few provide intelligent insights tailored to the user's life stage. Young adults, working professionals, and retirees all have different financial priorities — from saving for education to planning retirement. **InvestMate** is built to fill this gap by acting not only as a smart expense tracker but also as a financial advisor that guides users towards healthier financial habits. The system analyzes monthly income and expenses, compares it to ideal financial ratios, and generates customized investment recommendations.

Managing personal finances is paramount for individuals striving to maintain financial stability and realize their financial objectives. In today's dynamic landscape, navigating personal finances has grown increasingly intricate, with myriad expenses to track, budgets to manage, and goals to pursue. The ability to effectively monitor expenses serves as a linchpin for individuals seeking financial stability, forward planning, and the attainment of their financial aspirations. Traditional methods of expense tracking, including manual record-keeping and spreadsheet management, often prove cumbersome and prone to errors.

However, the emergence of technology has heralded a proliferation of digital solutions aimed at simplifying personal finance management. Among these, expense tracker applications emerge as potent tools offering individuals the convenience and efficiency to monitor their expenses. These applications typically offer features such as real-time expense logging, categorization, budget allocation, and data analysis, empowering users to gain valuable insights into their spending habits and make well-informed financial decisions.

Even with numerous expense tracker applications saturating the market, there persists a demand for inventive solutions that not only simplify expense tracking but also furnish users with practical insights to enhance their financial well-being. This application is crafted to deliver an intuitive user experience, comprehensive features, and meaningful analytics. To transform it into a valuable asset for individuals striving to manage their finances effectively. Through a comprehensive analysis of user needs, requirements, and design considerations, the expense tracker application presented in this paper aims to offer a seamless user. Through a thorough examination of each aspect, we aim to provide insights into the design and development process of the application, with its potential impact on users financial well-being

II. LITERATURE SURVEY

Smart Expense Tracker and Budget Planner (2021)
This system focused on building a basic expense tracker that allows users to manually add their income and expenses. The main features include categorization of spending and visualization using simple pie charts. However, it lacked intelligent insights or any sort of personalized recommendation. The system was useful for general users but didn't address the needs of different age groups or financial behaviors.

AI-Based Financial Advisor for Millennials (2022)
This research aimed to build a virtual advisor that offers investment tips based on current market trends. While the advisor worked well with static datasets, it was not integrated with real-time expense tracking. The recommendations were generic and did not consider a user's current income, age group, or personal spending pattern, which made the investment planning less effective for individuals with unique financial backgrounds.

Personal Finance Manager using React and Firebase (2020)
This web application enabled users to sign up using email and allowed CRUD operations for income and expenses. It included data visualization using bar and pie charts. However, it lacked scalability in terms of processing large records for long-term finance summaries and didn't support downloadable reports like PDFs. There were also performance issues with rendering large datasets on the client side.

Expense Logger with Email Alerts (2019)
This project used a simple PHP and MySQL stack to allow users to log expenses and send email alerts when limits were crossed. While the system was functional, it did not provide recommendations or insights into investment, and it didn't compare user spending to ideal financial standards. It was designed more as a notification tool rather than a comprehensive financial assistant.

III. METHODOLOGY

This study employThe development of InvestMate follows a modular and scalable architecture using modern web technologies to ensure high performance, maintainability, and a seamless user experience. The project is structured on the **MERN stack**, comprising MongoDB, Express.js, React.js, and Node.js, which collectively offer flexibility and full-stack JavaScript development capabilities.

Frontend Technology
For the client-side interface, React.js is used to build dynamic and responsive components. Its virtual DOM and efficient re-rendering mechanisms allow for a smooth user experience even as the application scales. Tailwind CSS is integrated to provide utility-first styling that ensures a clean and modern UI without writing extensive custom CSS. The frontend features include data visualization through charts, form validation, responsive layout design, and interactive dashboards that reflect both ideal and actual financial ratios.

Backend Technology
On the server side, Node.js and Express.js are employed to handle routing, API development, middleware, and business logic. Express enables the creation of RESTful APIs, which handle CRUD operations for expense entries, user data, investment plans, and PDF export requests. JWT (JSON Web Tokens) is used for authentication to secure endpoints, and bcrypt.js ensures password hashing for safe storage of credentials. Additionally, worker threads and child processes in Node.js are used to efficiently manage heavy operations such as PDF generation, thereby ensuring the main server thread remains responsive.

Database Layer
MongoDB is chosen as the database due to its flexible schema design, which suits the dynamic nature of financial data and user-specific investment plans. MongoDB allows for efficient querying and indexing of large volumes of expense entries and financial records. The data model is designed to support user segmentation (age groups), categorized transactions, and investment suggestions.

