



MONEYMINDER - A GUIDE TO FINANCIAL CLARITY

¹Shruthi B M, ²Saathvik M V, ³Manushreshtha B L, ⁴Adithya P Patel, ⁵Gokul C S

¹ Assistant Professor,

^{2,3,4,5} B.E Student,

Dept. of Computer Science & Engineering,

JSS Science & Technology University, Mysore, India - 570006

Abstract: The project's goal is to create a productive web-based application for tracking expenses that classifies expenses using a BERT model. With the help of this application, users can effortlessly track, organise, and evaluate their spending. The intuitive interface facilitates effortless data entry and expense management, and private is protected by safe authentication procedures. Insights into spending trends and budget allocations are provided by advanced features like summaries of expenses, data visualization, and customizable categories. With an emphasis on integrating the BERT model for expense categorization, the report goes into detail about the development process, covering system architecture, design methodologies, implementation strategies, and technology utilization. It places a strong emphasis on responsiveness across various devices, usability, and accessibility. The report also looks at future prospects and possible improvements, with the goal of leveraging the BERT model to further enhance the application's features and capabilities. By effectively classifying and analyzing expenses, the expense tracker web application not only helps with expense management but also encourages responsible financial behaviour and financial literacy.

Index Terms – Finance, Transaction, Budget Tracking & Analysis, BERT model, Holt-Winters model, react.js, node.js,

I. INTRODUCTION

The MoneyMinder website stands out as an essential tool for effectively tracking expenses in a time of financial obligations. The platform's intuitive interface enables users to efficiently handle their financial withdrawals, beginning with a quick account setup procedure. The dashboard gives users a thorough overview of all of their financial activity in one central location. An easily navigable form makes it simple for users to enter pertinent information and personalise category names when recording expenses. The platform employs cutting-edge technology, like the BERT model, to automatically classify expenses, guaranteeing precision and effectiveness in monitoring expenditures. The Holt-Winters model is employed for providing financial forecasts which allows the users to understand their future expenses.

Problem Statement

To provide a purpose-built, user-centric platform for comprehensive financial management. The focus is on addressing the challenges individuals encounter in monitoring and controlling their financial outflows by offering a streamlined and intuitive tool.

Aim

The project's goal is to create a user-friendly web application for thorough financial management that addresses the difficulties people have keeping track of and managing their out-of-pocket expenses. The goal is

to give users a simple and easy-to-use tool for managing their finances by incorporating automatic categorization based on the BERT model and supporting portable devices.

Objectives

The main objectives considered in this project are as follows:

- To develop a Web Application that enables users to keep track of their expenses.
- To provide an automatic categorization feature that classifies expenses into various categories.
- Offer portable device compatibility, allowing users to update expenses anywhere.
- To provide insightful reports and visualizations.
- Offer customisation option such as budget limit.
- Allow users to tailor the application to their individual financial goals.

II. LITERATURE SURVEY

The paper titled “TrackEZ Expense Tracker” by Priyanka Bhatele, Divya Mahajan, Bhushan Mahajan, Divesh Mahajan, Nikhil Mahajan, Prasad Mahajan depicts an automated expense tracking application using React, Redux, Node.js, and MongoDB. It offers features like expense tracking, verification workflows, and report generation. However, it faces limitations in inability to detect interest regions, and manual verification. Further improvements could improve user experience.

The paper titled “Expense: A Smart Approach to Track Everyday Expense” by Shahed Anzarus Sabab, Sadman Saumik Islam, Md. Jewel Rana, Monir Hossain introduces an Android app called eExpense, which uses optical character recognition to automatically track expenses and income. It extracts text from receipt images and reads SMS messages from bank accounts. However, it faces limitations such as poor performance with low-quality images, inability to detect receipt regions automatically, and OCR's difficulties in low light conditions.

The paper titled “A Study on a Smart Way to track Expenses: from efficiency to effective procurement” by Aman Pathak, Ashish Pathak, Vishwadeepak Singh Baghel discusses an automated web-based system using React, Node.js, and MongoDB for efficient procurement expense tracking. It proposes an OCR-based system to extract text from bill/receipt images, categorize expenses, and generate insights. However, it acknowledges limitations like low OCR accuracy, inability to detect interest regions, and manual verification of extracted data.

The paper titled “Text Categorization Research Based on Cluster Idea” by Jialun Lin, Xiaoling Li, Yuan Jiao discusses text categorization using clustering techniques on an expenses dataset. It proposes a model using k-means clustering and a multi-class SVM classifier. The model achieved slightly higher accuracy than standard SVM. The study suggests leveraging full text content and larger datasets for improved clustering and classification performance.

