VIVEKANAND EDUCATION SOCIETY'S
INSTITUTE OF TECHNOLOGY

(2024-25)

Department of Computer Engineering

Project Report on

"FinChores- Manage Life, Master Finances."

In partial fulfillment of the Fourth Year

(Semester–VII), Bachelor of Engineering (B.E.)

Degree in Computer Engineering at the University of

Mumbai Academic Year 2024-2025

Project Mentor

Mrs. Priti Joshi

Submitted by

Anchal Motwani
V.E.S.I.T
2021.anchal.motwani@ves.ac.in

Darpan Moorpani
V.E.S.I.T
2021.darpan.moorpani@ves.ac.in

Anjala Goreja
V.E.S.I.T
2021.anjala.goreja@ves.ac.in

Karan Kewalramani
V.E.S.I.T
2021.karan.kewalramani@ves.ac.in

Department of Computer Engineering

CERTIFICATE of Approval

This is to certify that **Anchal Motwani(D17B-31), Darpan Moorpani(D17A-42), Anjala Goreja(D17A-20), Karan Kewalramani(D17C-35)** of Fourth Year Computer Engineering studying under the University of Mumbai has satisfactorily presented the project on "FinChores- Manage Life, Master Finances." as a part of the coursework of PROJECT-I for Semester-VII under the guidance of Mrs. Priti Joshi in the year 2024-2025.

23-10-24
Date

_____ _____

Internal Examiner External Examiner

_____ _____ _____

Project Mentor Head of the Department Principal

Dr. Mrs. Nupur Giri Dr. J. M. Nair

ACKNOWLEDGEMENT

We are thankful to our college Vivekanand Education Society's Institute of Technology for considering our project and extending help at all stages needed during our work of collecting information regarding the project.

It gives us immense pleasure to express our deep and sincere gratitude to Assistant Professor **Mrs. Priti Joshi** (Project Guide) for his kind help and valuable advice during the development of project synopsis and for her guidance and suggestions.

We are deeply indebted to Head of the Computer Department **Dr.(Mrs.) Nupur Giri** and our Principal **Dr. (Mrs.) J.M. Nair ,** for giving us this valuable opportunity to do this project.

We express our hearty thanks to them for their assistance without which it would have been difficult in finishing this project synopsis and project review successfully.

We convey our deep sense of gratitude to all teaching and non-teaching staff for their constant encouragement, support and selfless help throughout the project work. It is a great pleasure to acknowledge the help and suggestion, which we received from the Department of Computer Engineering.

We wish to express our profound thanks to all those who helped us in gathering information about the project. Our families too have provided moral support and encouragement several times.

Department Of Computer Engineering

COURSE OUTCOMES FOR B.E PROJECT

Learners will be to:-

Course Outcome	Description of the Course Outcome
CO 1	Do literature survey/industrial visit and identify the problem of the selected project topic.
CO2	Apply basic engineering fundamental in the domain of practical applications FOR problem identification, formulation and solution
CO 3	Attempt & Design a problem solution in a right approach to complex problems
CO 4	Cultivate the habit of working in a team
CO 5	Correlate the theoretical and experimental/simulations results and draw the proper inferences
CO 6	Demonstrate the knowledge, skills and attitudes of a professional engineer & Prepare report as per the standard guidelines.

ABSTRACT

This project presents the development of a web-based Expense Tracker, designed to assist users in effectively managing their finances by recommending investment opportunities based on their income and spending patterns. The system employs advanced algorithms to analyze user-provided financial data, identifying optimal investment avenues to help maximize profitability. The platform is particularly aimed at individuals looking to improve financial literacy and make informed financial decisions.

By integrating budgeting techniques and machine learning, the tracker generates personalized insights and recommendations for users. The system is designed to be user-friendly, featuring a clean interface that allows users to easily input their income, expenses, and financial goals. Furthermore, a future feature of the platform will include a chore management system to assist in organizing household tasks and financial planning.

This project illustrates the potential of leveraging technology to provide accessible financial guidance, making it a valuable tool for individuals across various income levels. The system aims to empower users to take control of their finances, ensuring long-term financial health and profitability.

INDEX

1. Introduction

1.1. Introduction to the project

In today's digital economy, financial literacy and personal finance management are becoming increasingly important, as individuals face complex financial challenges. With various sources of income and a broad range of expenses, tracking spending habits manually is no longer efficient. Many people lack the tools to make informed decisions about their financial health, often missing opportunities to invest or save. The **Fine Chores - Manage life, Master Finance** aims to solve this by offering users a platform that not only tracks their income and expenses but also provides tailored financial insights and investment suggestions.

The **Fine Chores - Manage life, Master Finance** is particularly beneficial for individuals who need guidance in managing their day-to-day finances while planning for future investments. It not only monitors spending but also offers suggestions for improvement, focusing on helping users achieve financial stability and growth. By leveraging **data analytics**, the system identifies patterns in a user's financial behavior and offers personalized recommendations for investments that align with their specific goals. Over time, this helps users not only manage their current financial situation but also plan for long-term financial success.

This project also addresses the broader societal issue of **financial literacy**. Many individuals, especially those in underserved communities, may lack access to financial advisors or education. This tool can serve as a **digital financial advisor**, offering users reliable guidance on how to optimize their income, save more effectively, and invest wisely. Additionally, the planned integration of a **chore management system** will enable users to manage their household resources efficiently, aligning financial and household management in a comprehensive way.

As people increasingly rely on digital tools to manage their personal affairs, the Expense Tracker fits well into the growing demand for **automated, data-driven solutions**. By providing users with a system that is accessible, user-friendly, and focused on improving financial health, this project is relevant to individuals seeking to optimize their financial decisions and maximize their wealth in a sustainable manner.

1.2. Motivation for the project

In today's fast-paced world, many individuals struggle with managing their personal finances, leading to financial stress and missed opportunities for investment. Traditional methods, such as manually tracking expenses or consulting financial experts, are not feasible for everyone due to time, cost, and complexity. The lack of accessible tools that combine budgeting, expense tracking, and investment insights has created a gap in financial literacy, particularly for individuals in lower-income brackets or remote areas where financial guidance is limited.

The **Expense Tracker** is motivated by the need to address these gaps. It provides an **automated, user-friendly platform** that helps users manage their income and expenses while offering investment recommendations based on real-time data. This project is driven by the idea that financial management should not be a privilege but a resource accessible to everyone, regardless of their financial expertise or location. By empowering users to make informed decisions about their spending and saving habits, the Expense Tracker contributes to a more **financially literate** and **economically empowered** population.

In particular, the project seeks to address the needs of individuals who have irregular income streams, such as freelancers or gig workers, who often find it challenging to manage their finances effectively. By offering a system that tracks income, categorizes expenses, and suggests appropriate investments, the Expense Tracker serves as a **personalized financial assistant**. This tool helps users take control of their financial future, making better decisions today for greater stability tomorrow.

1.3. Drawback of the existing system

Despite the existence of various personal finance management tools, many suffer from significant shortcomings that hinder individuals from achieving financial literacy and effective management of their finances. Current systems often rely on manual input and generic templates that do not adapt to users' unique financial situations. This one-size-fits-all approach fails to consider factors such as income variability, spending habits, and individual financial goals.

Moreover, many existing financial tools lack the ability to provide personalized insights or actionable recommendations, leaving users uncertain about their financial decisions. For instance, without a tailored analysis of spending patterns, users might miss opportunities for savings or investment, leading to missed financial growth. Many financial apps do not adequately educate users about their financial health, often resulting in confusion and a lack of confidence in managing their finances.

Additionally, privacy concerns are prevalent as many financial tracking apps do not offer robust data security measures, leading to apprehension among users regarding the safety of their sensitive financial information. This lack of trust can deter individuals, particularly those in underserved communities, from utilizing available financial management resources.

The need for a comprehensive, user-friendly financial management system, like "Fine Chores," is evident. By providing tailored financial insights, robust security, and education, this project addresses the critical gaps in current solutions, fostering a more financially literate population.

1.4. Problem Definition

Managing personal finances is crucial for achieving financial stability and growth, yet many individuals encounter barriers that prevent them from effectively tracking their income and expenses. Factors such as irregular income streams—common among freelancers and gig workers—can complicate financial management, leading to stress and missed investment opportunities.