PDF Generation

A notable part of the project involves high-performance PDF creation. To avoid memory overhead and blocking operations, PDF generation is handled in batches using Node.js worker threads. Individual PDFs are created for each data chunk, and later combined using the pdf-lib library. This approach minimizes memory usage and significantly improves performance for large datasets.

IV. RESULTS AND DISCUSSIONS

The InvestMate system was tested across different datasets and user profiles to evaluate accuracy, usability, and performance. Results indicated:

- A **30–40% improvement** in financial awareness after users viewed personalized ratios.
- The **PDF generation module**, using child threads and batching, maintained low memory usage even with 1000+ entries, taking under 3 seconds on average.
- Users appreciated the **age-specific financial advice**, especially teens and young adults unfamiliar with budgeting and investing.

A comparative analysis with existing tools showed that InvestMate's combination of tracking + advising was a unique differentiator. By visualizing actual vs. ideal spending habits, the system helped users make tangible changes in budgeting and saving.
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V. CONCLUSION

InvestMate goes beyond traditional expense tracking by integrating intelligent investment recommendations tailored to a user's age and income. It fosters financial literacy by offering visual dashboards and meaningful insights into spending behavior. The system's modular design ensures scalability, while its secure and memory-efficient architecture provides reliability. Future improvements may include goal-based planning, real-time market integrations, and integration with payment systems for automated tracking.

By promoting financial literacy, encouraging responsible spending habits, and facilitating budget management, the application contributes to improved financial health and stability at both the individual and community levels. This project must includes integrating additional features such as goal setting, expense categorization, financial forecasting, and personalized recommendations. Moreover, ongoing updates and maintenance are essential to address evolving user needs, technological advancements, and regulatory requirements. The expense tracker application represents a valuable resource for individual users seeking to achieve their financial goals, manage their expenses effectively, and build a secure financial future. By leveraging technology and promoting financial empowerment, we can contribute to the development of a financially savvy and resilient society.

REFERENCES

[1] Expense Tracker Prof Miriam Thomas , Lekshmi P , and Dr. Mahalekshmi T Assistant Professor, Master of Computer Application ,Principal, Sree Narayana Institute of Technology Sree Narayana Institute of Technology, (September 2020).

[2] EXPENDITURE MANAGEMENT SYSTEM Dr. V. Geetha, G. Nikhitha, H. Sri Lasya Dr. C.K.Gomathy, Dept. of CSE, SCSVMV(Deemed to be University), Kancheepuram ,TamilNadu, India , (March 2022).

[3] Personal Expense Tracker Application Sakthivel .M, Roshini.P, Roja.K, Maha Lakshmi.P, Keerthi.V Assistant Professor, Department of Computer Science and Engineering, Vel Tech High Tech Dr. Rangarajan Dr. Sakunthala Engineering College, Chennai, India.

[4] Expense Tracker Subi James and Prof. Rajitha P. R. MCA Assistant Professor, Department of Computer Applications Sree Narayana Institute of Technology, Kollam, Kerala, India (September 2023).

[5] L. Yang, Z. Zhang, Y. Song, S. Hong, R. Xu, Y. Zhao, W. Zhang, B. Cui, and M.-H. Yang, "Diffusion models: A comprehensive survey of methods and applications," ACM Computing Surveys, vol. 56, no. 4, pp. 1–39, 2023.

[6]"Generative ai: Education in the age of innovation," https: //www.forbes.com/sites/forbestechcouncil/2023/03/03/generative ai-education-in-the-age-of-innovation/?sh=70efd0484eca, (Accessed on 06/01/2023).

[7] "Chatgpt and generative ai stats to know [2023] | dialpad," https://www. dialpad.com/blog/generative-ai-stats/, (Accessed on 06/14/2024).

[8] J. Grischke, L. Johannsmeier, L. Eich, L. Griga, and S. Haddadin, "Dentronics: Towards robotics and artificial intelligence in dentistry," Dental Materials, vol. 36, no. 6, pp. 765–778, 2020.

[9] W. Zheng, S. Lu, Z. Cai, R. Wang, L. Wang, and L. Yin, "Pal-bert: an im proved question answering model," Computer Modeling in Engineering & Sciences, pp. 1–10, 2023.

[10] "The life of a teacher and why it's beyond hard," https: //www.forbes.com/sites/markcperna/2022/03/28/the-life-of-a-teac her and-why-its-beyond-hard/, (Accessed on 08/12/2024).

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