Department of Information Science and Engineering

A Minor Project Report On

"PennyWise"

IS6C06

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Certificate

Certifies that the minor project titled “**PennyWise** ” is presented by **S VEERENDRAREDDY** bearing USN **4NI20IS089** , **SAMMED C JAIN** bearing USN **4NI20IS095, VADIRAJ KARNAM** bearing USN **4NI20IS123, YASHWANTH S GOWDA** bearing USN **4NI20IS126** in partial fulfillment for the requirements of the sixth semester BE in Information Science & Engineering prescribed by The National Institute Of Engineering, Autonomous Institution under Visvesvaraya Technological University, Belagavi, It is certified that all correction/suggestions indicated for Internal Assessment have been incorporated. The project report has been approved as it satisfies the academic requirements in respect of the Minor Project prescribed for the sixth semester.

Signature of Guide	Signature of HoD	Signature of the Principal
(Dr. P Devaki)	(Dr. Girish)	(Dr. Rohini Nagapadma)

Name of the Examiners **Signature with Date**

1.

2.

ABSTRACT

The project titled **“PennyWise”** is a web-application that’s an expense tracking solution to simplify user's money management. This is an application that helps users to keep an accurate record of their money inflow and outflow. Many people in India live on a fixed income, and they find that towards the end of the month they don’t have sufficient money to meet their needs. While this problem can arise due to low salary, invariably it is due to poor money management skills.

In today's fast-paced world, managing expenses has become a significant concern for individuals and businesses. Keeping track of expenses can be difficult and time-consuming, especially when dealing with multiple accounts and payments. An Expense Tracker is a web application that can help users keep track of their expenses by automatically categorizing transactions and providing detailed reports.

An Expense Tracker application offers several advantages to its users, including improved Financial Management, the application helps users to manage their finances better by tracking their expenses and providing reports. Users can gain insights into their spending habits and make informed decisions about their finances. Time-Saving, the application automates the process of tracking expenses, saving users time and effort to categorize their expenses. Increased Efficiency, with the application's automatic categorization feature, users can easily organize and track their expenses without any hassle.

ACKNOWLEDGEMENT

We would like to express my heartfelt gratitude to the following individuals who have played an instrumental role in the successful completion of our Minor Project. Their guidance, support, and expertise have been invaluable at every stage of the project preparations.

First and foremost, we express our profound thanks to **Dr. Rohini Nagapadma,** Principal, NIE, Mysuru for her much-needed moral support and encouragement.

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Special thanks to our project Guide **Dr. P Devaki** for her unwavering guidance, patience, and insightful feedback throughout the entire project. Her expertise and mentorship have truly shaped the outcome of our work.

We thank our Minor project coordinator **Mrs. Shwetha S,** Assistant Professor, Dept. of I.S.&E, for her much-needed assistance and support during this Minor project.

Also, we would like to extend our sincere regards to all the teaching and non-teaching staff of the IS&E Dept. for their timely support.

We are truly fortunate to have had such an incredible support system throughout this project, and we extend our sincere thanks to each and every person mentioned above. Your contributions have made a significant impact on the success of our Minor Project, and for that, we are truly grateful.

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INTRODUCTION

In today’s world where people spend money every day on so many different things and put very little effort to think what they are spending on and try to manage their expenses which often leads to them having to be with zero savings after each month, so it's been evident that money management has become a key skill for an individual to survive and have a comfortable and peaceful life. Many people in India live on a fixed income, and they find that towards the end of the month they don’t have sufficient money to meet their needs. While this problem can arise due to low salary, invariably it is due to poor money management skills.

Managing expenses has become a significant concern for individuals these days. Keeping track of expenses can be difficult and time-consuming. The project titled PennyWise is an expense tracking web application which helps the user to track and analyze all the expenses. The improvement in technology and overwhelming use of AI validates the point that life is easy if we have technologies that make complex work simplified. Our application does the most of the work and gives the user a detailed visual representation on their spending habits and records which may indicate to a user what they may have to improve on.

