International Conference on Research in Education and Science
www.icres.net May 18-21, 2023 Cappadocia, Turkiye www.istes.org

Machine Learning based Financial Management Mobile Application to enhance College Students' Financial Literacy

Mohsina Kamarudeen
National University of Science and Technology, Sultanate of Oman

Dr. K. Vijayalakshmi
National University of Science and Technology, Sultanate of Oman, https://orcid.org/0000-0001-5417-4944

Abstract: This paper presents a mobile application aimed at enhancing the financial literacy of college students by monitoring their spending patterns and promoting better decision-making. The application is developed using the agile methodology with Android Studio and Flutter as development tools and Firebase as a database. The app is divided into sub-applications, with the home page serving as the program's integration point, displaying a summary of the user's financial progress. The app generates valuable insights into the user's current and future financial success, utilizing data analytics and machine learning to provide detailed and summary insights into the user's financial progress. The machine-learning algorithm used in this app is linear regression, which predicts the user's income and expenses for the upcoming month based on their historical spending data. In addition, the app highlights deals and student discounts in the user's vicinity and links to financial articles that promote better financial planning and decision-making. By promoting responsible spending habits and providing valuable financial insights, this mobile application aims to help students become financially literate and make informed financial decisions for future.

Keywords: Predictive Machine Learning, Financial Management, Mobile Application, Data Analysis, Financial Planning,

Citation: Kamarudeen, M., & Vijayalakshmi, K. (2023). Machine Learning based Financial Management Mobile Application to enhance College Students' Financial Literacy. In M. Koc, O. T. Ozturk & M. L. Ciddi (Eds.), *Proceedings of ICRES 2023-- International Conference on Research in Education and Science* (pp. 1237-1253), Cappadocia, Turkiye. ISTES Organization.

Introduction

Financial management is an essential skill for people of all age groups, but college students, in particular, face unique challenges as they navigate their way through a time of significant transformation in their lives. Often taking out student loans to pay for their education, these students are expected to pay back their debts while also striving to establish their identity and independence in society. However, their lack of financial literacy and planning skills frequently leads to increased debts and inadequate savings, making it difficult for them to

achieve financial independence (Widener, 2017).

The cost of higher education in the United States has been steadily rising for decades, with tuition and fees increasing faster than the rate of inflation (Baum, Ma, & Payea, 2015). As a result, college students are increasingly reliant on student loans to finance their education, and many are struggling to pay back these loans after graduation. In fact, recent studies have found that college graduates are entering the workforce burdened with significant student loan debt, with the average borrower owing over $30,000 in student loans (Baum et al., 2016). Unfortunately, many college graduates are finding it difficult to manage their debt, with a significant proportion of borrowers experiencing delinquency or default on their student loans (Houle & Berger, 2017). This not only has negative financial consequences for borrowers, but it can also impact their mental and emotional well-being, with studies finding that high levels of student loan debt are associated with increased levels of stress, anxiety, and depression (Eisenberg, Hunt, & Speer, 2013).

Furthermore, college students are not only struggling with paying back their loans, but they are also not saving enough for their future. A recent survey found that only 24% of college students are saving for retirement, and 21% have no savings at all (TIAA, 2021). This lack of financial preparedness can have long-term consequences, as it may delay important milestones such as purchasing a home or starting a family.

According to iontuition, less than 45% of university students believe they understand basic financial concepts, while more than 50% believe they do not practice or understand financial management (iontuition, 2016). This lack of financial literacy can lead to poor financial decisions, which can have significant consequences for their financial well-being. As a result, there is a pressing need to bridge the gap in financial literacy among college students.

To address these issues, a personal financial management mobile application has been developed to assist college-going students in managing their finances using technology and data. The mobile application aims to help college students become more financially literate and mindful spenders by assisting them in budgeting for their expenses, providing insights into their spending habits, and offering guidance on managing their debts .

This journal article explores the background and motivation for developing the financial management mobile application, and the importance of financial literacy for college students. (Times New Roman, 10)

Literature Review

In the article, Widener (2017) argues that college students struggle to keep up with their finances due to a lack of financial literacy and awareness. The author supports the argument by citing studies and literature reviews. According to Koposko et al. (2016), students were highly aware of the importance of planning their financial futures and their retirement, but they were not committed to putting their financial knowledge into practice. On

the other hand, Goetz et al. (2011) discovered a demand for personal finance courses among students, indicating that students have both the desire and the awareness to gain financial knowledge. However, some students even after having the necessary knowledge, fail to use it for their futures due to reasons such as financial background and lack of awareness.

The author points out that students are not up-to-date with financial management, lack discipline for proper financial planning, and are prone to overspending (Archuleta, Dale, & Spann, 2013). The students' over-reliance on credit cards, low income, and irrational spending habits lead them to financial disaster (Goetz et al., 2011). The lack of financial planning among students often leads them to be in debt even after completing their degree, affecting their financial well-being and security and having a negative psychological impact that continues to affect their confidence in managing their finances. The author further adds that the lack of financial literacy among college students is due to various factors such as demographics, family influence, and backgrounds. Furthermore, students' financial decisions are influenced by their lack of parental support, their own financial choices, or both. The transition from dependent to independent living frequently leads to hasty financial decisions, and sound financial planning may help avoid excessive spending.

According to recent data from the Federal Reserve, as of 2021, the total outstanding student loan debt in the United States is $1.57 trillion, and the average student loan debt for borrowers in the class of 2019 is $29,900.This is a significant burden on young people who are just starting their careers, and it is particularly challenging for those who are already struggling with low wages and a high cost of living. A recent study by the National Center for Education Statistics found that only 39% of undergraduate students in the U.S. graduate without any student loan debt. This means that the majority of students are entering the workforce with a significant amount of debt to pay off.