A significant challenge lies in the overwhelming nature of existing financial tools, which often do not consider individual user circumstances, such as income variability or personal financial goals. This oversight makes it difficult for individuals to understand their financial standing and make informed decisions.

The core issue is the necessity for an accessible, accurate, and user-friendly platform that empowers users to manage their finances effectively. "Fine Chores" aims to bridge this gap by providing a comprehensive solution that tracks income and expenses while offering personalized financial recommendations. By leveraging data analytics, the platform encourages users to make informed decisions about their financial health, ultimately promoting financial literacy and economic empowerment.

1.5 Relevance of the Project

The relevance of "Fine Chores" lies in its capacity to address contemporary financial management challenges by providing a solution that enhances accessibility and user engagement. As individuals increasingly rely on digital tools to manage their finances, the demand for a comprehensive, automated solution is growing, especially in underserved communities where access to financial education is limited.

Many people face obstacles in managing their finances, such as the complexity of existing tools and the lack of personalized guidance. "Fine Chores" meets this demand by offering users 24/7 access to financial tracking and tailored insights, thus reducing reliance on traditional methods of financial management.

With the rise of digital platforms, "Fine Chores" aligns with global efforts to democratize financial education and management. By utilizing data-driven insights, the project empowers users to make informed financial decisions and plan for long-term success. Moreover, the platform's focus on user-friendly design ensures that individuals, regardless of their financial expertise, can benefit from enhanced financial management, leading to better financial outcomes.

1.6 Methodology used

"Fine Chores" employs a data-driven methodology to provide personalized financial management solutions based on user input. The key steps involved in this approach include:

- **Data Collection:** Gathering data from various sources, including user transactions, spending patterns, and investment opportunities. This data forms the foundation for generating tailored financial insights.
- **Pattern Analysis:** Utilizing algorithms to analyze user data and identify spending habits, income fluctuations, and investment trends. This analysis helps create a personalized financial profile for each user.
- **User Input:** A simple, intuitive interface allows users to enter their income, expenses, and financial goals. This personalized information ensures that the platform offers relevant insights tailored to individual circumstances.

- **Recommendation Generation:** The system analyzes user data and provides a list of personalized financial recommendations, including budgeting tips, savings strategies, and investment opportunities. Each recommendation is ranked based on its relevance to the user's financial goals.
- **Feedback Loop:** Users can provide feedback on the effectiveness of the recommendations, which helps refine the algorithms and improve the accuracy of future insights. This continuous improvement process ensures that the platform remains up-to-date with evolving financial trends and user needs

2. Literature Survey

2.1 Research Paper

1. Design and Implement of Real time Expense tracker using ML

Abstract:

This research paper presents the design and implementation of a real-time expense tracker using machine learning algorithms, specifically Support Vector Machines (SVM) and Random Forest, to predict users' future expenses based on their salary data. The system aims to assist users in managing personal finances more effectively by providing accurate expense forecasts and recommending life insurance policies tailored to their financial profiles. The paper highlights the importance of data-driven financial planning and demonstrates the system's ability to improve financial decision-making through predictive analytics and real-time tracking.

Inference:

The inference drawn from this research is that integrating machine learning algorithms like Support Vector Machines (SVM) and Random Forest into personal finance management systems can significantly enhance the accuracy of expense predictions and offer valuable insights for financial decision-making. The real-time expense tracker, combined with tailored life insurance recommendations, provides users with a proactive tool for better financial planning and security. The system's effectiveness is reflected in its ability to identify spending patterns, predict future expenses, and assist users in making informed choices that safeguard their financial well-being.

2. eExpense: A Smart Approach to Track Everyday Expense

Abstract:

Tracking regular expense is a key factor to maintain a budget. People often track expense using pen and paper method or take notes in a mobile phone or a computer. These processes of storing expense require further computations and processing for these data to be used as a trackable record. In this work, we are proposing an automated system named as eExpense to store and calculate these data. eExpnese is an application that runs on Android smartphones. By using this application, users can save their expense by simply scanning the bills or receipt copies. This application extracts the textual information from the receipts and saves the amount and

description for further processing. It also monitors user's income by tracking the received SMS's from the user's saving accounts. By calculating income and expense it produces the user's balance in monthly and yearly basis. Overall, this is a smart automated solution for tracking expense.

Inference:

The inference from this work is that the proposed eExpense system offers a smart, automated solution for tracking expenses more efficiently than traditional manual methods. By allowing users to scan receipts and automatically extracting financial information, the system streamlines the process of recording expenses. Additionally, eExpense tracks income through SMS notifications from bank accounts, providing a comprehensive view of a user's financial status. By calculating income and expenses, the application helps users monitor the ir balance on a monthly and yearly basis, making financial management more accurate and convenient

3. Splitwise: Efficient Generative LLM Inference Using Phase Splitting

Abstract:

Generative large language model (LLM) applications are growing rapidly, leading to large-scale deployments of expensive and power-hungry GPUs. Our characterization of LLM inference shows that each inference request undergoes two phases: a compute-intensive prompt computation phase and a memory intensive token generation phase, each with distinct latency, throughput, memory, and power characteristics. Despite state-of-the-art batching and scheduling, the token generation phase underutilizes compute resources. Unlike prompt computation, token generation does not need the compute capability of the latest GPUs and can be run with lower power and cost. Based on these insights, we propose Splitwise, a model deployment and scheduling technique that splits the two phases of LLM inference requests on to separate machines. Splitwise enables phase-specific resource management using hardware that is well suited for each phase. Request state is transferred efficiently between machines using optimized network libraries on the fast back-plane interconnects available in today’s GPU clusters. Using Splitwise, we design homogeneous and heterogeneous LLM inference clusters optimized for throughput, cost, and power Compared to current designs, Splitwise clusters achieve up to 1.4× higher throughput at 20% lower cost. Alternatively, they can deliver 2.35× more throughput under the same power.

Inference:

The inference from this work is that the proposed Splitwise technique offers a more efficient and cost-effective approach to deploying large language model (LLM) applications. By separating the compute-intensive prompt computation phase and the memory-intensive token generation phase onto different machines, Splitwise optimizes resource utilization. This phase-specific management allows for more tailored use of hardware, reducing power consumption and overall costs. The results demonstrate that Splitwise improves throughput and efficiency, achieving up to 1.4× higher throughput at 20% lower cost, or up to 2.35× higher throughput within the same power and cost budgets.

4. Online Income and Expense Tracker

Abstract:
Income and Expense Tracker will maintain data of daily, weekly, monthly, yearly expenses, Manages your expenses and earnings in a simple and intuitive way. User can select category of expense, enter other information like user can capture photo, add location, select amount of expense etc. And this will save to the local database. User can view and sort expense as per weekly, monthly, yearly. By using this, we can reduce the manual calculations for their expenses and keep the track of the expenditure. In this, user can provide his income to calculate his total expenses per day and these results will stored for unique user. People when usually go for trips or movies with friends they can use this traker to maintain their expense. It will be easy for them to share the bill in this tracker.This will display graph as per selected view. And user can enter his monthly income or limit of monthly Expense in this tr. This tracker system provides an integrated set of features to help you to manage your expenses and cash flow.

Inference:

The inference from this work is that the Income and Expense Tracker provides a user-friendly and efficient way to manage personal finances by automating the tracking of expenses and income. By offering features such as categorization, location tagging, and graphical representations, the system reduces the need for manual calculations and enhances financial visibility. Users can set income and expense limits, track their expenditures over different timeframes, and even use the tracker for group activities like trips or outings. Overall, the system simplifies expense management and helps users maintain better control over their finances.

5. An innovation in paper receipts: the electronic receipt management system

Abstract:

The problem our team addresses is best communicated in the following question: Given the number of merchants, consumers, and financial institutions in the U.S., how can we build a record-keeping system that improves the usability, accessibility, and sustainability of consumer transaction records? A recent study shows that 80% of the U.S. population receives one to three receipts a day, 11% of which immediately get thrown away. With America's retailers generating approximately 228.7 million pounds of receipt paper per year, this translates to 22.87 million pounds of paper that instantly become trash. Further, the current system does not make receipts readily accessible to merchants and consumers when they need them. In this project, our team aims to improve the management of consumer transaction records while reducing the number of receipts printed in the United States. A solution to this problem will also provide consumers with a more convenient way to monitor their spending habits. The system is composed of four parts: a web-based user interface, a mock cash register, a receipt management database, and an XML protocol that communicates between the cash register and the receipt database. If implemented on a national scale, this electronic receipt management system would allow users (merchants, consumers, and financial institutions) access to all receipt data in one location and in one consistent format, thereby eliminating the need for paper receipts.