The paper titled “Machine learning based Time series prediction using Holt-Winters Exponential Smoothing with Multiplicative Seasonality” by Cvsr Syavasya; A. Lakshmi Muddana discusses how revenue management systems, like aircraft capacity planning, accurate forecasting is essential. The time series prediction algorithms for Oracle Machine Learning can now reliably forecast the number of passengers. The Holt-Winters exponential model performs better than other methods at properly predicting passenger volume because it has multiplicative seasonality and a multiplicative propensity. This study emphasises how crucial precise forecasting is to increasing income and resolving data-driven problems.

III. EXISTING METHODS

The existing expense tracking systems often lack several critical functionalities, leading to limitations in providing comprehensive financial management solutions.

Primarily, the absence of automatic categorization stands as a significant drawback. Users manually input expenses without automated classification, leading to time-consuming and error-prone data entry. This limitation hampers efficiency and the ability to gain quick insights into spending habits.

Moreover, the absence of financial goal tracking within these systems inhibits users from setting, monitoring, and achieving their financial objectives. Lack of goal-oriented features limits users in planning and aligning their expenses with long-term financial ambitions.

Interactive data visualizations play a pivotal role in understanding expenditure patterns. The absence of such visualizations in the existing systems restricts users from gaining insightful perspectives on their spending behaviors, hindering informed decision-making.

Additionally, the inability to track subscriptions efficiently within these systems poses challenges in managing recurring expenses. Users may struggle to monitor subscription-based spending, leading to oversights and potential financial strain, which brings out the need of a standalone application to offer all these features with portability and ease of usage as its main features.

IV. PROPOSED WORK

The proposed MoneyMinder expense tracker is a web-based application that combines the Holt Winters model for financial forecasting and the BERT model for expense categorization. Users can add update their expenses from anywhere, improving accuracy and convenience, thanks to its compatibility with portable devices. Accurate financial forecasting is made possible by the integration with the Holt Winters model, which also gives users insight into potential spending trends.

Integration with BERT eliminates the need to maintain Excel sheets and CSV files, improving the accuracy and efficiency of the expense tracking process. Utilising the potent categorization capabilities of the BERT model, the system provides a user-friendly means of monitoring daily expenditures and streamlines the computation of income and expenses. It is crucial to recognise that the suggested system has a drawback, namely that it does not include date-specific reminders. In summary, the proposed system addresses the limitations of the existing system by offering portability, better user-friendliness, and automated calculations, even though it lacks reminders for specific dates.

Holt-Winters model

Developed by Peter Winters and Charles Holt, the Holt-Winters model is a potent technique for time series forecasting. It's especially helpful in financial analysis when extrapolating past data trends into the future is necessary. This model takes into account three factors: seasonality, trend, and level, extending the concept of simple exponential smoothing. The baseline value that the data varies around is represented by Level (L). The most recent observation is used for updating, and a smoothing parameter is applied.

The direction and magnitude of the data's movement over time are captured by the trend (T). To level it, an analogous exponential smoothing method is used for updating. Seasonality (S) takes into consideration cyclical patterns in the data that appear at regular intervals. This element is especially crucial for financial data, as certain time periods may show recurring patterns because of things like market trends, sales cycles, or holidays. The Holt-Winters model makes use of three smoothing parameters: seasonality (γ ; gamma), trend (β ; beta), and level (α ; alpha). For the purpose of updating the level, trend, and seasonality components, respectively, these parameters establish the weights of the latest observations. Recursive equations are used in the model to update the seasonal, trend, and level components, which enables it to adjust to changes in the data over time. These elements enable the Holt-Winters model to accommodate both short- and long-term trends, which makes it appropriate for financial data forecasting.