Moreover, even after graduation, college students are facing difficulties in paying back their loans. The latest report by the Federal Reserve Bank of New York shows that as of 2021, 9.9% of student loan borrowers are delinquent or in default on their loans. Additionally, studies show that many college students are not saving enough money for their future. A recent survey by Bank of America found that 41% of millennial (ages 24 to 41) have less than $5,000 in savings, which is not enough to cover even a few months' worth of living expenses. One study found that students who receive financial education are more likely to have positive financial behaviours, such as saving money and paying bills on time (Hastings et al., 2013). This underscores the importance of financial literacy education for college students, as it can help them develop the necessary skills to manage their finances effectively.

Another study found that students who have a high level of financial knowledge are more likely to save money and less likely to carry credit card debt (Robb and Woodyard, 2011). This suggests that financial education can have a significant impact on a student's financial behaviours and outcomes. Furthermore, research has shown that financial stress can have negative impacts on students' academic performance and mental health (Huston et al., 2010; Wilmarth, 2019). This highlights the need for college students to develop strong financial

management skills to avoid financial stress and its associated negative consequences.

Regarding the impact of parental support on a student's financial management, a study found that parental financial support can have both positive and negative effects on a student's financial behaviours (Lawrence and Ritchie, 2017). While parental support can provide a safety net for students, it can also lead to a lack of financial responsibility and independence.

Finally, a report by the Consumer Financial Protection Bureau found that financial education programs can have a positive impact on students' financial behaviours, such as saving money and avoiding excessive debt (Consumer Financial Protection Bureau, 2014). The report recommends that financial education be incorporated into college curriculums to better equip students with the skills and knowledge necessary to manage their finances effectively.
Overall, these studies and reports support the claims made in the literature review regarding the importance of financial education and the negative consequences that can result from poor financial management. They highlight the need for college students to develop strong financial management skills and for educational institutions to incorporate financial education into their curriculums.

Hiebl and Weber (2017) conducted a study to explore the role of mobile apps in financial management for college students. The study recognized the increasing importance of financial literacy and management for college students, as they transition from being dependents to managing their own finances. The study identified that financial management apps can help students monitor their expenses, budget their finances, and track their spending. Additionally, these apps can provide helpful tips for managing finances and give students a better understanding of their financial situation.

The authors highlighted that mobile apps have the potential to assist college students in managing their finances, especially since most college students already rely heavily on their mobile devices. The study revealed that these apps can help students to keep track of their expenses and gain a better understanding of their financial situation, which in turn can help them make informed decisions about their financial future.

The study also highlighted that financial management apps can help reduce financial stress among college students. The authors noted that financial stress can lead to poor academic performance and lower graduation rates, so reducing financial stress is crucial to improving academic outcomes. The authors recommended that universities promote financial management apps to their students to help them manage their finances effectively. They also suggested that financial management apps should be made user-friendly and should incorporate gamification elements to encourage students to use them regularly.

Another study by Ahmed and Malik (2020) investigated the impact of financial education and financial management apps on the financial literacy of college students in Pakistan. The study found that the use of financial management apps significantly increased the financial literacy of college students. The authors

recommended that financial management apps be integrated into the financial education curriculum for college students. Similarly, a study by Lee et al. (2018) examined the effectiveness of a financial management app in enhancing financial literacy among college students in South Korea. The study revealed that the use of the financial management app significantly increased the financial literacy of college students. The authors recommended that universities incorporate financial management apps into their financial education curriculum to enhance financial literacy among their students.

Overall, the literature suggests that financial management apps have the potential to assist college students in managing their finances effectively, reducing financial stress, and improving academic outcomes. The use of financial management apps can also enhance financial literacy among college students, which is crucial for their financial well-being. The integration of financial management apps into financial education curriculums is recommended to promote financial literacy and effective financial management among college students.

The study by Cao et al. (2019) investigated the effectiveness of a financial management app on college students' financial management skills, financial literacy, savings, and debt reduction. The app included several features such as financial goal-setting, budgeting, expense tracking, and financial education.

The study recruited 180 college students who were divided into two groups: a treatment group that used the financial management app and a control group that did not use the app. The study lasted for 12 weeks, during which the treatment group received training on how to use the app effectively.At the end of the study, the researchers found that the treatment group had a higher level of financial literacy compared to the control group. The treatment group also reported a significant improvement in their financial management skills, such as budgeting and expense tracking. Moreover, students who used the app were able to save more money compared to the control group. The researchers also found that the use of the app helped students to reduce their debt.The findings of the study are consistent with previous research on the effectiveness of financial management apps. For example, a study by Hira and Loibl (2005) found that using financial management software is associated with increased financial knowledge, improved budgeting, and debt reduction. Similarly, a study by Lusardi and Mitchell (2014) found that using a financial education website improved financial literacy and savings behavior.

Overall, the study by Cao et al. (2019) suggests that financial management apps can be effective tools for improving financial management skills and increasing financial literacy among college students. Financial management apps can also help students save money and reduce debt, which are crucial skills for achieving financial stability and success in the future.

Design and Implementation

The financial management mobile application is designed to provide a comprehensive set of tools and resources to manage finances effectively. Based on an extensive literature review of budgeting and financial management

techniques, this user-friendly application consists of several sub-applications as shown in figure 1.