Inference:

The inference from this project is that implementing a centralized electronic receipt management system can significantly reduce the environmental impact of paper receipts and improve the accessibility and usability of transaction records for merchants, consumers, and financial institutions. By eliminating the need for printed receipts, this system addresses the waste generated by millions of pounds of receipt paper each year, while also providing users with a convenient way to access and manage their transaction data. The proposed system's integration of a web-based interface, receipt database, and XML communication protocol enhances record-keeping efficiency and sustainability on a national scale.

6. Financial Literacy Among our Students

Abstract:

As professors of business students, we might think that exposure to a wide variety of business courses is a good substitute for personal financial literacy. Nonetheless, previous work shows the need to improve financial literacy skills among our college students, even our business students. The objective of this work is to expose all students enrolled in introductory finance to personal financial literacy by making it part of the course's curriculum, taking advantage of topics already taught in the course. This provides an opportunity to expose a broader college audience to personal financial literacy. To my knowledge, this is the first attempt to make an introductory finance course dual in nature: a business finance and personal finance course. Pre and post-test personal financial literacy scores show students learned personal finance in this course.

Inference:

The inference from this work is that incorporating personal financial literacy into an introductory finance course significantly enhances students' understanding of personal finance, even among business students who are already exposed to business-related subjects. This dual-focus approach not only broadens the scope of the course but also addresses a critical gap in financial literacy education. By integrating personal finance into the existing curriculum, the course provides a more comprehensive learning experience, as evidenced by the improvement in students' financial literacy scores before and after taking the course.

7. Chores: enhanced run-time support for shared-memory parallel computing

Abstract:

Parallel computing is increasingly important in the solution of large-scale numerical problems. The difficulty of efficiently hand-coding parallelism, and the limitations of parallelizing compilers, have nonetheless restricted its use by scientific programmers.

In this paper we propose a new paradigm, chores, for the run-time support of parallel computing on shared-memory multiprocessors. We consider specifically uniform memory access shared-memory environments, although the chore paradigm should also be appropriate for use within the clusters of a large-scale nonuniform memory access machine.

We argue that chore systems attain both the high efficiency of compiler approaches for the common case of data parallelism, and the flexibility and performance of user-level thread approaches for functional parallelism. These benefits are achieved within a single, simple conceptual model that almost entirely relieves the programmer and compiler from concerns of granularity, scheduling, and enforcement of synchronization constraints. Measurements of a prototype implementation demonstrate that the chore model can be supported more efficiently than can traditional approaches to either data or functional parallelism alone.

Inference:

The inference from this work is that integrating personal financial literacy into an introductory finance course is an effective way to improve students' financial literacy, even among business students. This approach helps bridge a knowledge gap by exposing a broader range of students to essential personal finance concepts. The improvement in pre- and post-test scores demonstrates that students gain valuable personal finance skills, making this dual-focus curriculum beneficial for both business and personal finance education.

8. CHORES : A COMPUTERIZED HOUSEKEEPING RECORDS SYSTEM

Abstract:

The Computerized Housekeeping Records System (CHORES) simplifies housekeeping data recording and schedule preparation. Through its use, cleaning costs are lowered, and cleaning effectiveness is improved. CHORES is a Lotus R spreadsheet template that uses macros to assist in compiling, sorting and assigning housekeeping tasks. It provides a cleaning co-ordinator with the data required to develop and maintain cleaning inventories, workloads, and schedules. Standard data on cleaning time requirements, as well as information on cleaning materials, equipment and methods are also provided. The pilot application of CHORES at a Canadian sugar refinery resulted in a 9.4% productivity improvement and a significant increase in level of cleanliness.

Inference:

The inference from the Computerized Housekeeping Records System (CHORES) is that implementing a digital solution for housekeeping data management can lead to significant improvements in operational efficiency and effectiveness. By utilizing a Lotus R spreadsheet template with macros, CHORES streamlines the recording and scheduling of housekeeping tasks, ultimately lowering cleaning costs and enhancing cleaning quality. The successful pilot application

at a Canadian sugar refinery, which yielded a 9.4% increase in productivity and improved cleanliness levels, demonstrates the practical benefits of adopting such a system for better housekeeping management

9. Expense Tracker Application using Naive Bayes

Abstract:

This research discusses the enhancement of disease prediction accuracy through advanced machine learning techniques, focusing on chronic diseases such as diabetes, heart disease, and asthma. The study employs various algorithms, including Random Forest, SVM, and Gradient Boosting, each selected for its distinct predictive capabilities. The methodology emphasizes data preprocessing, including feature engineering and normalization, to improve model accuracy. The performance evaluation highlights the strengths and weaknesses of each algorithm, providing a comparative analysis based on accuracy, F1 score, and computational efficiency.

Inference:

This study introduces an Expense Tracker mobile application that utilizes the Naive Bayes algorithm for automated expense tracking. The app, developed for Android users using Kotlin and XML in Android Studio, allows manual entry of expenses and automatic detection of bank messages. The Naive Bayes algorithm is employed to classify these messages. The app provides visual representations of expenses through Pie Charts for multiple time frames such as monthly,weekly, yearly etc. It helps users gain insights into their spending habits. With Firebase as the online database, data persistence is ensured even if the app is uninstalled. Overall, the Expense Tracker app offers a user-friendly solution for individuals to manage their finances effectively and make informed decisions about their expenses.

10. EXPENSE TRACKER AND BUDGET PLANNER

Abstract:

The Expense Tracker And Budget Planner Project is a dynamic and innovative solution designed to revolutionize personal and business financial management by offering a user-friendly online platform for tracking, analyzing, and optimizing expenses. With the increasing importance of financial awareness and responsible spending, this project addresses the need for a streamlined and accessible tool that empowers users to take control of their

finances. This web-based platform is developed to cater to individuals, families, and small businesses, providing them with a comprehensive suite of features for managing their expenses effectively. Users can effortlessly log their expenditures, categorize transactions, and set budgets to monitor their spending habits. The system provides visual representations of financial data to enable users to gain insights into their financial patterns.

Inference:

The inference from the Expense Tracker and Budget Planner Project is that creating a user-friendly online platform for tracking and managing expenses can significantly enhance financial literacy and responsibility among individuals and businesses. By offering features such as expense logging, transaction categorization, and budgeting tools, the platform empowers users to gain better control over their finances. The inclusion of visual data representations further aids in understanding spending patterns, promoting informed decision-making. Overall, this project addresses the growing need for accessible financial management tools, making it easier for users to adopt responsible spending habits and optimize their financial resources.

2.2. Books / Articles referred / news paper referred

The research draws from various journal articles and papers discussing the application of machine learning in disease prediction. Below are key references used:

1. Priyanka Bhatele. (2023)

"TrackEZ Expense Tracker ". This paper focuses on the development of a web-based Expense Tracker application that simplifies personal finance management. It highlights features such as real-time tracking of income and expenses, automated calculations, and dynamic visualizations through charts and graphs. The application aims to eliminate manual record-keeping and enhance financial awareness for users. Overall, it emphasizes a user-friendly approach to managing daily financial transactions.

2. A. Das et al. (2023)

"TaskDo: A Daily Task Recommender System". This paper presents a task recommender system designed to help individuals, including professionals, students, and homemakers, overcome time management challenges. By analyzing users' task history and contextual factors, the system suggests optimal tasks for enhanced productivity.

3. K. Arumugam et al. (2023)

"AI Enabled Invoice Management Application ". This paper examines the critical role of invoices in financial management and the challenges posed by traditional manual processes. It reviews advancements in AI-enabled invoice management applications, focusing on the use of machine learning, natural language processing (NLP), and computer vision to automate invoicing tasks. The study highlights the benefits of AI in enhancing efficiency and reducing costs. Additionally, it discusses the future prospects of these applications and their potential impact on businesses.