1.1 Purpose: -

The purpose of this project is to develop a comprehensive tool that empowers users to efficiently manage their personal expenses and loans. Through the use of intuitive graphs and charts, it enables users to effortlessly track their expenses. By simplifying the tasks associated with money management, Pennywise aims to save user’s time and helps to analyze their overall spending habits.

1.2 Objectives: -

i. Expense and Loan Tracking: To Design and develop a Web Application that enables users to keep track of their expenses and loans.

ii. Categorization : To provide an automatic categorization feature by incorporating machine learning algorithms that classifies expenses into various categories.

iii. Financial Insights and Analysis: To provide graphical visualizations which help the users to gain a better understanding of their spending patterns.

1.3 Existing System: -

The existing system for expense tracking typically involves manual methods such as pen-and-paper, spreadsheets, or basic note-taking applications. Here are some common methods used in the traditional expense tracking system:

1. Manual Recording: Individuals manually record their expenses by writing them down in a notebook, diary, or expense log. They jot down details such as the date, description, category, and amount for each transaction. This method heavily relies on manual effort and leaves room for errors and omissions.

2. Spreadsheets: Some individuals use spreadsheet software, such as Microsoft Excel or Google Sheets, to create custom expense tracking templates. They input their expenses into designated columns, categorize them, and perform basic calculations.

1.3.1 Disadvantages of existing system :

These existing systems for expense tracking can be time-consuming, prone to errors, and lack features for analysis and automation. It require significant efforts in manual calculations and categorizations. Additionally, there is a risk of data loss in these systems as there is no data backup functionality.

1.4 Proposed system

The proposed system is a comprehensive and user-friendly web application that changes the way individuals manage their expenses. The key features and components of the proposed system include automatic categorization , expense tracking with the help of remote data base, graphical insights and analysis.

1.4.1 Advantages in proposed system

The proposed system is not time consuming as expenses are automatically categorized, and all kinds of analysis are made automatically. It is easy to keep track of expense history as it is stored in the database. Users can avoid mistakes and errors in calculations as it is handled by the computer itself. Overall, the proposed system overcomes all the previously mentioned limitations of the existing system.

CHAPTER 2:

LITERATURE SURVEY

[1] eExpense by Shahed Anzarus Sabab & Sadman Saumik Islam published in ICEEICT dated 31st January 2019 :

“eExpense” research paper which is published in 2018 4th International Conference on ICEEICT introduces an automated Android-based expense tracking system. Users can scan bills or receipts to extract expense details, and the application monitors income through SMS tracking. The system calculates monthly and yearly balances, providing a smart and automated solution for expense tracking.

[2] Expense Tracker by Prof Miriam Thomas & Lekshmi P published in IJARSCT dated 4th September 2020:

The research paper titled "Expense Tracker," is a web application for efficient daily expense management. Users can input income for daily expense calculations, with provisions for predictive data mining. The application includes three user logins with different privileges for admin, manager, and staff roles, allowing for expense and income management, verifications, and custom report generation.

[3] Supervised multi-class text classification by Susan Li published in TDS dated 19th February 2018 :

In the research paper "Multi-Class Text Classification with Scikit-Learn" by Susan Li, a model is presented that focuses on categorizing expenses based on the entered text. The model utilizes Scikit-Learn, a powerful machine learning library, and employs algorithms such as logistic regression to predict the category to which each expense belongs. This approach, which was inspired by the ideas discussed in Susan Li's article, forms the foundation of our own model for expense categorization.