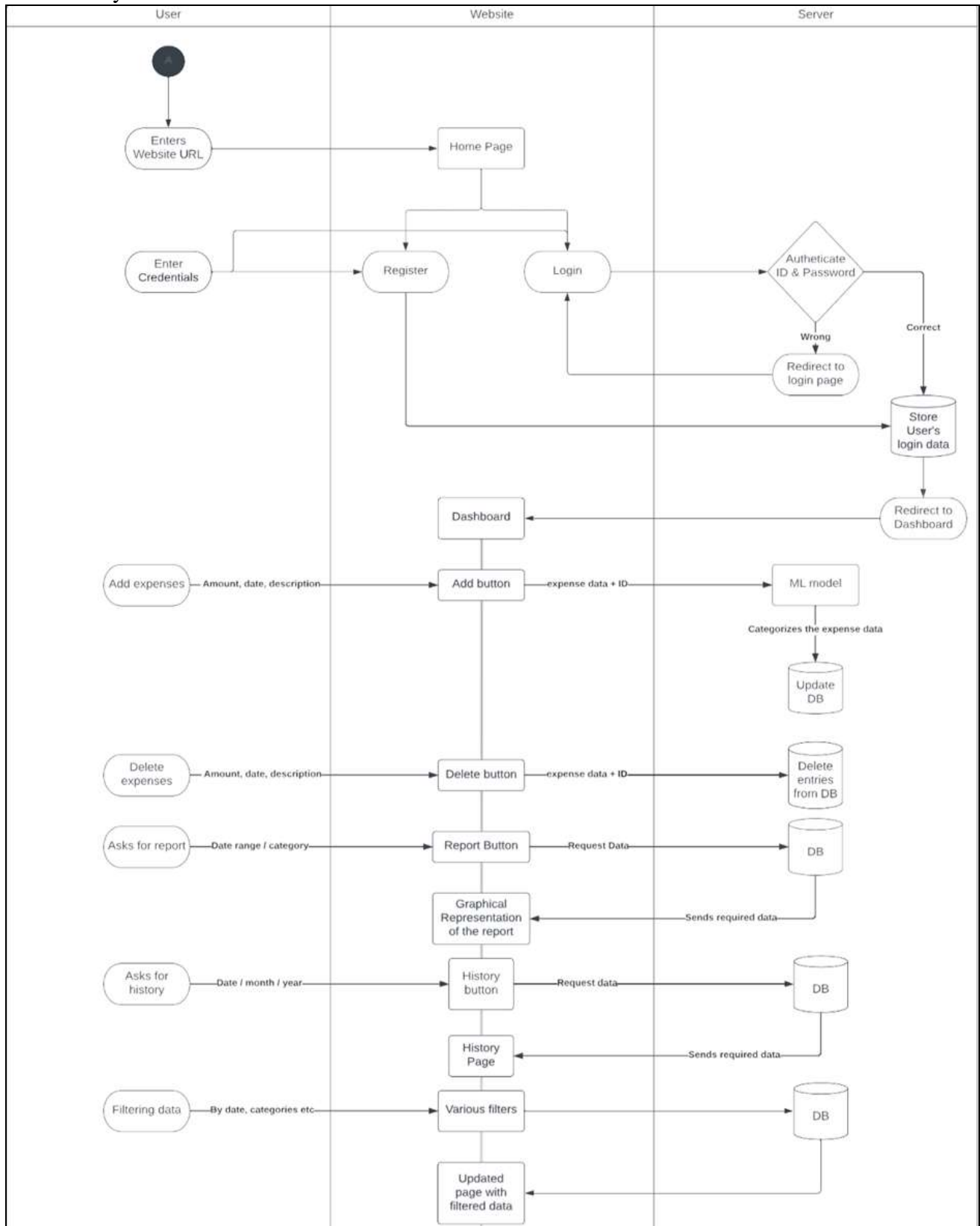
In addition, the Holt-Winters model offers several variants according to the kind of seasonality found in the data. For instance, when seasonality is multiplicative, the seasonal component is multiplied and added to the level and trend, but when seasonality is additive, it is added to both. The Holt-Winters model's capacity to produce forecasts that take seasonality and trend into account is one of its advantages, making it appropriate for datasets with intricate patterns. It may, however, perform poorly with data that has anomalies or unclear patterns and needs careful parameter tuning. To sum up, the Holt-Winters model is a useful tool for financial analysts and planners because it makes it possible to accurately forecast future trends while identifying seasonal patterns and short-term fluctuations in the data.

BERT model

The state-of-the-art natural language processing (NLP) model known as the BERT model, or Bidirectional Encoder Representations from Transformers, has transformed a number of tasks, including the categorization of expenses on the Expense Tracker Website. BERT improves the efficiency and accuracy of expense tracking by accurately classifying expenses based on their descriptions by bidirectionally understanding the context of words in a sentence. Because of its sophisticated features, the platform can classify expenses automatically, saving users time and ensuring that financial data is consistently organized. The MoneyMinder Website provides users with a smooth experience by utilizing BERT to help them manage their finances with accurate categorization and insightful analysis.

System Architecture

Flow of Money Minder website is as follows.