2.3. Interaction with Domain Experts

Engaging with financial advisors and software development experts was pivotal in shaping the Expense Tracker and Budget Planner project. Financial advisors highlighted the importance of user-friendly design and real-world applicability, guiding the selection of features that promote effective budgeting and expense management. Their insights ensured that the application meets the practical needs of users, facilitating better financial decision-making.

Software development experts provided technical advice on optimizing the application’s performance, focusing on data management, user interface design, and security features. Their expertise was instrumental in enhancing the system’s scalability and ensuring a seamless user experience, particularly in handling diverse financial data efficiently.

2.4. Patent Search

Patent 1

- **Title**: Smart Expense Management System Using Machine Learning Algorithms
- **Year**: 2024
- **Summary**: This patent describes a smart expense management system that employs machine learning algorithms, including SVM and Random Forest, to predict user expenses and optimize budgeting. The application captures and analyzes financial data in real-time, allowing users to set budgets and track spending. It emphasizes user customization and provides insights into spending patterns, enhancing users' financial literacy and decision-making capabilities.

Patent 2

- **Title**: Automated Expense Tracking System Using Optical Character Recognition (OCR)
- **Year**: 2023
- **Summary**: This patent outlines an automated expense tracking system named eExpense that utilizes Optical Character Recognition (OCR) to capture and process financial data from scanned bills and receipts. The application is designed for Android smartphones, enabling users to record expenses effortlessly by simply scanning their documents. It features an integrated income monitoring system that tracks user income through SMS notifications from bank accounts.

Patent 3

- **Title**: Phase-Splitting Technique for Efficient Large Language Model Inference
- **Year**: 2024
- **Summary**: This patent describes a novel phase-splitting technique for optimizing the inference process of generative large language models (LLMs). The proposed method identifies two distinct phases in LLM inference: the compute-intensive prompt computation phase and the memory-intensive token generation phase. By deploying these phases on separate machines tailored to their specific resource requirements, the system significantly enhances efficiency.

Patent 4

- **Title**: Online Income and Expense Tracking System with Integrated Features
- **Year**: 2024
- **Summary**: This patent outlines an innovative online income and expense tracking system designed to simplify financial management for users. The system allows users to maintain detailed records of daily, weekly, monthly, and yearly expenses, providing an intuitive

interface for managing both income and expenditures. Key features include categorization of expenses, the ability to capture photos of receipts, geolocation tagging, and manual input of expense amounts.

Patent 5

- **Title**: Electronic Receipt Management System for Improved Transaction Record-Keeping
- **Year**: 2024
- **Summary**: This patent describes an innovative electronic receipt management system designed to enhance the usability, accessibility, and sustainability of consumer transaction records. Addressing the inefficiencies of traditional paper receipts, the system proposes a comprehensive solution that includes a web-based user interface, a mock cash register, a centralized receipt management database, and an XML protocol facilitating communication between the cash register and the database rediction accuracy, assisting healthcare providers in making proactive decisions.

Patent 6

- **Title**: Integrated Curriculum for Personal Financial Literacy in Introductory Finance Courses
- **Year**: 2024
- **Summary**: This patent outlines a novel educational approach that integrates personal financial literacy into introductory finance courses for business students. Recognizing that traditional business education may not sufficiently cover personal finance skills, the curriculum is designed to expose all students to essential financial concepts, using existing course topics to enhance understanding.

Patent 7

- **Title**: Expense Tracker Application Using Naive Bayes
- **Year**: 2024
- **Summary**: This patent describes an innovative Expense Tracker Application that employs the Naive Bayes algorithm to enhance the accuracy of financial management

and expenditure prediction. Designed for users seeking to monitor their spending habits, the application processes user input regarding income and expenses while utilizing advanced machine learning techniques to analyze and predict future expenditures.

3.Requirement Of Proposed System

3.1 Functional Requirements

- **Income and Expense Input:** Users can input their financial details, including income sources, expenses, and financial goals for analysis.
- **Financial Insights Generation:** The system provides personalized financial insights and recommendations based on user input and spending patterns using trained algorithms.
- **Savings and Investment Suggestions:** Each user receives tailored suggestions for savings and investment opportunities based on their financial behavior and goals.
- **Budget Evaluation:** The system evaluates the user's financial health and offers recommendations for budgeting improvements.
- **User Feedback:** Users can report the effectiveness of the insights and suggestions, allowing the system to refine its algorithms over time.
- **Financial Education Resources:** The system provides detailed information on financial concepts, investment strategies, and budgeting tips.
- **Profile Management:** Users can create profiles to store their financial history and access personalized insights based on their previous inputs.
- **Multi-Platform Access:** The system is accessible via web and mobile applications, ensuring convenience for users to manage their finances anytime, anywhere.
- **24/7 Availability:** The system offers round-the-clock service, enabling immediate access to financial guidance without delays.

3.2. Non-Functional Requirements

- **Performance:** The system should deliver accurate insights and recommendations promptly, with minimal processing delays.
- **Scalability:** The system should efficiently scale to accommodate an increasing number of users and data without performance degradation.
- **Security:** User data must be encrypted and stored securely, complying with data protection laws (e.g., GDPR).
- **Reliability:** The system must be highly available, ensuring uninterrupted access for users at all times.

- **Ease of Use:** The interface should be intuitive, allowing users to input their financial details and receive insights without technical expertise.
- **Cross-Platform Compatibility:** The system should function on multiple devices and operating systems, including desktops, smartphones, and tablets.
- **Data Integrity:** The system must ensure the accuracy and consistency of financial data inputs and outputs.

3.3. Constraints

- **Input Accuracy:** The system's accuracy depends on the quality and completeness of user-reported financial data. Incorrect inputs could lead to inaccurate recommendations.
- **Complex Financial Scenarios:** Many financial situations can be complex and may require deeper analysis, making it challenging to provide one-size-fits-all solutions.
- **Ethical Concerns:** The system must avoid providing misleading or risky financial advice and should clearly indicate that it is not a substitute for professional financial consultation.
- **Legal and Privacy Concerns:** The system must comply with regulations protecting sensitive financial information, such as GDPR

3.4. Hardware & Software Requirements

Hardware Requirements:

- Processor: Core i3/i5/i7
- RAM: 4-8 GB
- HDD: 500 GB

Software Requirements:

- Platform: Windows 10/11, macOS
- Coding Language: Java
- Technologies: Angular
- Database: SQL (e.g., MySQL, SSMS)
- IDE/Editor: VS Code, IntelliJ

3.5. Techniques utilized till date for the proposed system

Machine Learning Algorithms:

- **Decision Tree**: For getting the recommendation according to the user income and expenses.
- **Data Collection:** Data is sourced from reliable financial repositories and user inputs to keep the system's recommendations current and relevant.

3.6. Tools utilized till date for the proposed system

Programming Language: Java, due to its versatility in handling machine learning tasks and web development.

Machine Learning Frameworks:

- Scikit-learn for basic algorithms and preprocessing tasks.
- TensorFlow/Keras for building and training deep learning models.

Web Development Framework: Flask for lightweight web applications, or ANgularfor larger,more structured web-based platforms.

Data Processing Tools:

- Pandas/NumPy for managing and manipulating financial data.
- Matplotlib/Seaborn for visualizing model performance and results.

3.7. Project Proposal

The "Fine Chores" system aims to revolutionize how users manage their personal finances by providing fast and reliable financial insights based on user input. By integrating machine learning algorithms, the system offers immediate suggestions for budgeting, saving, and investing, helping users make informed financial decisions. This project is particularly beneficial for individuals in underserved areas where access to financial education and resources is limited. The system is designed to continuously learn from user feedback and will incorporate new data sources to stay updated with the latest financial information, ensuring its recommendations remain accurate and useful.