User Interface Design

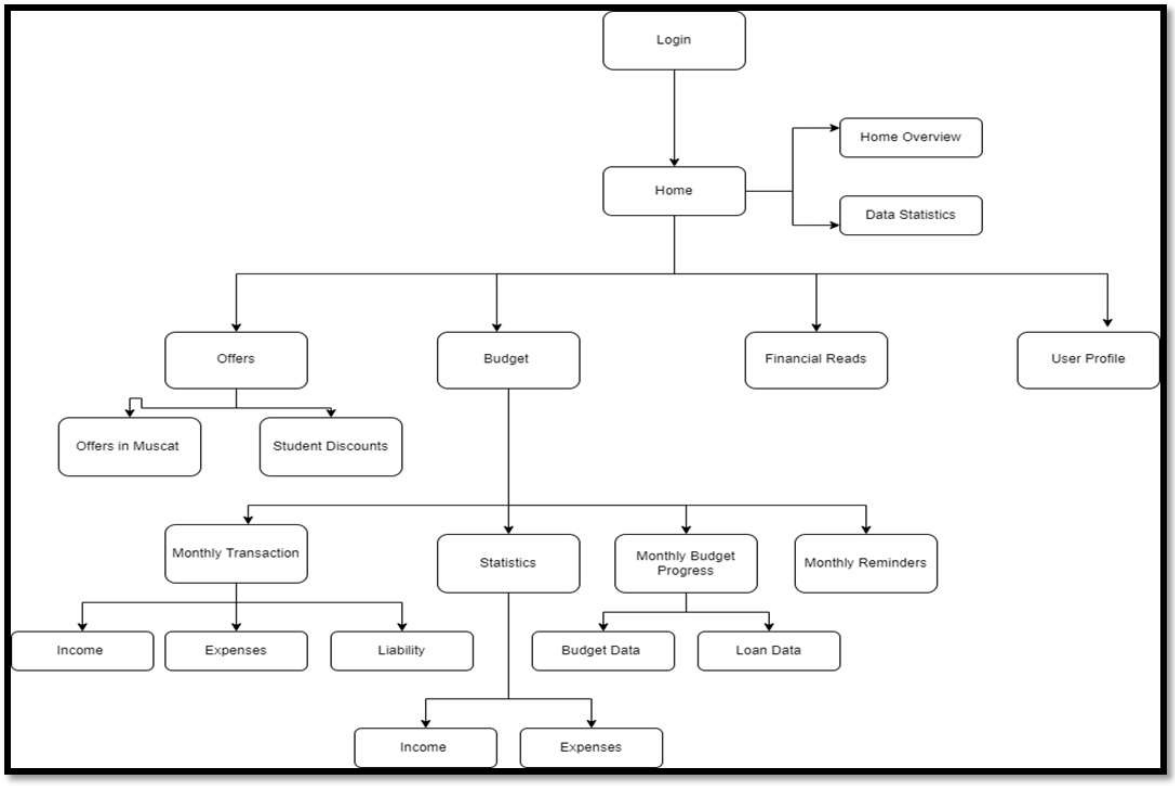


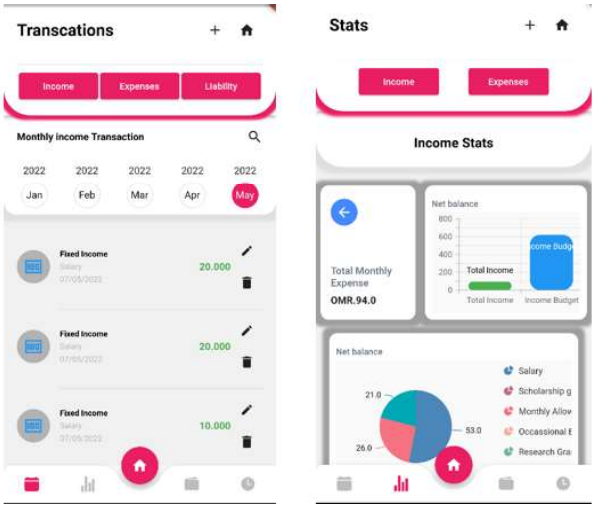
Figure 2. Application prototype flow chart