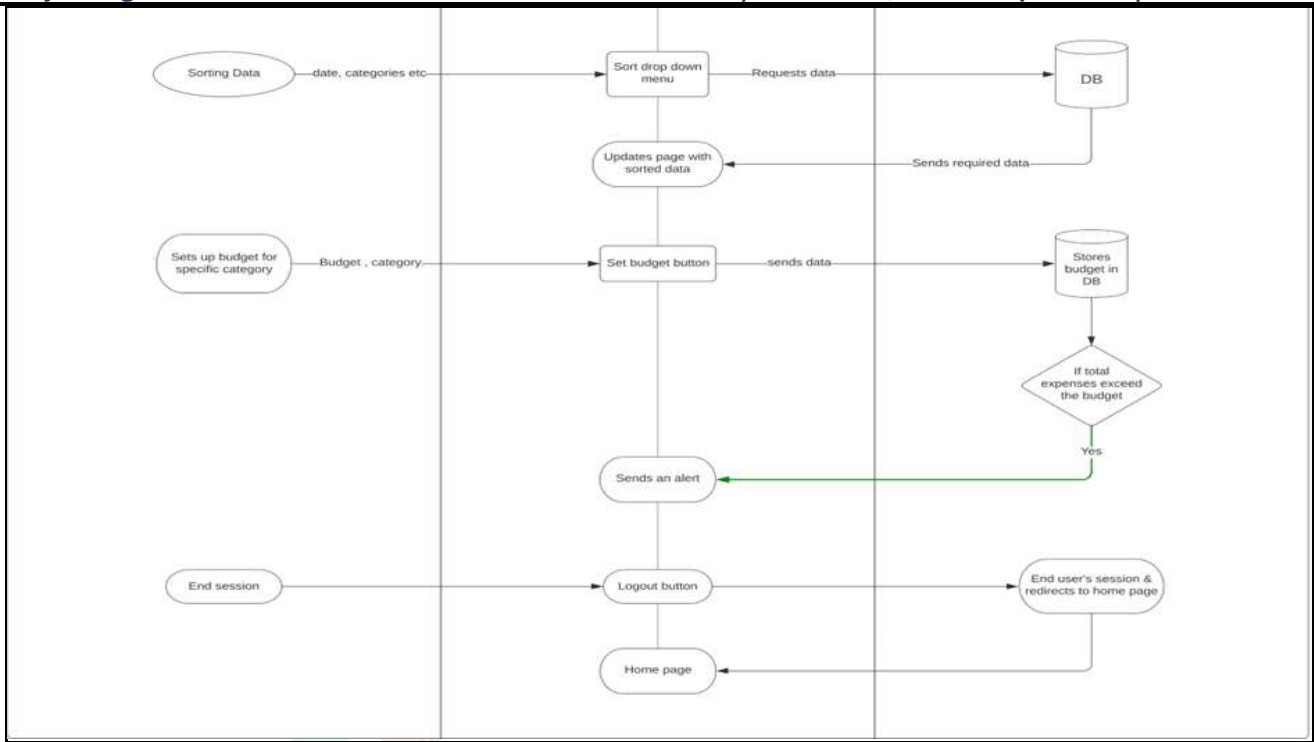


Fig.1 – System Design

Methodology

- **SignUp/Login page**

If the user uses the website for the first time then he should create an account otherwise he should login to use the features of the application.



Fig.2 – Sign Up

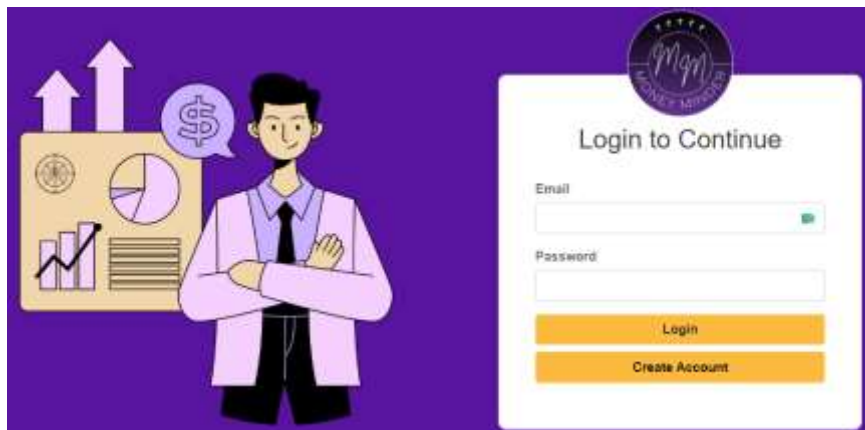


Fig.3 – Login

- **Home page**

After successful login/signup the user navigated to the home page. Home page implemented as follows.



Fig.3 – Home page

- **Dashboard page**

The Dashboard page lets the users to add or delete their expenses. They also get to see their expense history by applying filters which is displayed in a form of a table. Customized filters enables flexibility and to get more detailed data.