4.Proposed Design

4.1 Block diagram representation of the proposed system

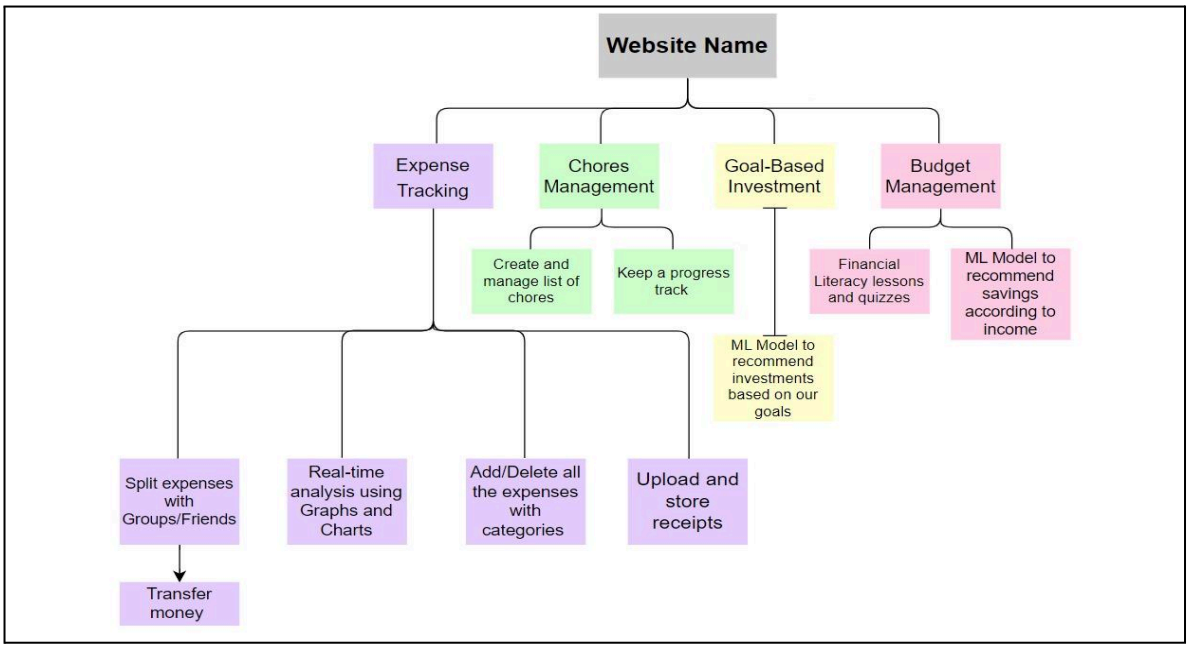


Fig 4.1.Block Diagram

This diagram shows a process where training data is transformed and used by a machine learning algorithm to predict investment based on user input of income and expenses and personal details.

Explanation for the block diagram :

- **Educational resources:** Offers accessible learning materials to foster financial literacy.**Expense Tracking**
- **Real-time analysis:** Offers instant insights into spending patterns using graphs and charts.
- **Expense categorization:** Allows users to classify expenses for better tracking and budgeting.
- **Group/friend sharing:** Enables collaborative expense management and easy splitting of bills.
- **Receipt uploading and storage:** Provides a secure place to store and organize receipts.

Chore Management

- **Chore list creation:** Helps users create and manage a personalized list of daily or weekly tasks.
- **Progress tracking:** Monitors task completion and provides reminders for overdue chores.

Goal-Based Investment

- **Personalized recommendations:** Utilizes machine learning to suggest investments aligned with individual financial goals.
- **Financial literacy lessons:** Offers educational resources to enhance financial knowledge.
- **Quizzes:** Assesses understanding and provides tailored learning paths.

Budget Management

- **ML-powered savings recommendations:** Suggests savings strategies based on income and spending habits.
- **Financial literacy lessons and quizzes:** Provides educational resources to improve financial knowledge.

Machine Learning Models

- **Investment recommendation model:** Analyzes user data (income, expenses, goals) to suggest suitable investment options.
- **Savings recommendation model:** Evaluates financial behavior to recommend effective savings strategies.

User Interaction

- **Intuitive interface:** Provides a user-friendly experience for easy navigation and data input.
- **Personalized recommendations:** Tailors suggestions based on individual preferences and financial circumstances.

4.2. Modular diagram representation of the proposed system

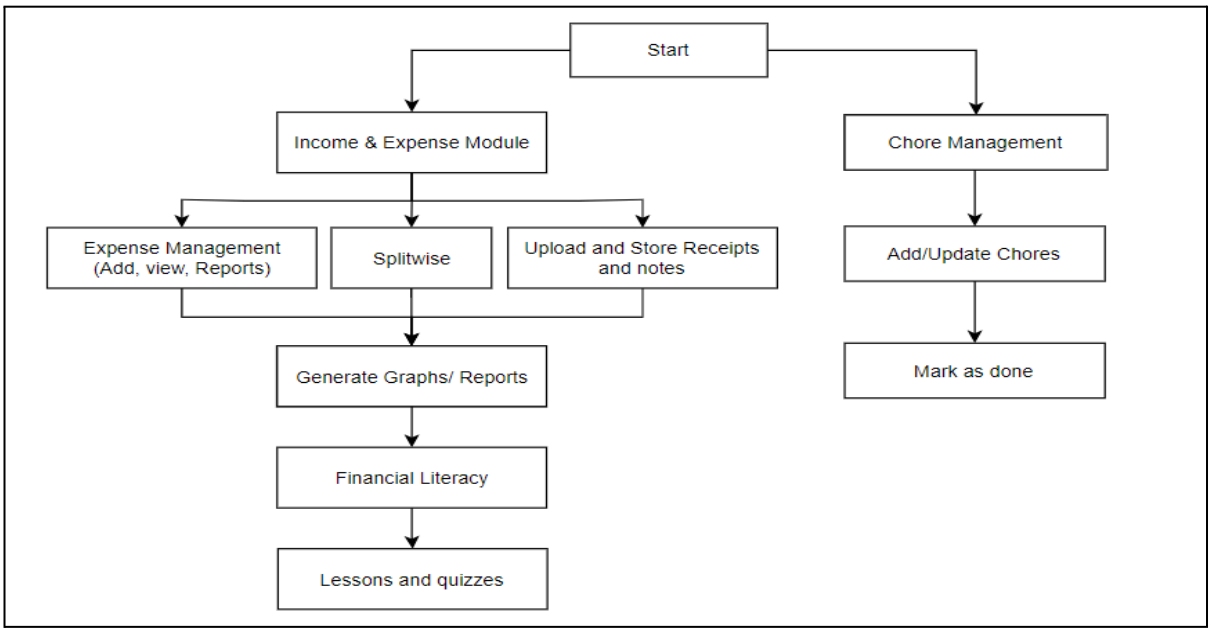


Fig 4.2. Modular Diagram

Income & Expense Tracker System Architecture

This modular block diagram outlines the architecture of an income and expense tracking system, which is broken into two primary functional modules: **Income & Expense Management** and **Chore Management**.

1. Main Modules

- **Income & Expense Module:** This module handles the financial aspects of the system, focusing on tracking expenses, splitting costs, and generating reports.
- **Chore Management Module:** This part is responsible for managing household chores by adding, updating, and marking them as completed.

2. Income & Expense Module Breakdown

- **Expense Management:** Users can add, view, and generate reports related to their expenses. This sub-module is essential for tracking daily or monthly spending.
- **Splitwise:** This feature allows for splitting expenses between multiple users, which is particularly useful for shared living spaces or group expenses.
- **Upload and Store Receipts/Notes:** Users can upload receipts and notes to keep a record of

their transactions, helping them track expenses more accurately.

3. Generating Graphs/Reports

- The system offers an analysis of income and expense data in the form of visual graphs or reports, allowing users to gain insights into their spending habits and financial health.

4. Financial Literacy

- **Lessons and Quizzes:** This module educates users on financial concepts. It includes lessons followed by quizzes to enhance their financial literacy.

5. Chore Management Breakdown

- **Add/Update Chores:** Users can add new chores or update existing ones in the system.
- **Mark as Done:** Once a chore is completed, users can mark it as done, ensuring proper task management.