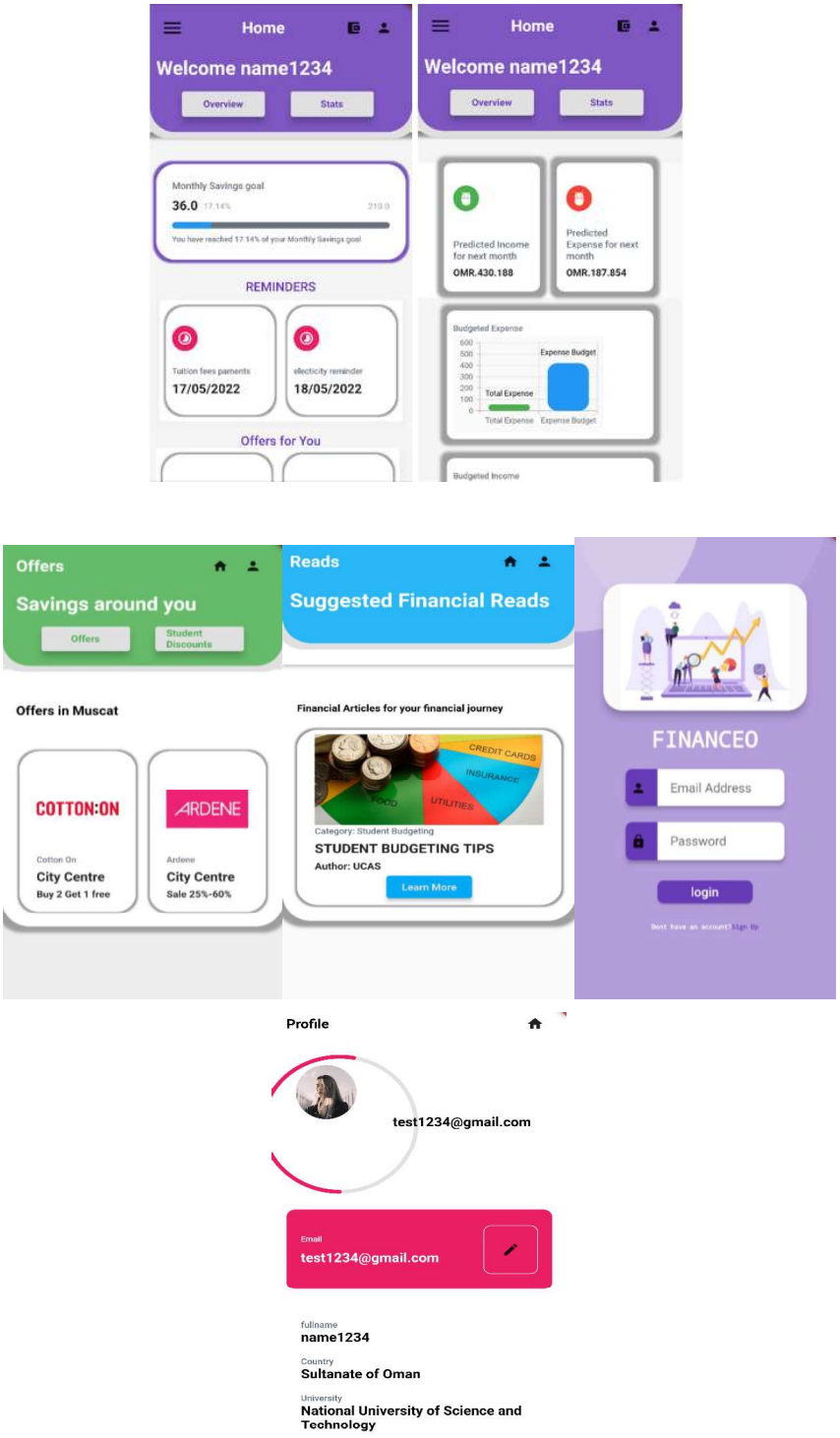
- The Home app acts as the central dashboard that connects all other sub-applications. It showcases the user's current financial performance and uses machine learning to predict their next month's financial performance. The home page showcases the user progress, reminders and their predicted income and expense for the upcoming month.
- The budget app is structured in a way that allows users to access many features of the application via the footer and directs them to the Home page and other sections of the budget app.
- The monthly transaction page in the budget app displays the user's monthly income, expenses, and liabilities/loans taken for the current and previous months. The monthly statistics page provides users with data visualizations such as graphs and pie charts, allowing them to have a glance look into their monthly performance.
- The budget progress page displays budgeted income and expense and savings progress through a progress bar. It also displays the user's total liabilities, loan details, and the progress of each section to clearing their loans.
- The reminders section in the budget app allows users to set recurring and non-recurring reminders with

notes to remind them of any payments or commitments of the month.

- The Offers app provides users with exciting offers and discounts available in the user's city that they can avail to save more. In the same app, users can also view discounts available to them as students only, helping the users to make and save the most out of being students in general. This section is also an important section as the application can showcase advertisements targeted towards college students.
- The Financial Reads section of the application is designed to help college students learn more about finance and improve their financial literacy. This section is a great addition to the application as financial literacy is important for young adults, especially college students who are starting to become more financially independent. By providing easy access to financial articles, the application can help college students make informed financial decisions. The app provides users with a range of topics such as investment, budgeting, saving, credit score, and much more. The articles are updated regularly, providing users with fresh and updated financial knowledge.
- The Profile and Login sub-applications provide users with an option to set up their profile and log in to access the application.

The UI design of the mobile application is shown in figure 2 is intended to provide users with a simple, accessible, and enjoyable experience. Close attention is paid to the colour scheme and design of each sub-app to ensure that users can easily differentiate between them. The UI design is based on users' expectations in terms of accessibility, aesthetics, and simplicity of use, which will help keep users engaged with the app.





(a). Home Page UI ***(b) Budget app UI***

(c).Offers Page UI ***(d) Financial Reads UI*** ***(e) Login Section Design*** ***(f) User Page UI***

Figure 2. User Interface Design

Database Design

The Financial Management app's database design is created to meet the requirements of the application. Firebase Real-time Database is used as the database for the application. Firebase has the ability to create new accounts and utilizes Firebase authentication to determine whether the user's email address and password are correct before allowing access to their home page. All user accounts are stored in the Authentication section, where the admin can also disable or delete user accounts. Overall, the use of Firebase Real-time Database and Firestore database in the Financial Management app allowed for efficient and real-time syncing of data between the mobile and other clients. The app's database design as shown in Figure 3, also enabled the app to store and manage users' data effectively while ensuring data security and privacy.

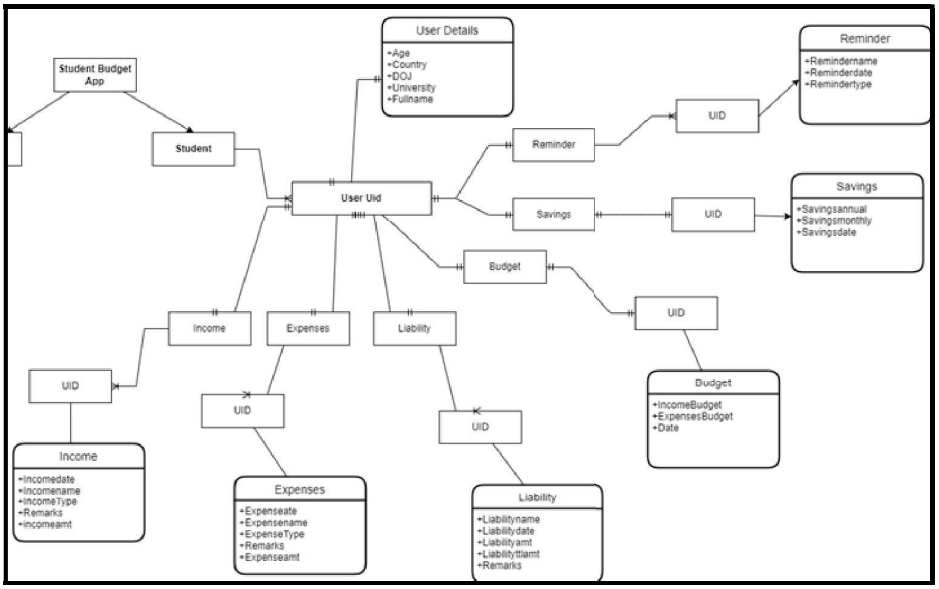


Figure 3. Database design

Implementation

The financial management application for college students is implemented using Flutter as the framework and Dart as the programming language. Android Studio is used as the Integrated Development Environment (IDE) for the project. Various libraries were used to enhance the user interface (UI) and add functionality to the application. Once a user logs in or registers, they will be led to the home page, which is the main page of the application. The Home page ties everything together and serves as a dashboard for the user. It contains the user's personal information, income, expenses, liabilities, budget, and savings information which are shown in Figure 4 and Figure 5.