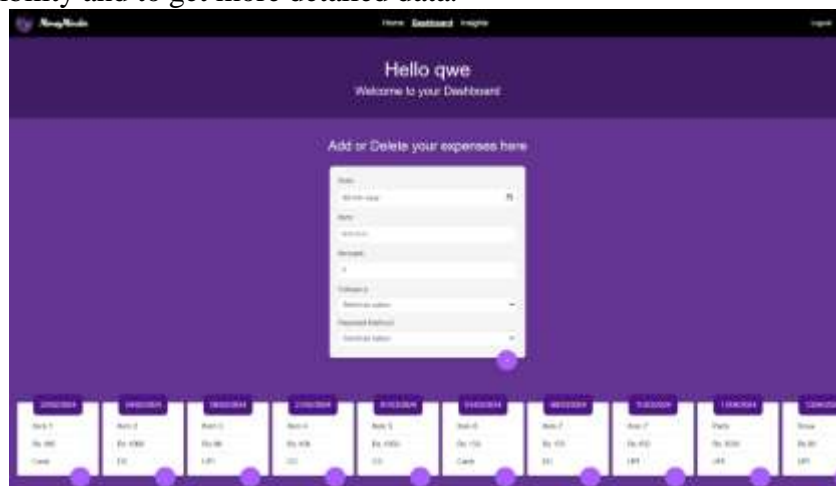


Fig.4 – Dashboard - Adding/Deleting Expenses

On adding an expense, a card for each transaction is displayed by which the user can navigate by using the horizontal scrollbar.

ITEM	AMOUNT IN RS.	DATE	CATEGORY
Item 1	100	23/03/24	Health
Item 2	1500	24/03/24	Beverage
Item 3	80	02/03/24	Food
Item 4	400	27/03/24	Entertainment
Item 5	1000	11/03/24	Travel
Item 6	180	15/03/24	Housing
Item 7	150	03/03/24	Maintenance
Item 7	400	11/03/24	Housing
Party	3000	10/03/24	Entertainment
Dinner	80	13/03/24	Food
Movie	800	15/03/24	Entertainment

Fig.5 Dashboard page - Expense history

- **Insights Page**

The Insights page gives detailed insights of the users' expenses. The user can filter the insights w.r.t month and can get breakup of expenses based on category and payment type.

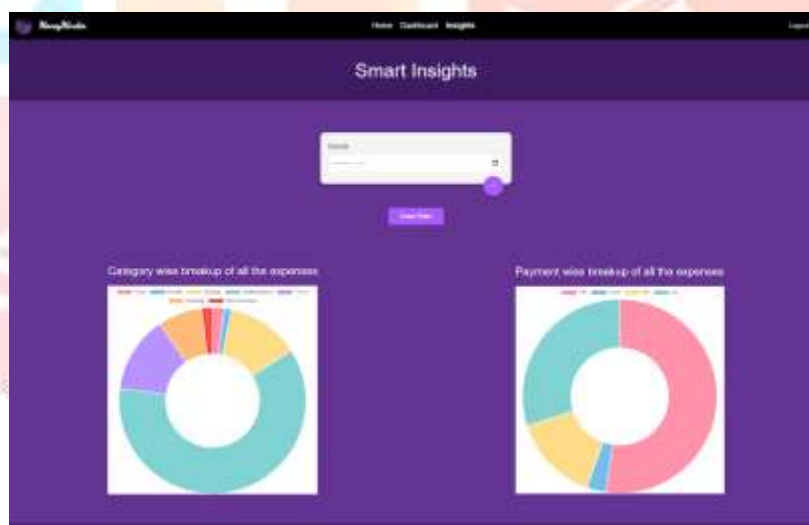


Fig.8 Insights Page - based on category and payment type

The users also get a detailed month wise breakup of their expenses and budget along with the predicted expense forecast during the current year.



Fig.8 Insights Page - based on category and payment type

CONCLUSION

When it comes to managing personal finances, the MoneyMinder website seamlessly combines cutting-edge technology with an easy-to-use interface. Making user-friendliness a top priority guarantees accessibility for people with varying technological backgrounds. A seamless user experience is offered by the ordered dashboard and expedited account creation process. Vibrant visualisations and real-time updates provide quick insights into spending trends and budgetary progress. The platform's dedication to sound financial management is demonstrated by the timely reminders for monthly expenses and budget limits that are included. Users are given strong tools to take charge of their financial futures with features like automatic expense categorization using the BERT model and financial forecasting using the Holt-Winters model. By enabling people to make wise and responsible financial decisions, the MoneyMinder Website is poised to transform personal finance management.

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