CHAPTER 3:

SYSTEM REQUIREMENTS

Hardware Requirements:

- Processor: 8th gen Intel Core i5 or higher
- Memory: 8GB RAM or above
- Clock speed: 2.7GHz or higher

Software Requirements:

Jupyter Notebook	- For ML model
VS Code	- As a Code editor
Python 3.10	- For ML model
NumPy	- For ML model
Pandas	- For ML model
Node.js	- For Backend development
Express.js	- For Backend development
EJS	- As a Frontend templating engine
Bootstrap	- For Frontend
MongoDB	- For Database operations

CHAPTER 4:

SYSTEM DESIGN

The web-application consists of multiple web-pages which link to each other upon performing different actions and events. Thus, the flow diagrams depicting the different workflow of each page is shown below.

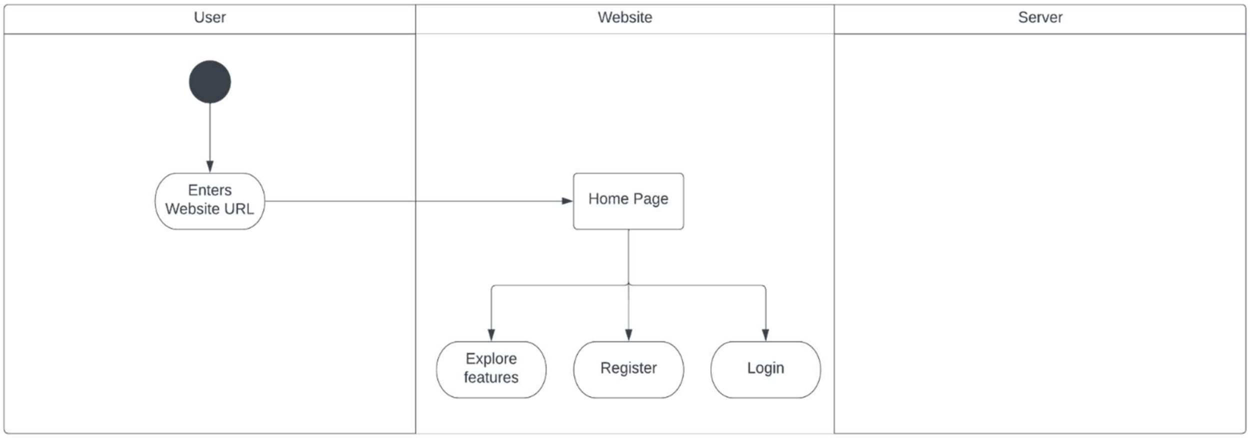


Fig 4.1: Home page

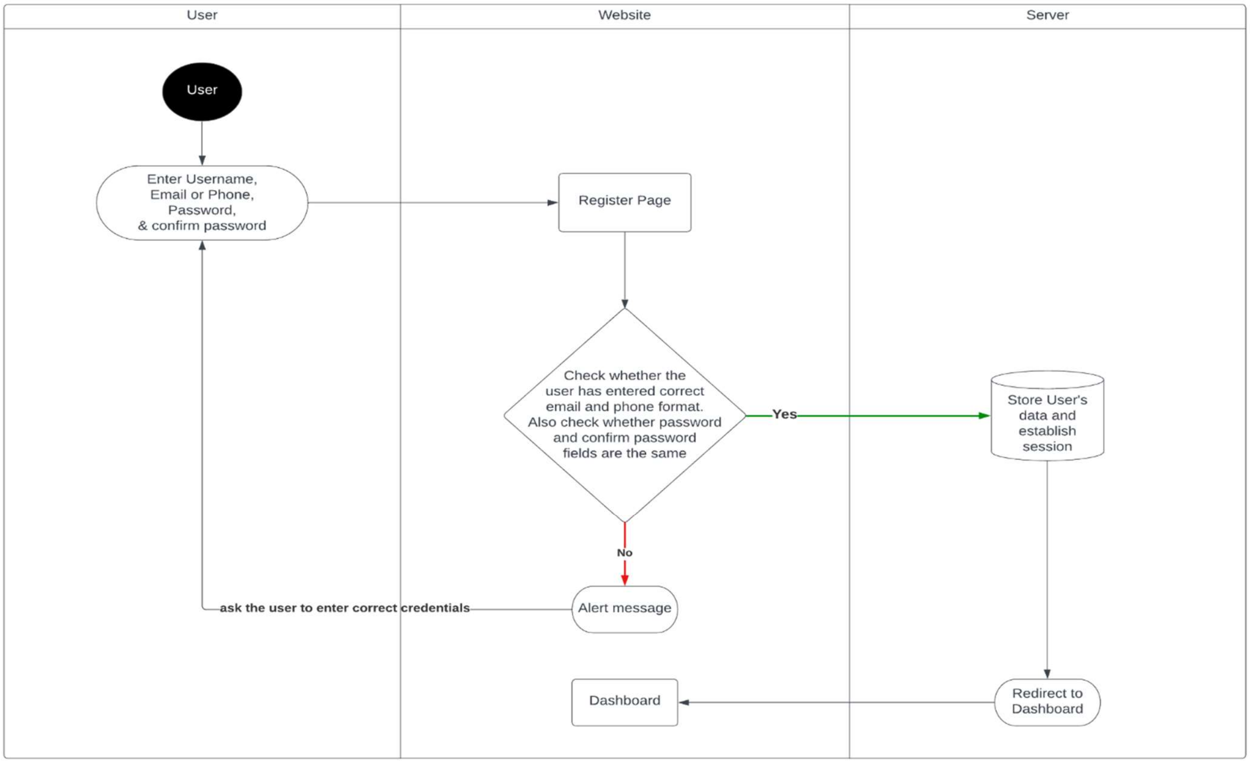

User
Website
Server
User
Enter Username, Email or Phone, Password, & confirm password
Register Page
Check whether the user has entered correct email and phone format. Also check whether password and confirm password fields are the same
Yes
Store User's data and establish session
No
Alert message
ask the user to enter correct credentials
Redirect to Dashboard
Dashboard