In conclusion, the financial management mobile application for college students has several essential features that enable students to improve their financial literacy and can provide college students with a comprehensive

tool to manage their finances effectively.

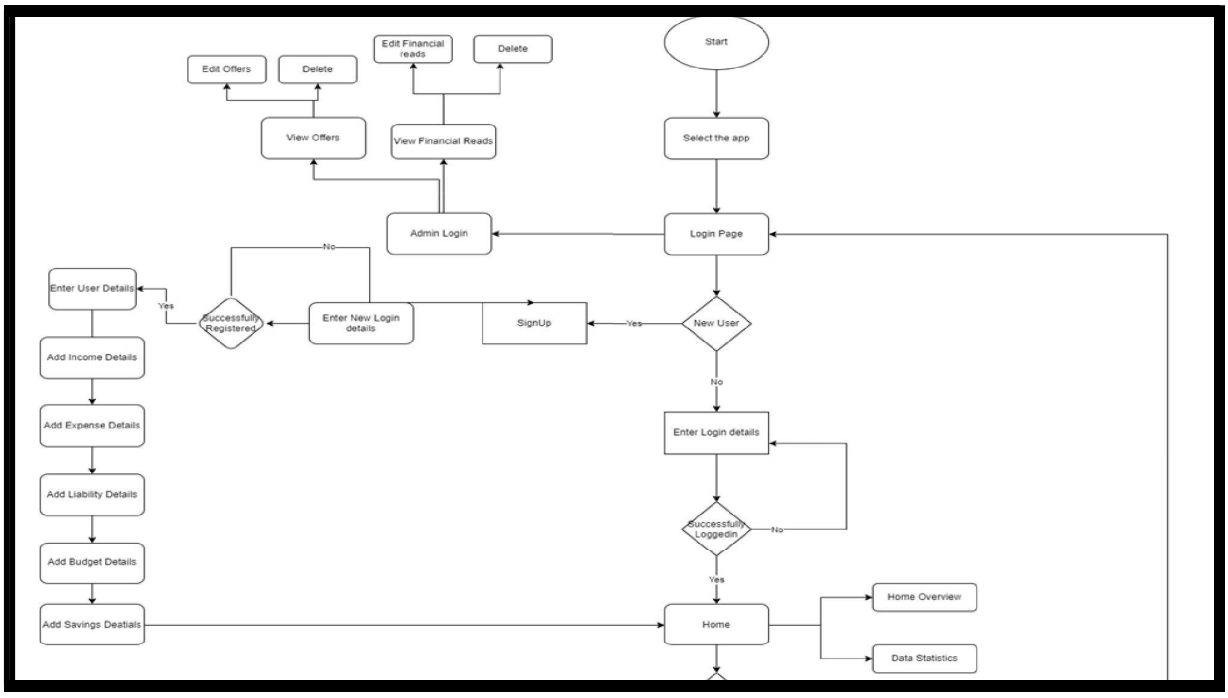


Figure 4. Application Flow chart Part-1

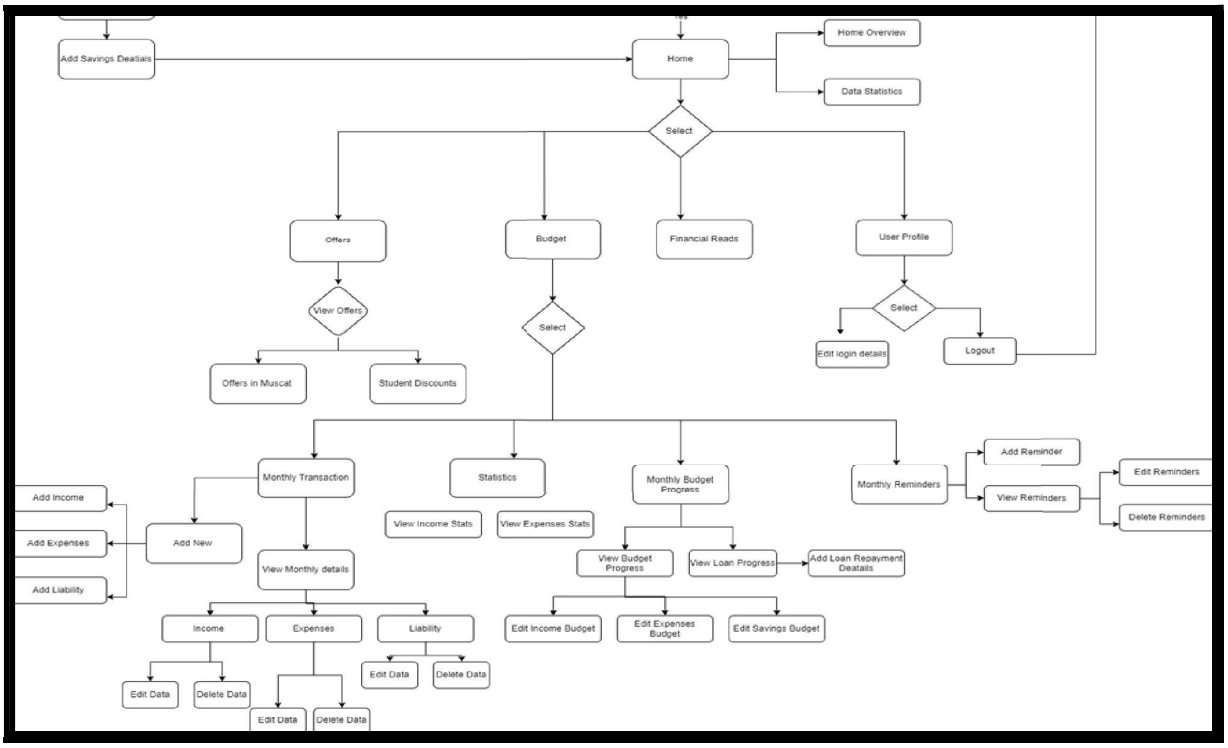


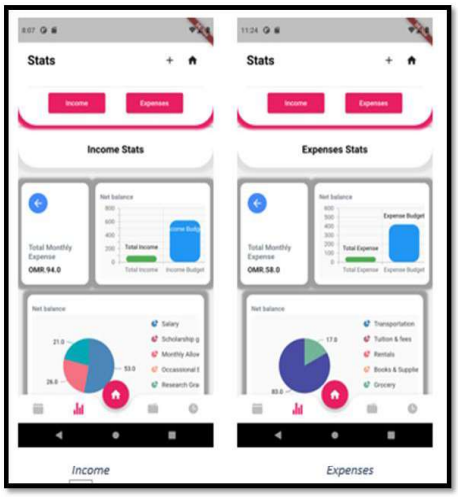
Figure 5. Application flow chart Part-2

Results & Discussions

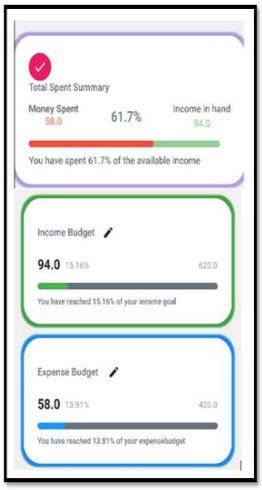
The application effectively employs data analytics and machine learning to evaluate user data and provide detailed and summary insights into the user's income, spending patterns, budgeting progress, and credit or loan status.

User Data Analysis Results

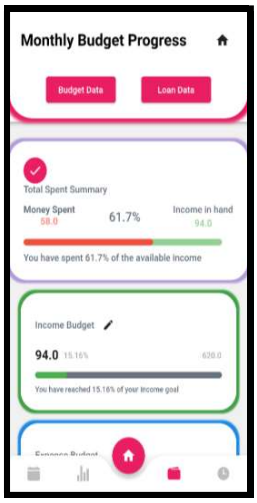
Data analysis is the process of summarizing acquired data, interpreting the data acquired using analytical and logical reasoning to find patterns, connections, or trends (Coursera, 2022). In this application, data analysis is used to summarize user data and provide insights that users can quickly examine their past and present progress via graphs, summaries, and progress bars. This helps users become more financially aware and make informed financial decisions without requiring too many financial details that could potentially confuse them, saving the user time and motivating the user to make wise financial decisions.Graphs are used to summarize the user's income and expenses for the month. The data analysis for income and expenses using graphs is shown in Figure 6(a). This feature aims to let the user know their income and expenses performance at a glance. To visualize the user's progress toward their spending and budget goals, the program employs a progress bar, as shown in Figure 6(b). Each progress bar also provides a percentage and a word summary for further understanding of their progress. Progress bars are also used to analyze the user's savings progress, as shown on the home overview page and budget page, as shown in Figure 6(c). Loans are also a significant aspect of a person's life, and paying on time and keeping track of the loan progress is critical. This application promotes and assists the user in making timely loan repayments