Ai-Powered Personal Finance Automation System Using Predictive Analytics

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***Abstract*—The advancement of artificial intelligence (AI) has significantly influenced financial technologies, enabling intelligent automation in personal finance management. This paper presents the design and implementation of an AI-powered personal finance automation system that utilizes predictive analytics to forecast user expenses and optimize budgeting strategies. The system integrates machine learning models with financial data processing pipelines to provide actionable insights. Experimental evaluation using real-world inspired datasets demonstrates improved prediction accuracy and enhanced financial decision-making. The proposed system offers a scalable and user-centric solution for modern financial ecosystems.**

***Index Terms*—Artificial Intelligence, Predictive Analytics, Personal Finance, Machine Learning, Financial Forecasting, FinTech**

I. INTRODUCTION

Effective personal financial management is essential for economic stability, yet many individuals struggle with budgeting and expense tracking. Traditional systems rely on manual input and lack predictive capabilities.

Recent developments in AI enable systems to analyze historical financial data and predict future trends. This paper proposes a predictive analytics-based system that automates financial management and enhances decision-making.

II. LITERATURE REVIEW

Existing applications such as Mint and YNAB provide budgeting tools but lack robust predictive capabilities. Research in predictive analytics has focused primarily on stock markets rather than personal finance.
Studies using regression models and time-series forecasting demonstrate potential in financial prediction but lack integration into user-centric systems.

III. SYSTEM DESIGN

3.1 Architecture

The system consists of:

- Data Collection Layer
- Data Processing Layer
- Predictive Analytics Layer
- User Interface Layer

3.2 Features

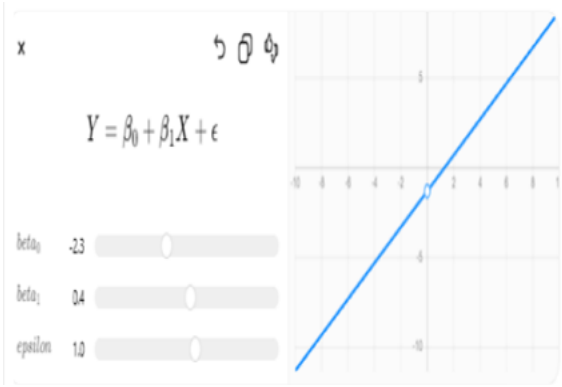
- Automated expense tracking
- Expense forecasting
- Budget recommendations
- Savings optimization

IV. METHODOLOGY

4.1 Data Preprocessing

- Missing value handling
- Data normalization
- Transaction categorization

4.2 Predictive Model



4.3 Workflow

- Input transaction data
- Train model
- Generate predictions
- Provide recommendations

V. DATASET DESCRIPTION

This study uses:

- UCI Machine Learning Repository
- Synthetic personal transaction data

Dataset includes:

- Transaction amount
- Category
- Date
- Income

VI. EXPERIMENTAL SETUP

6.1 Models

- Linear Regression
- Moving Average (Time-Series)