Fig 4.2 : Signup page

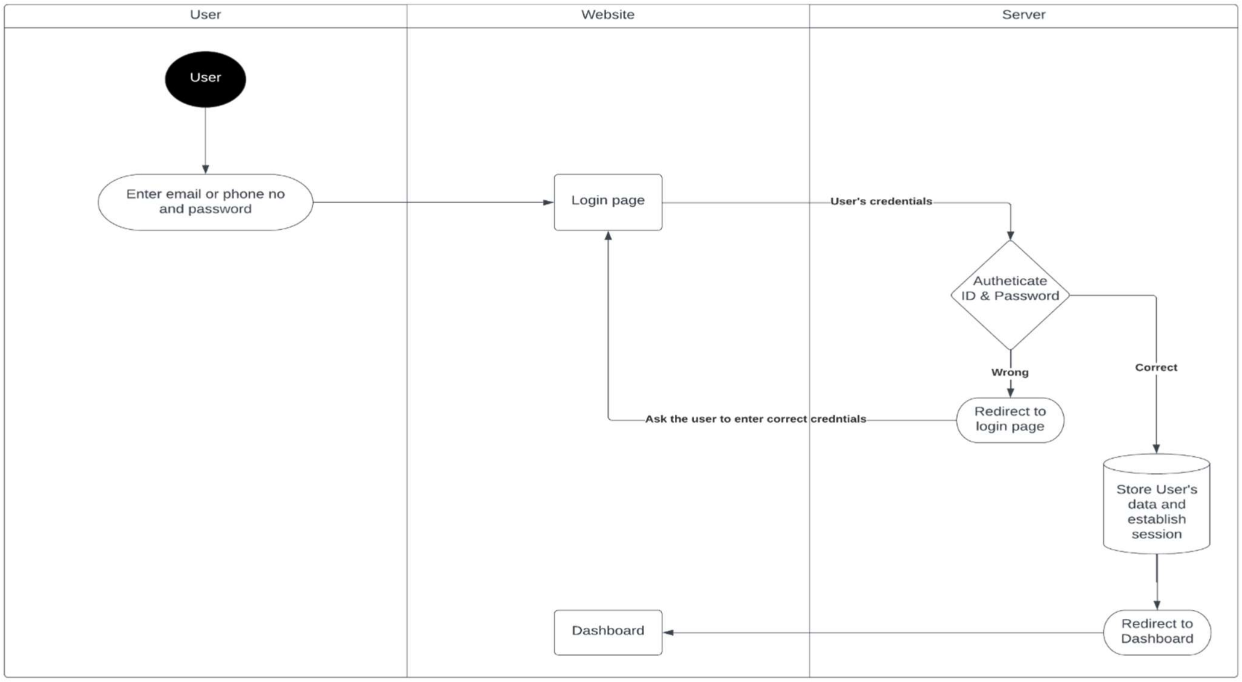

User
Website
Server
User
Enter email or phone no and password
Login page
User's credentials
Autheticate ID & Password
Wrong
Correct
Redirect to login page
Ask the user to enter correct credntials
Store User's data and establish session
Redirect to Dashboard
Dashboard