while also keeping them aware of their commitments or obligations. Figure 6(d) depicts how a progress bar and summaries were utilized to display user loan progress for simple examination. The green color highlights good progress or the percentage of the loan paid , whereas the red color highlights poor progress or the percentage of loan to liable to pay .



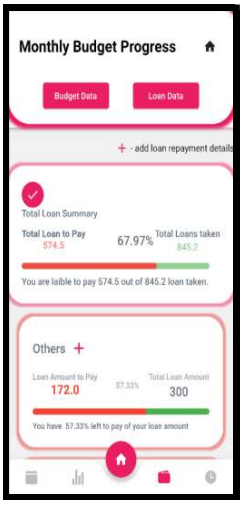
(a) Income and expenses data analysis



(b) Progress Bar Income and expenses



(c) Savings progress



(d) Loan progress

Figure 6. User data analysis

Machine Learning

The use of machine learning in a mobile application can greatly enhance college students' financial literacy. The application predicts a user's income and expenses for the upcoming month based on their past spending patterns, with the goal of providing them with a forecast of their financial performance for the upcoming month. This feature is not developed to display the users' accurate performance (income & expense) for the next month, but is used to make future predictions based on their past spending patterns. Thus helping the users make changes to their present spending and saving habits based on how their financial patterns have been in the past and make better and more responsible financial decisions.

The machine learning libraries within Flutter, such as the ml_algo and ml_dataframe libraries, were utilized to predict the user's income and expenses for the upcoming month. Linear regression is chosen as the most appropriate machine learning algorithm for the prediction, given its simplicity and ability to model a linear relationship between dependent and independent variables.

To predict the user's next month's income and expenses, the application categorizes the data provided by the user by month, and the machine learning algorithm is trained on this data to generate a prediction for the next month's income and expenses. The prediction is updated every time the user enters new data into the application.The machine learning prediction feature is displayed on the home stats page, where it summarizes the user's financial statistics progress. The predicted value is displayed at the top of the home stats page, allowing the user to view their predicted next month's performance at a glance.