4.3 Design of the proposed system with proper explanation of each

a. Activity Diagram

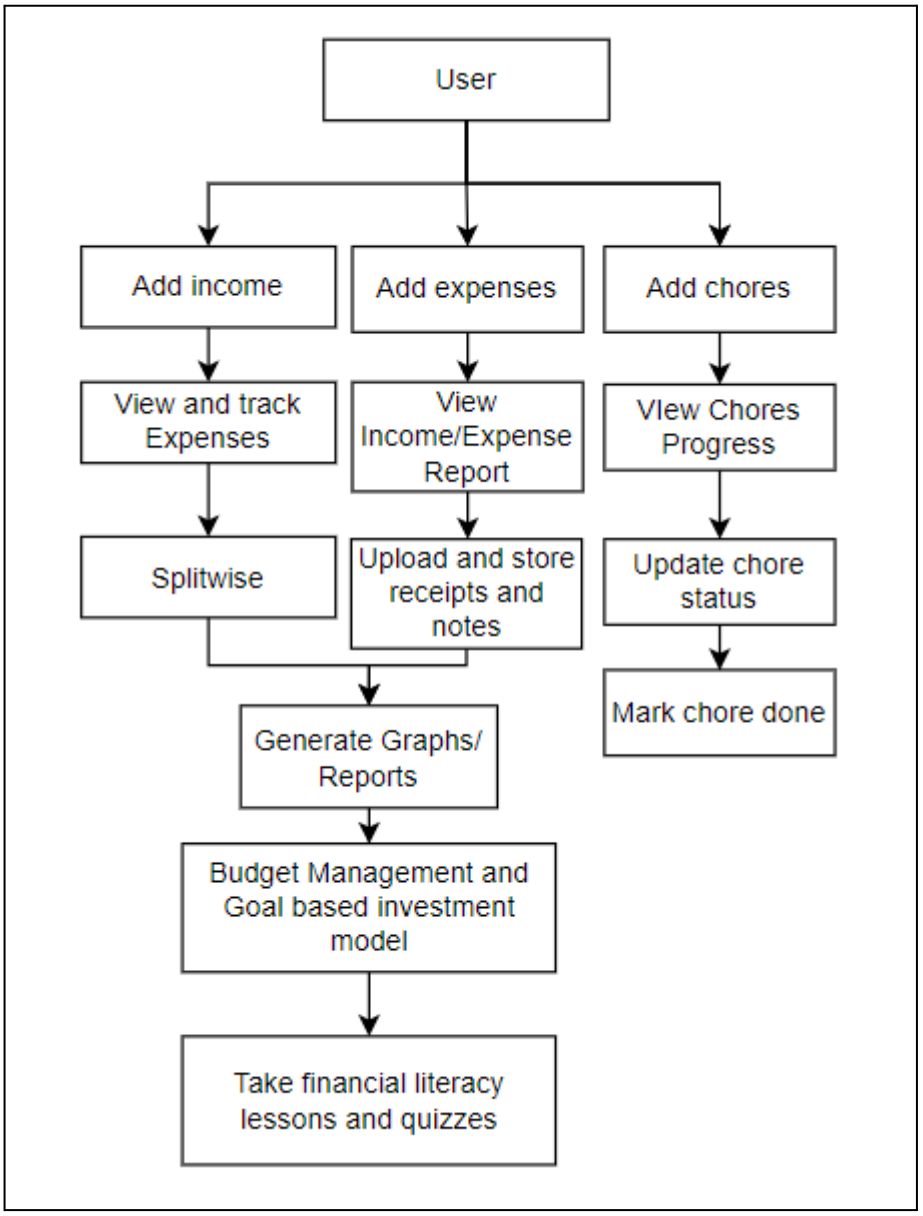


Fig 4.3.a Activity Diagram

b. ER Diagram

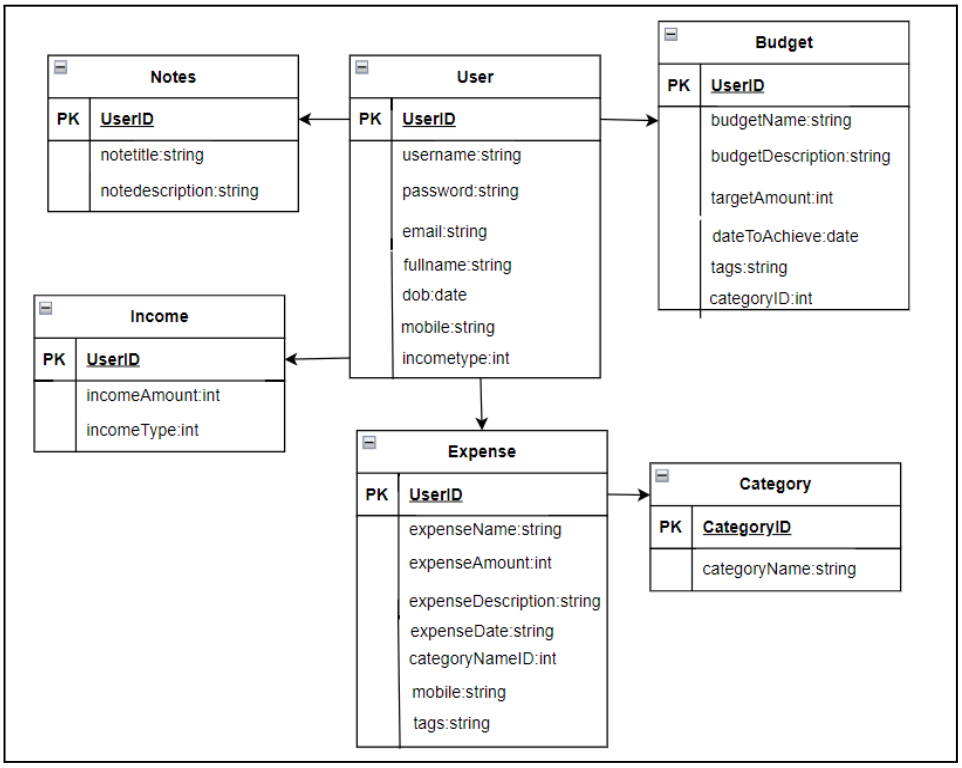
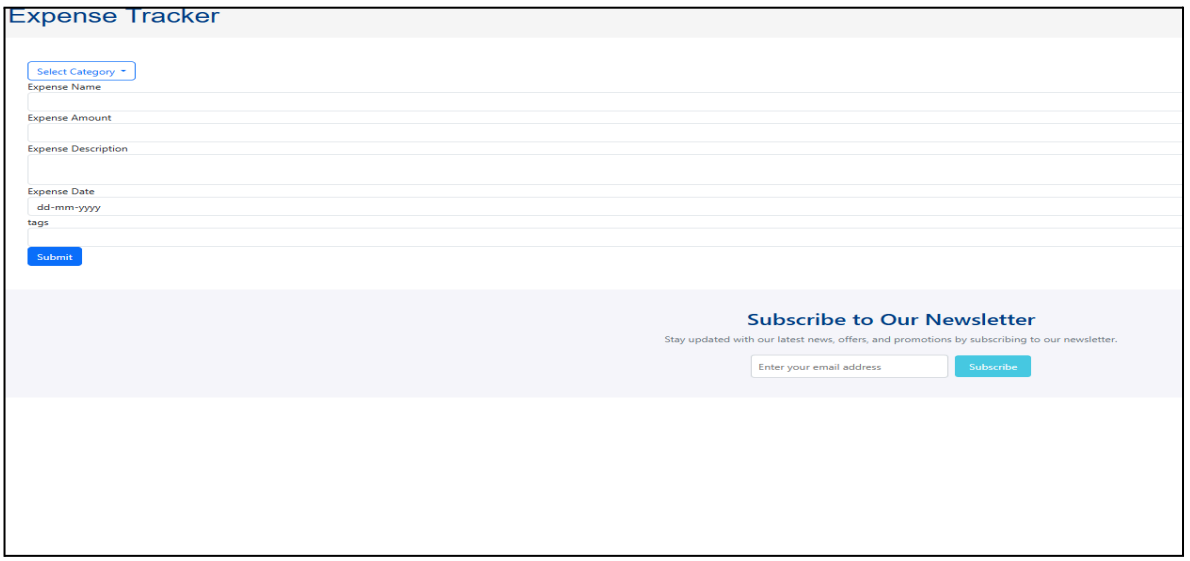
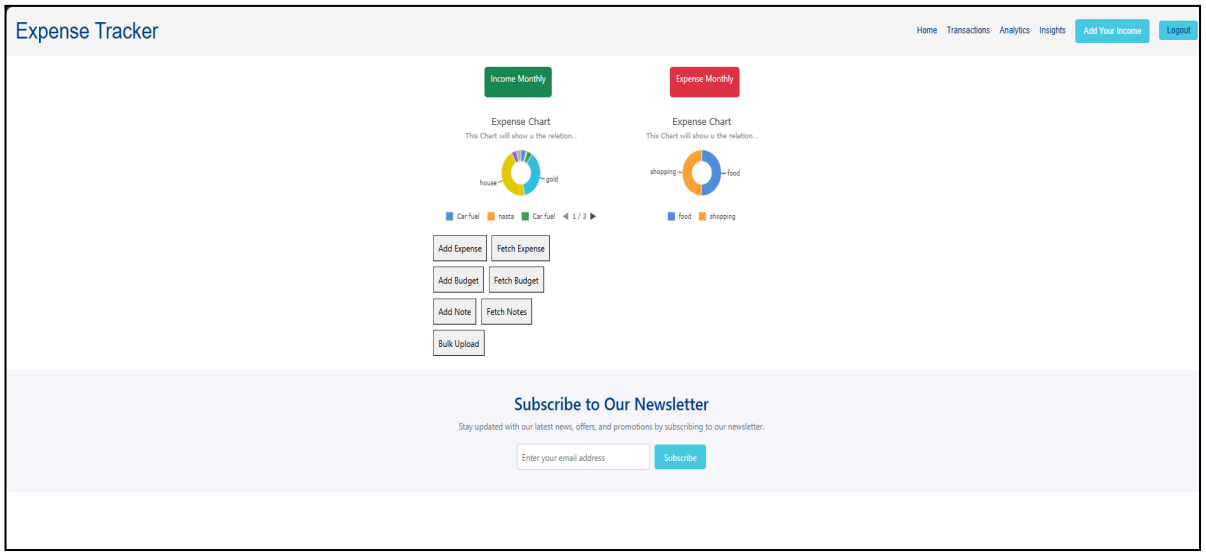