Fig 4.3: Login page

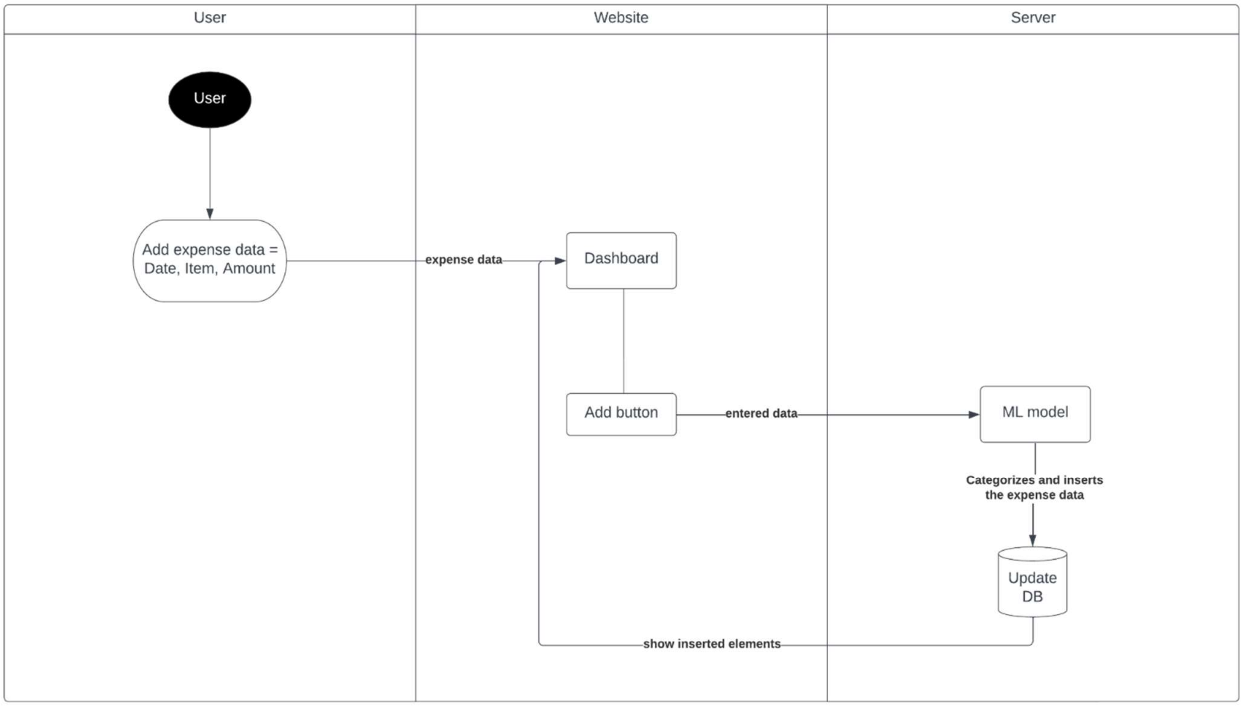


Fig 4.4: Add expense data

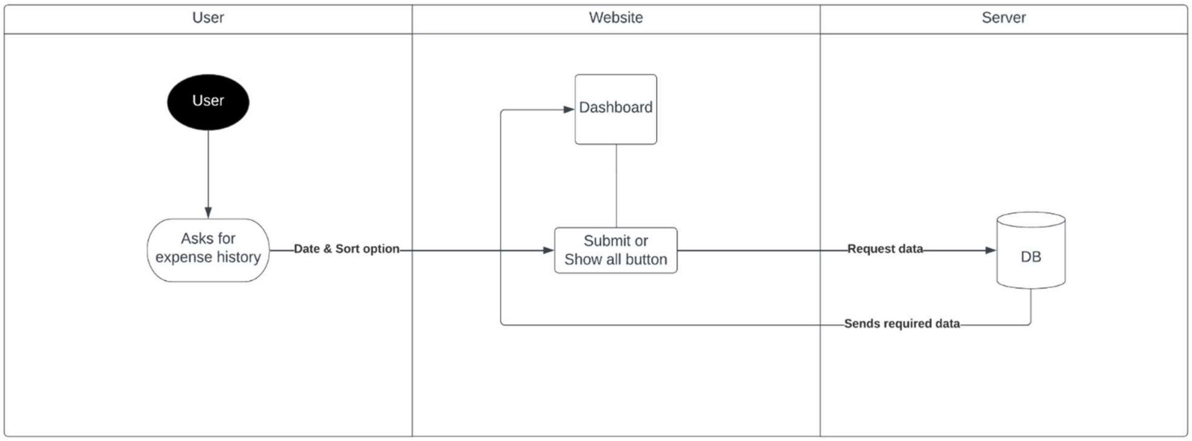


Fig 4.5: Dashboard history

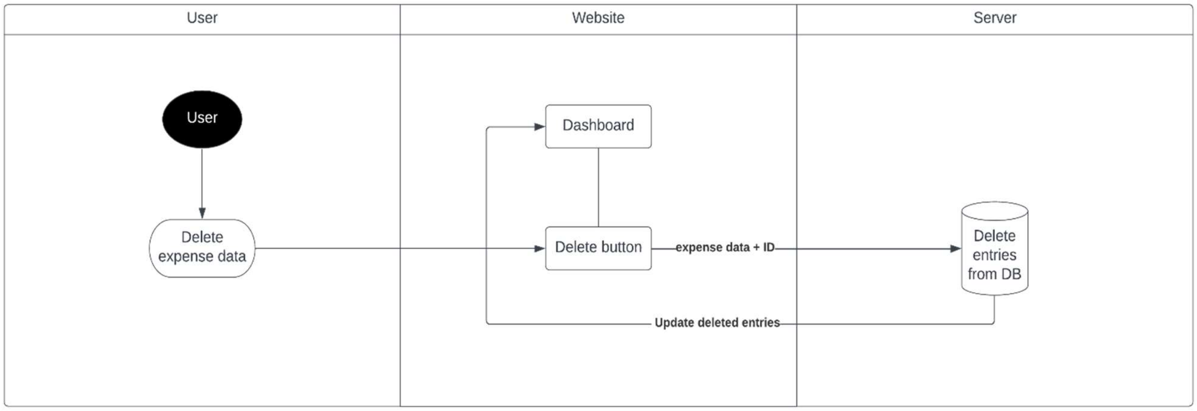


Fig 4.6: Delete expense data

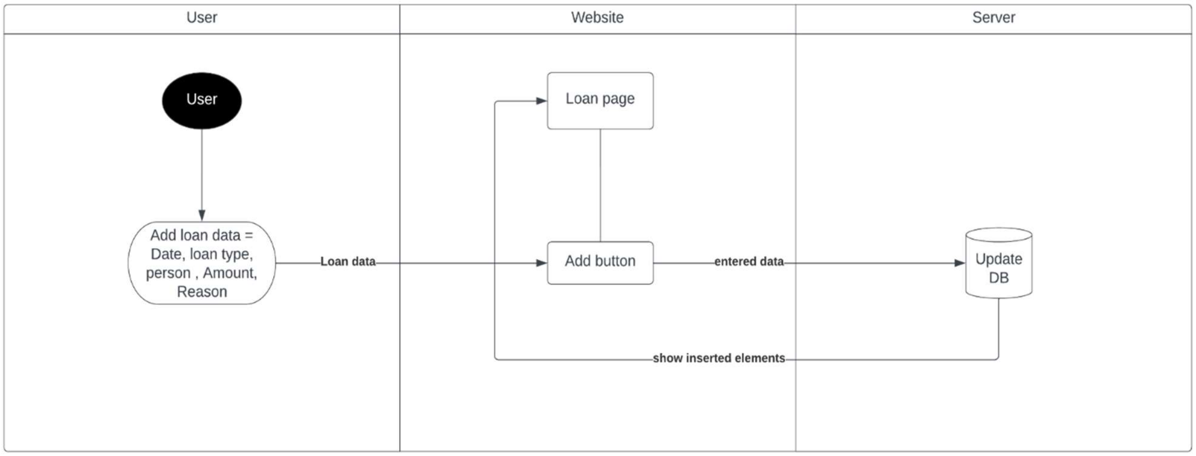


Fig 4.7: Add loan data

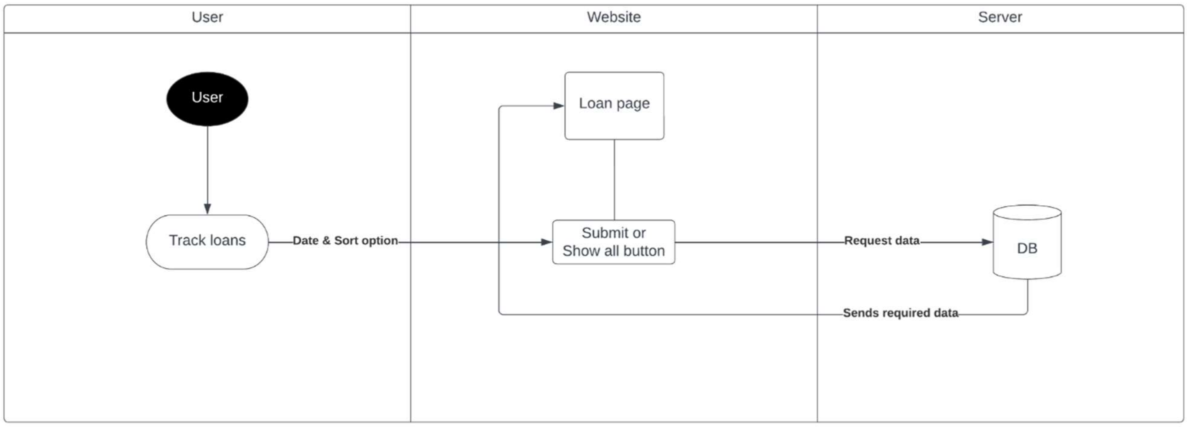


Fig 4.8: Loan history