Figure 7 illustrates the machine learning prediction feature on the home stats page. The income data is retrieved

from the Firestore database in Firebase and used to calculate the total sum of income for each month. The get sum method is executed to add up the total sum of income for each month, which is displayed on the home stats page.

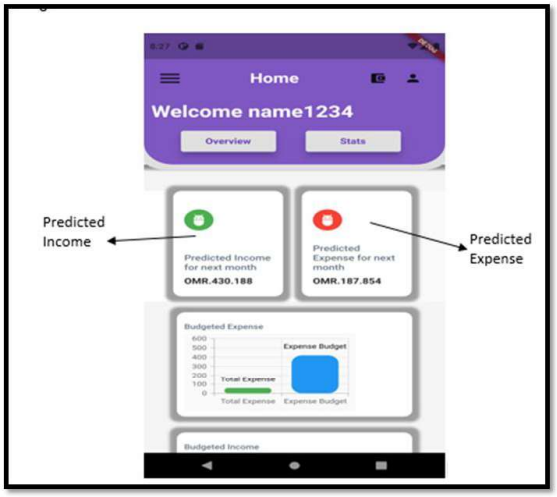


Figure 7. Predicting Income & Expense

The process of implementing the machine learning functionality in a Flutter application involves the following steps as shown in Figure 8:

Data Collection: The application collects data from the user through a form where users can enter their income and expenses for each month. The application saves this data to the firebase database along with the corresponding date.

Prepare the Training Dataset: The application prepares the training dataset for the linear regression model. To prepare the training dataset, The application accesses the users' data and sorts the income/expense based on month (X) and adds the total income/expense of each month into a list (Y). This involves collecting the user data from the database and organizing it into a set of X (month) and Y (income and expenses) values. Each row of the dataset represents one month of income (Yi) and expenses (Yi') data.

Train the Linear Regression Model: The application trains the linear regression model using the prepared dataset. This involves using the Dart library for linear regression, such as the "linear regression" package, to fit the data to a linear regression model. The model will learn the relationship between the month (X) and income and expenses (Y) values and create a line of best fit.

Predict the Next Month's Income and Expenses: Once the model is trained, the application can use it to predict the income (Yn) and expenses (Yn') for the next month (Xn). To do this, the application can use the month value of the next month (Xn) as the input (X), and the model will output the predicted income/ expenses values (Yn, Yn').

Display the Predicted Income and Expenses: The predicted income (Yn) and expenses (Yn') for the next month (Xn) are displayed on the home page of the application.

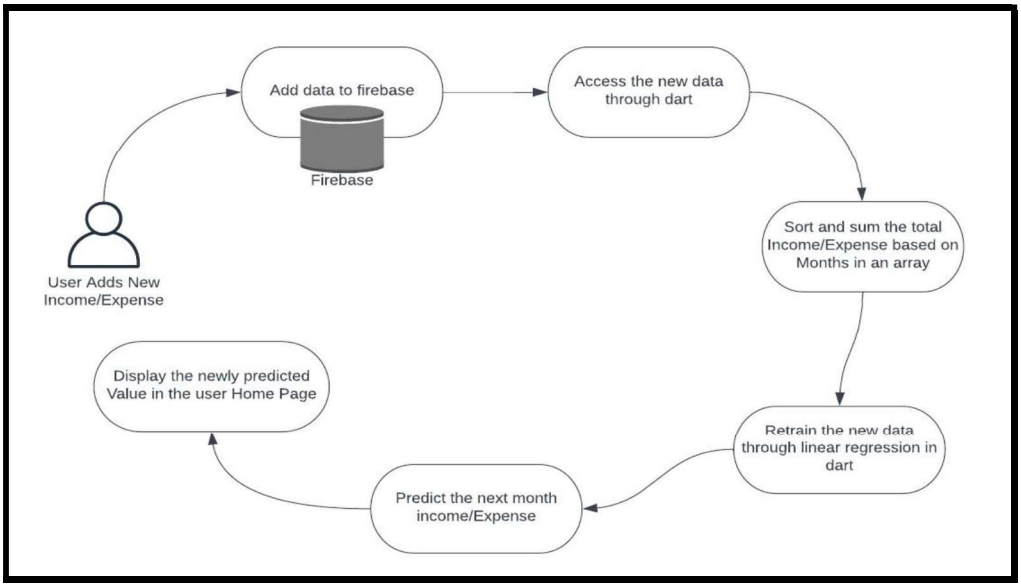


Figure 8 . Predicting user income using linear regression and past data

The accuracy of the predictions depends on the quality and quantity of the data provided by the user. As the application collects more data over time, the accuracy of the model is expected to improve. The Mean Square Error (MSE) and Mean Absolute Error (MAE) are used to evaluate the performance of the models. MAE and MSE values are shown in figure 9. The MAE and MSE are measures of the difference between the predicted and actual values of the dependent variable, so a lower MAE and MSE indicate that the predictions are closer to the actual values. Therefore, lower values of MAE and MSE indicate that the model is performing better in terms of its predictive accuracy.

```
MAE for 36-month prediction: 697.4929351400388
MSE for 36-month prediction: 689945.366606091
```

Figure 9. 36 Month prediction performance

The application's ability to accurately predict income and expenses is expected to improve as more data is collected from users over time.

In the future to further improve the accuracy of the model, the application could also incorporate additional features such as the user's current account balance, recurring expenses, and income sources. This would provide the model with more data points to learn from and make more accurate predictions. In addition, as the data and accuracy of the predictions improve the application could also provide users with suggestions for saving money, such as reducing unnecessary expenses or increasing income sources. This could help users to improve their financial situation and make more responsible financial decisions.

