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Student Budget Planner: A Web-Based Financial Management System Using Machine Learning

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Abstract- Financial management is an essential aspect of student life, yet many students face difficulties in tracking expenses, maintaining budgets, and planning future spending. This research presents the development of a Student Budget Planner, a web-based financial management application designed to assist students in managing their income and expenses effectively. The system is developed using Python and integrates Streamlit for the user interface, SQLite for database management, Pandas and NumPy for data processing, Matplotlib for visualization, and Scikit-learn for machine learning-based expense prediction. The application enables users to record transactions, categorize expenses, analyze spending patterns through graphical representations, and forecast future expenses using a Linear Regression model. The proposed system offers a simple, interactive, and intelligent solution for personal financial management while providing practical exposure to software development, data analytics, and machine learning concepts. The results demonstrate that the application successfully improves financial awareness and budgeting efficiency among students.

Keywords: Student Budget Planner, Financial Management, Expense Tracking, Machine Learning, Linear Regression, Streamlit, Python.

I. INTRODUCTION

Financial planning has become increasingly important for students due to rising educational and living expenses. Traditional methods of maintaining expense records, such as notebooks and spreadsheets, are often inefficient, time-consuming, and prone to human error. The growing availability of digital technologies provides opportunities to develop intelligent systems that simplify financial management.

The Student Budget Planner is designed as a web-based application that allows students to record, manage, and analyze their financial transactions digitally. The system provides features including transaction management, expense analytics, and future expense prediction. By integrating machine learning techniques with financial tracking, the application enhances decision-making and promotes better spending habits.

II. PROBLEM STATEMENT

Students frequently encounter challenges in maintaining accurate financial records and controlling expenditures. Existing budgeting methods often lack automation, analytical capabilities, and predictive features. There is a need for a centralized system that can:

- Store financial records digitally
- Categorize and organize expenses
- Provide graphical analysis of spending patterns
- Predict future expenses using historical data

The proposed Student Budget Planner addresses these issues through an integrated financial management platform.

III. OBJECTIVES

The major objectives of this research are:

- To develop a digital budgeting platform for students.
- To simplify financial record management through automation.

- To implement CRUD operations for transaction handling.
- To provide expense analytics using visual representations.
- To predict future expenses using machine learning algorithms.
- To improve financial awareness and planning among students.

IV. LITERATURE REVIEW

Recent studies in personal finance management emphasize the importance of digital budgeting systems for improving financial literacy and spending control. Financial management applications provide users with automated tracking, analytical reporting, and predictive insights. Machine learning techniques such as Linear Regression have been widely used for forecasting financial trends based on historical data.

Modern web-based frameworks and database systems further enhance accessibility and usability of financial applications.

V. METHODOLOGY

The proposed system follows a modular architecture consisting of the following components:

User Interface Module
The graphical user interface is developed using Streamlit, which provides an interactive environment for data entry, transaction viewing, and analytics visualization.

Database Management Module
SQLite is used as the backend database for storing transaction details, including transaction date, category, amount, and transaction type.

Transaction Management Module
The module supports Create, Read, Update, and Delete (CRUD) operations for managing financial records efficiently.

Analytics Module
Pandas and Matplotlib are used to process and visualize expense data. Pie charts and bar graphs provide category-wise expenditure analysis and spending distribution.

Machine Learning Prediction Module
A Linear Regression model from Scikit-learn is trained on historical expense records. The model predicts future expenses based on previous transaction trends, enabling users to make informed budgeting decisions.

VI. SYSTEM REQUIREMENTS

Software Requirements:
- Python
- Streamlit
- SQLite
- Pandas
- NumPy
- Matplotlib
- Scikit-learn
- Visual Studio Code

Hardware Requirements:
- Intel Core i3 Processor or higher
- 4 GB RAM
- 500 MB Storage Space
- Keyboard, Mouse, and Monitor

VII. SYSTEM REQUIREMENTS

The Student Budget Planner is implemented as a Python-based web application. Users can enter income and expense transactions through an interactive interface. Data is stored in SQLite and retrieved dynamically for analysis. The application generates visual reports that display spending behavior across different categories such as Food, Travel, Education, Shopping, Entertainment, and Others.

The machine learning module processes historical expense data and predicts future expenditure using Linear Regression. The predicted value and trend graph help users estimate upcoming financial requirements.

VIII. RESULTS AND DISCUSSION

The developed system successfully demonstrates the integration of financial management and machine learning technologies. Key outcomes include:

- Efficient transaction recording and management.
- Secure storage and retrieval of financial records.
- Graphical representation of spending patterns.
- Improved understanding of expenditure behavior.
- Accurate prediction of future expenses based on historical data.

The visualization module assists users in identifying major spending categories, while the prediction module enhances financial planning capabilities.

Advantages

- User-friendly interface.
- Automated financial tracking.
- Real-time analytics and reporting.
- Intelligent expense prediction.
- Easy deployment and maintenance.
- Educational value for learning software development and machine learning.

Future Scope

Several enhancements can be incorporated into future versions of the system:

- Cloud database integration.
- User authentication and account management.
- Mobile application development.
- AI-based financial recommendations.
- Advanced analytics dashboards.
- PDF and Excel report generation.

These improvements can transform the application into a comprehensive personal finance management platform.

XI. CONCLUSION

The Student Budget Planner provides an effective solution for managing personal finances through digital technologies. The integration of Python, Streamlit, SQLite, data visualization tools, and machine learning techniques creates an intelligent and user-friendly budgeting system. The application enables efficient transaction management, expense analysis, and future expenditure prediction. The project successfully achieves its objectives and demonstrates the practical application of modern software development and machine learning concepts in financial management.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this research work.

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