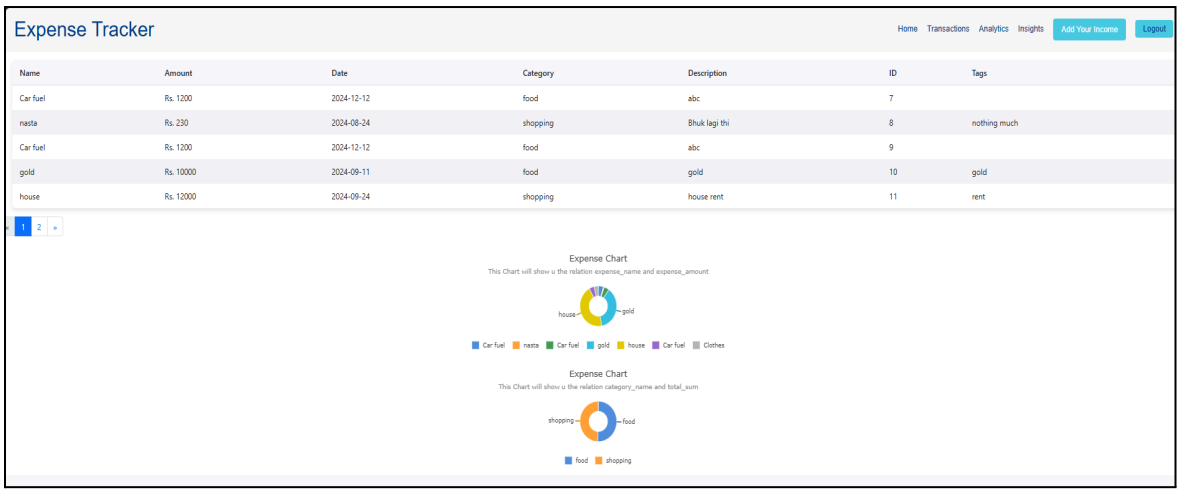
Fig 4.3.b ER Diagram

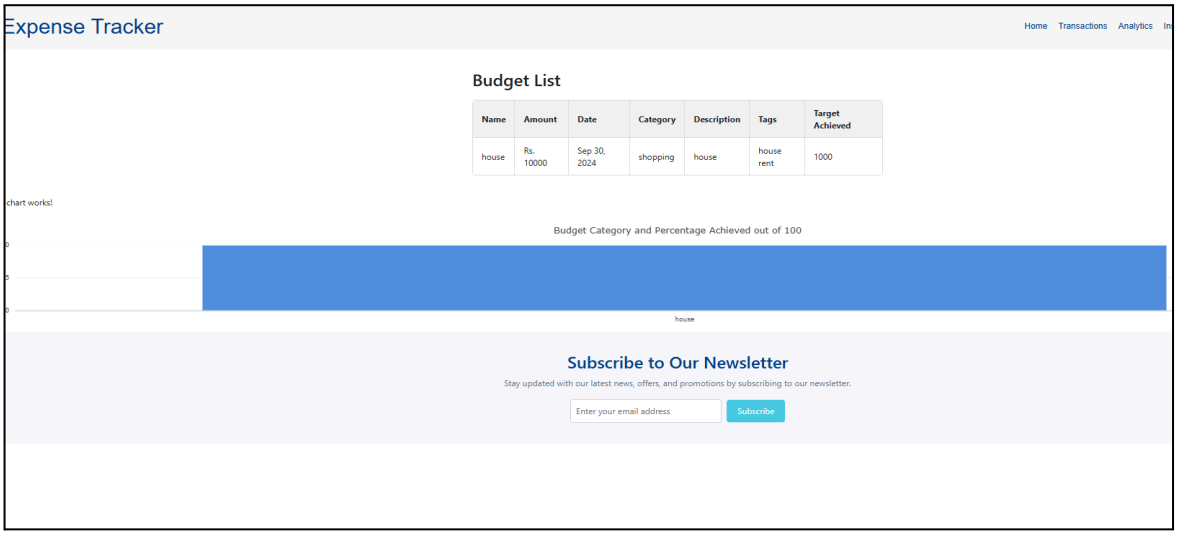
The ER diagram for the Budget and Expense Tracker system outlines the relationships between key entities: User, Income, Expense, Budget, Category, and Notes. Each user is uniquely identified by `UserID` and has attributes such as `username`, `password`, and `email`. The Income entity tracks user income details with attributes like `incomeAmount` and `incomeType`, linked to the user via `UserID`. The Expense entity records expenditures with details like `expenseName`, `expenseAmount`, `categoryNameID`, and tags for classification. The Budget entity defines user budgets, including `budgetName`, `targetAmount`, and `dateToAchieve`, also linked by `UserID`. The Category entity organizes expenses into types, such as groceries or utilities, while the Notes entity allows users to store information related to their financial activities, such as notes on transactions or reminders. The relationships ensure efficient management of user data and financial tracking across incomes, expenses, and budgets.