In conclusion, the machine learning-based financial management mobile application developed for college

students aims to enhance their financial literacy by providing them with a forecast of their financial performance for the upcoming month. The application uses machine learning algorithms such as linear regression to predict the user's income and expenses based on their past spending patterns. The accuracy of the predictions is expected to improve as the application collects more data from users over time. Overall, the application can help college students better understand their finances and make informed financial decisions.

Conclusion

In conclusion, it is critical to prepare college students financially, as they will represent and contribute to the country's future. The mobile application developed for college- going young students aims to assist them in becoming more financially literate by tracking their spending habits, offering insights into their purchasing habits, and suggesting financial articles for them to read. The program also promotes savings by showing student discounts and deals in the user's city. Several studies have emphasized the importance of financial planning among the youth and the role of mobile applications in achieving this goal. Machine learning is employed to analyze and predict data, providing users with relevant and straightforward insights to make better financial decisions. The use of the agile development technique, implemented using the flutter framework based on the Dart programming language, allows for a flexible and collaborative approach to software development. Finally, a comparison of the prototype with other existing budgeting applications shows its advantages and limitations. Overall, the project's aim is to prepare college students in Oman for financial success and self-sufficiency.

Limitations and Future Studies

Based on the results of the application, several enhancements will be made to improve its performance and user experience. Firstly, the application will provide annual statistics and a monthly user summary to help users track their financial progress more effectively. Additionally, an API will be developed to automate the conversion of user bank statements into data for the Firebase database, reducing the need for manual data input. The program will also be linked to the user's bank account for automatic data syncing, making the app more convenient to use. To further improve the application's accuracy and efficiency, the machine learning algorithm will be evaluated and refined. This will enhance the application's predictive capabilities and improve its overall performance.

In order to gather user feedback and ensure the application meets the needs of college students, the app will be tested for at least one month. This testing period will help to identify any issues and make necessary improvements before launching the application.

The applications financial reads section will provide customized article recommendations based on the student's savings performance. For instance, if a student has saved enough money, investment articles will be

recommended to help them learn more about investing and growing their wealth. If a student does not have any savings, the app will recommend savings articles to help them learn about budgeting and saving money.

Furthermore, the offers and discounts section will not only feature shops where students can save money but will also display discount advertisements tailored to the student's city of registration. This will enable the app to generate revenue while also providing students with relevant and useful information about available discounts and offers.

The ultimate goal of the application is to promote financial literacy and independence among young people. By empowering college students with the tools and knowledge they need to manage their finances effectively, the application aims to make a meaningful contribution towards building a financially aware and responsible generation.

References

Archuleta, K. L., Dale, A., & Spann, S. M. (2013). College students and financial distress: Exploring debt, financial satisfaction, and financial anxiety. Journal of Financial Counseling and Planning, 24(2), 50-62.

Baum, S., Kienzl, G., & Payea, K. (2016). Trends in Higher Education Series: Student Debt and the Class of 2015. The College Board.

Baum, S., Ma, J., & Payea, K. (2015). Education Pays 2013: The Benefits of Higher Education for Individuals and Society. The College Board.

Cao, J., Li, J., Li, X., Li, X., & Li, X. (2019). Enhancing Financial Literacy and Money Management Skills among College Students: A Study of the Effectiveness of a Financial Management App. Journal of Financial Counselling and Planning, 30(2), 187-199.

Consumer Financial Protection Bureau. (2014). Financial education programs for college students. Retrieved from https://files.consumerfinance.gov/f/201409_cfpb_report_financial-education-programs-for-college-students.pdf

Eisenberg, D., Hunt, J., & Speer, N. (2013). Mental health in American colleges and universities: Variation across student subgroups and across campuses. The Journal of Nervous and Mental Disease, 201(1), 60-67.

Goetz, J. W., Lupton, J., & Maddox, K. E. (2011). The demand for personal financial education in state high school graduation requirements. Journal of Family and Economic Issues, 32(4), 694-706.

Hastings, J. S., Madrian, B. C., & Skimmyhorn, W. L. (2013). Financial literacy, financial education, and economic outcomes. Annual Review of Economics, 5(1), 347-373.

Hiebl, M. R. W., & Weber, C. (2017). Financial management applications for college students. Journal of Higher Education Policy and Management, 39(2), 174-188. doi: 10.1080/1360080X.2016.1265966

Hira, T. K., & Loibl, C. (2005). The Impact of Financial Education and Counseling on Marital Satisfaction.

Journal of Financial Counseling and Planning, 16(1), 37-48.

Houle, J. N., & Berger, L. M. (2017). Is student loan debt discouraging home buying among young adults? Social Service Review, 91(4), 595-626.

Huston, S. J., Bailey, W. C., Keesling, J. E., & Morgan, C. L. (2010). Financial well-being of college students: A literature review. Journal of College Student Development, 51(3), 315-332.

iontuition. (2016). Survey: Money management habits of college students.

Koposko, J. L., Lindo, E. J., & Falciglia, G. A. (2016). Financial literacy and retirement planning: Evidence from the United States. Journal of Financial Counseling and Planning, 27(1), 37-48.

Lawrence, F. C., & Ritchie, J. (2017). Parental financial support and student financial behaviours. International Journal of Consumer Studies, 41(4), 401-411.

Lusardi, A., & Mitchell, O. S. (2014). The Economic Importance of Financial Literacy: Theory and Evidence. Journal of Economic Literature, 52(1), 5-44.

Robb, C. A., & Sharpe, D. L. (2017). Effect of personal financial knowledge on college students' credit card behavior. Journal of Financial Counseling and Planning, 28(2), 255-266.

Robb, C. A., & Woodyard, A. S. (2011). Financial knowledge and best practice behavior. Journal of Financial Counseling and Planning, 22(1), 60-70.

TIAA. (2021). The 2021 TIAA Student Debt Survey.

Widener, J. (2017). College student financial literacy: A review of the literature. Journal of Financial Counseling and Planning, 28(1), 126-137.