6.2 Metrics

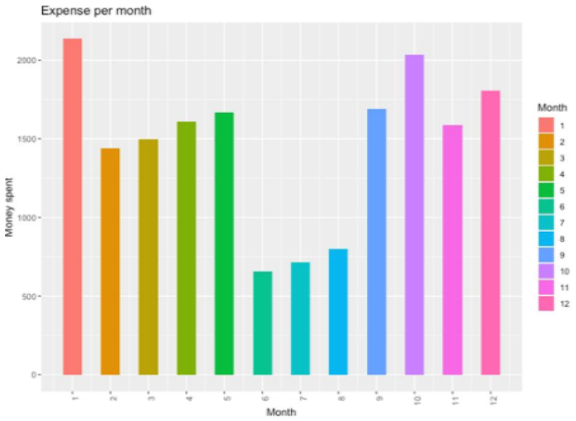
- MAE
- MSE
- Accuracy

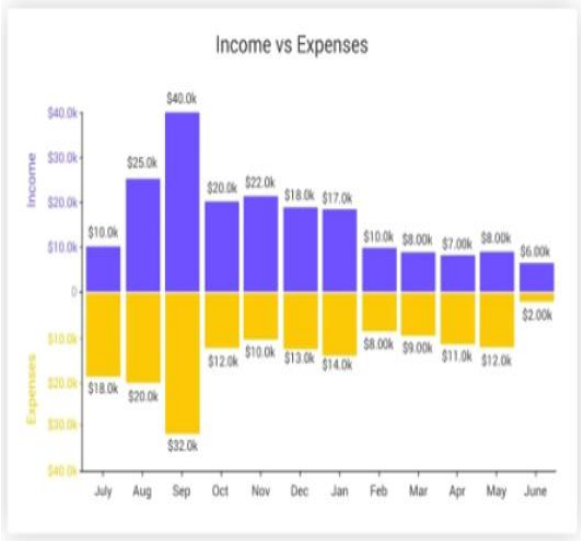
VII. RESULTS

Model	MAE	MSE	Accuracy
Linear Regression	120	2500	82%
Time-Series	150	3000	76%

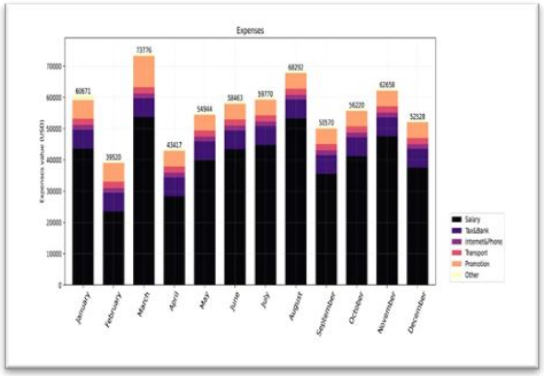
VIII. GRAPHICAL ANALYSIS

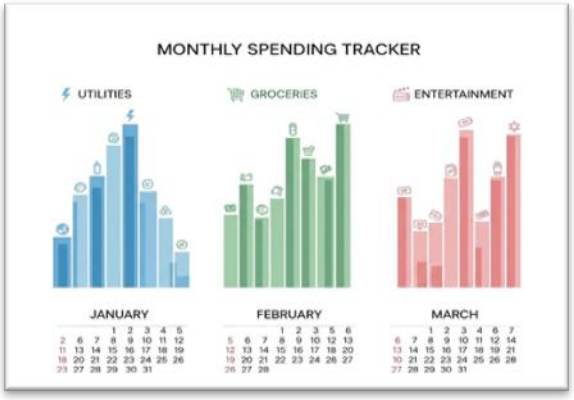
8.1 Prediction vs Actual

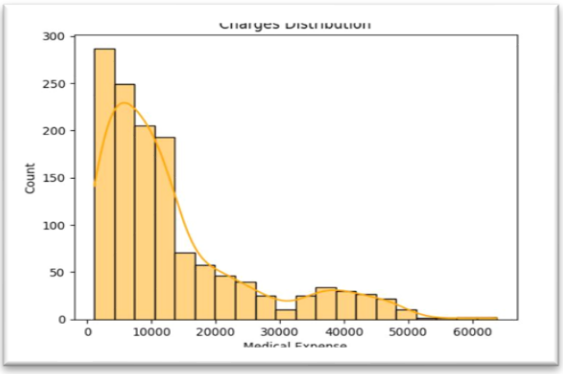


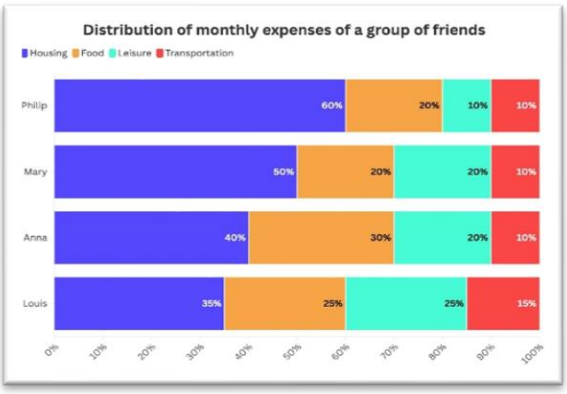


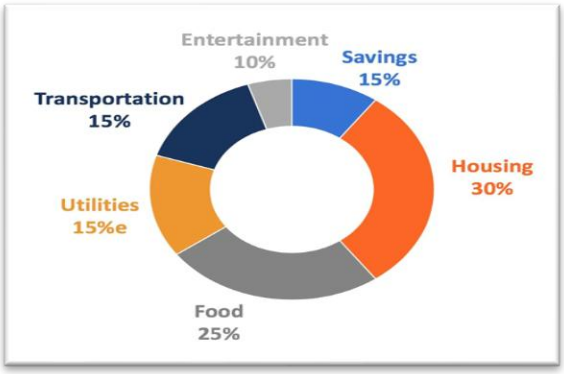
8.2 Expense Distribution











IX. DISCUSSION

Results show that predictive analytics improves budgeting accuracy and financial awareness. Linear regression performs effectively for structured financial data, while time-series methods show limitations with irregular patterns.

X. CONCLUSION

The proposed system demonstrates the potential of AI in automating personal finance management. Predictive analytics enables proactive financial planning, making the system practical and scalable.

XI. FUTURE WORK

- Integration with banking APIs
- Deep learning models (LSTM)
- Fraud detection
- Voice-based assistants

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