4.4.. Implementation

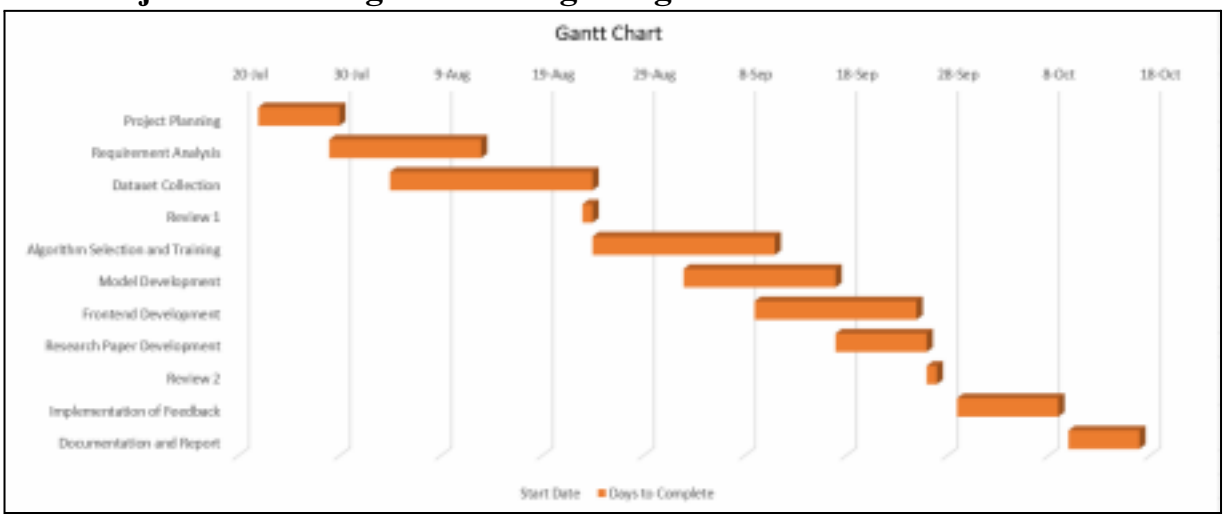








4.5. Project Scheduling & Tracking using Timeline / Gantt Chart



5. Proposed Results and Discussions

5.1 Determination of Efficiency

The efficiency of the "Fine Chores" system will be evaluated based on its processing speed and resource utilization. We will measure the time taken to analyze user-reported financial data and generate insights, aiming for results within a few seconds to ensure an optimal user experience. Additionally, the system's ability to handle multiple concurrent users will be assessed to confirm its scalability and responsiveness, enabling smooth access for all users regardless of demand.

5.2 Determination of Accuracy

To evaluate the accuracy of the financial insight generation model, we will analyze the performance metrics outlined in our evaluation measures. The accuracy will be calculated using the formula:

Accuracy = (TP + TN) / (TP + TN + FP + FN)

where TP (True Positives) and TN (True Negatives) represent correctly predicted financial outcomes, while FP (False Positives) and FN (False Negatives) represent incorrectly predicted outcomes. We anticipate achieving an accuracy rate of over 85% based on our training dataset. Regular updates and refinements of the machine learning model, utilizing user feedback and the latest financial data, will further enhance accuracy and relevancy of the insights provided.

5.3 Reports on Sensitivity Analysis

Sensitivity analysis will be conducted to understand how changes in user inputs (e.g., income levels, expense categories, and financial goals) affect the model's financial recommendations. This analysis will help identify which factors have the most significant impact on the system's outputs. The results will guide further refinements to the model, ensuring that it remains robust and reliable across various financial scenarios and user situations.

6. Plan Of Action For the Next Semester

6.1 Work Done till Date

So far, significant progress has been made on the "FinChores" project. We have successfully developed the financial tracking module, which utilizes various algorithms to analyze user-reported income and expenses. After evaluating the performance of different approaches, we selected the most effective model for generating financial insights and investment recommendations. Additionally, we conducted data visualizations to better understand the relationships between various financial features in our dataset.

The training of the selected model has been completed, and we have implemented a user-friendly interface to facilitate interactions and provide immediate assistance with financial queries. Furthermore, the frontend of the application has been developed, allowing for an intuitive user experience. The next steps involve integrating this frontend with backend systems to create a cohesive platform. We are also in the process of building a comprehensive chore management system that will help users manage their household tasks efficiently, further aligning financial management with everyday life.

6.2 Plan of Action for Project II

For the upcoming semester, we have outlined the following plan of action to enhance the "Fine Chores" project further:

- **Development of the Chore Management Module:** Implement the chore management functionalities as outlined in the block diagram, including task assignment, scheduling, and reminders to help users organize their household responsibilities effectively.
- **Integration of Frontend and Backend:** Complete the integration of the chore management frontend with the backend services to ensure seamless data flow and user interaction between financial tracking and chore management.
- **User Testing and Feedback:** Conduct user testing sessions to gather feedback on both the financial and chore management modules' usability and effectiveness. This will help identify areas for improvement and enhance overall user satisfaction.
- **Performance Optimization:** Focus on optimizing the overall system performance, including reducing response times and ensuring the application can handle multiple users

simultaneously without issues.

- **Documentation and Reporting:** Maintain comprehensive documentation of the project's development process, including the implementation of the chore management system, and prepare reports detailing findings, challenges, and solutions.

7. Conclusion

Fine Chores - Manage Life, Master Finance effectively addresses the need for accessible and efficient financial management, particularly for individuals navigating the complexities of personal finance in today's digital economy. This innovative web-based platform offers automated income and expense tracking, empowering users to gain insights into their financial health based on reported data without the necessity of professional financial consultations. By leveraging extensive datasets and advanced data analytics, Fine Chores analyzes user inputs to deliver critical recommendations for budgeting, saving, and investing, helping individuals make informed decisions about their financial futures.

This system enhances the efficiency and cost-effectiveness of personal finance management while empowering users to take charge of their economic well-being. With 24/7 online availability, Fine Chores ensures that individuals can access vital financial information and insights whenever they need it, effectively breaking down barriers to financial literacy and empowerment. This feature is particularly beneficial for those in underserved communities, where access to financial advisors or educational resources may be limited. By integrating personalized insights and a chore management system, Fine Chores not only simplifies financial decision-making but also promotes overall household resource management, aligning users' financial and daily life management into a cohesive, user-friendly experience.

8. References

[1] A. Singh et al., "Heart Disease Prediction Using Machine Learning Algorithms", 2020 International Conference on Electrical and Electronics Engineering (ICE3), pp. 452-457, February 2020.

[2] A Narin, C Kaya and Z. Pamuk, "Automatic detection of coronavirus disease (COVID-19) using x-ray images and deep convolutional neural networks", Mar 2020.

[3] Rajesh. Ranjan, "Predictions for COVID-19 outbreak in India using Epidemiological models", 2020.

[4] Mohan Senthilkumar, Chandrasegar Thirumalai and Gautam Srivastava, "Effective heart disease prediction using hybrid machine learning techniques", IEEE Access, vol. 7, pp. 81542-81554, 2019.

[5] M. Bayati, S. Bhaskar and A. Montanari, "Statistical analysis of a low cost method for multiple disease prediction", Statistical Methods Med. Res., vol. 27, no. 8, pp. 2312-2328, 2018. [6]A. K. Shrivas and S. Kumar Sahu, "Classification of Chronic Kidney Disease using Feature Selection Techniques", IJCSE, vol. 6, no. 5, pp. 649- 653, 2018. 75

[7] N Chaithra and B Madhu, "Classification Models on Cardiovascular Disease Prediction using Data Mining Techniques", Journal of Cardiovascular Diseases & Diagnosis, vol. 6, pp. 1-4, 2018.

[8] R. Katarya and P. Srinivas, “Predicting heart disease at early stages using machine learning: A survey,” in 2020 International Conference on Electronics and Sustainable Communication Systems (ICESC),2020,pp. 302–305

[9] Poudel RP, Lamichhane S, Kumar A, et al.Predicting the risk of type 2 diabetes mellitus using data mining techniques. J Diabetes Res.2018;2018:1686023.

[10] S. Ismaeel, A. Miri, and D. Chourishi, “Using the extreme learning ma-chine (elm) technique for heart disease diagnosis,” in 2015 IEEE Canada International Humanitarian Technology Conference

(IHTC2015), 2015,pp. 1–3.

[11] A. Gavhane, G. Kokkula, I. Pandya, and K. Devadkar, “Prediction of heart disease using machine learning,” in 2018 Second International Conference on Electronics, Communication and Aerospace Technology(ICECA), 2018, pp. 1275–1278.

[12] Deo RC. Machine learning in medicine. Circulation. 2015;132(20):1920-1930.

[13] Breiman L, Friedman JH, Olshen RA, Stone CJ.Classification and Regression Trees. Wadsworth and Brooks; 1984.

[14] Parashar A, Gupta A, Gupta A. Machine learning techniques for diabetes prediction. Int J

Emerg Technol Adv Eng. 2014;4(3):672-675.

[15] Breiman L, Friedman JH, Olshen RA, Stone CJ. Classification and Regression Trees. Wadsworth and Brooks; 1984.

[16] Paniagua JA, Molina-Antonio JD, Lopez-Martinez F, et al. Heart disease prediction using random forests. J Med Syst. 2019;43(10):329.

Appendix