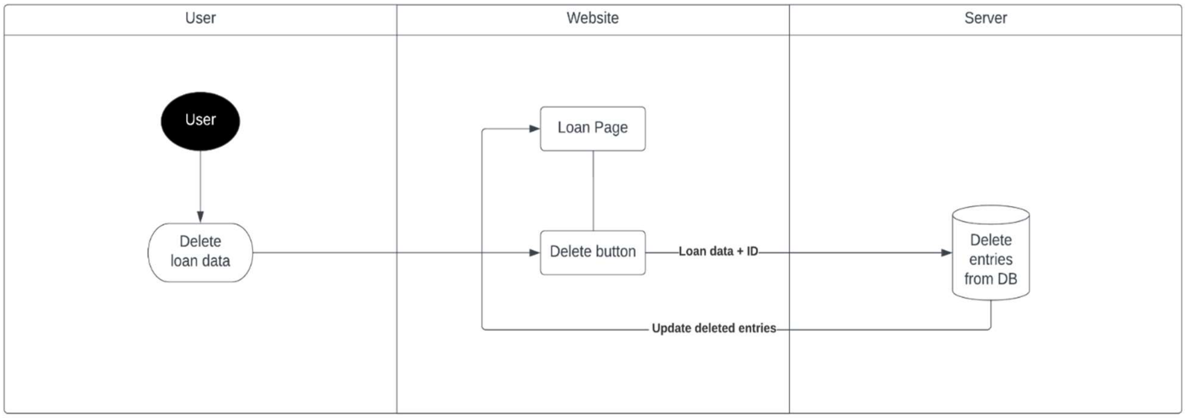


Fig 4.9: Delete loan data

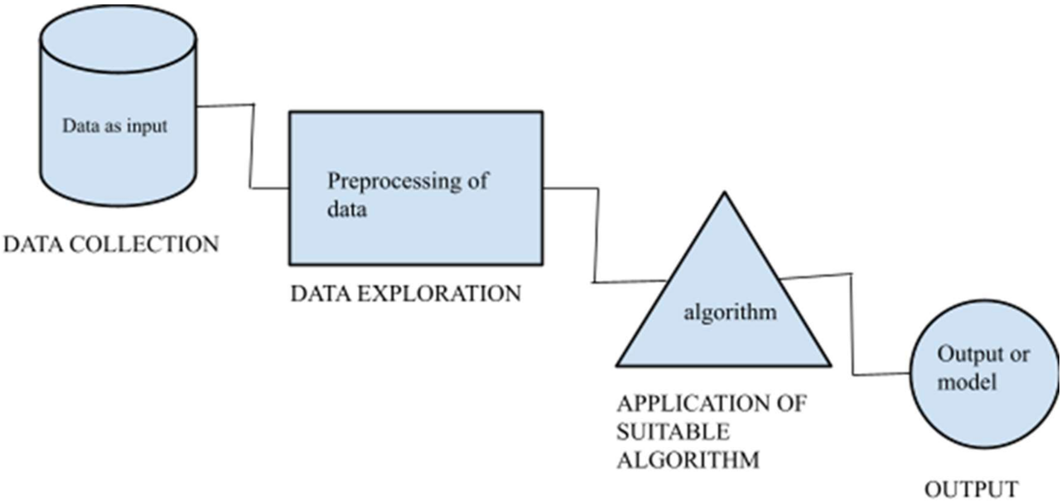


Fig 4.10 : System design for ML application

CHAPTER 5:

SYSTEM IMPLEMENTATION

Code Snippet for User Authentication:

```
router.get('/register', async(req, res) => {
   res.render("register")
})
router.post('/register', async(req, res) => {
   try {
      const { email_or_phone, username, password } = req.body
      const user = new User({ email: email_or_phone, username: username })
      const registeredUser = await User.register(user, password)

      req.logIn(registeredUser, err => {
         if (err) {
            return next(err)
         }
      })
      const expense = new Expenses({ user: req.user._id, expense: [] })
      await expense.save()
      const friend = new Friends({ user: req.user._id, friends: [] })
      await friend.save()
      res.redirect('/:user/dashboard')

   }
catch (error) {
      console.log(error)
      res.redirect('/register')
   }
})
router.get('/login', async(req, res) => {
   res.render("login");
})
router.post('/login', passport.authenticate('local', { failureFlash: false, failureRedirect:
'/login' }), async(req, res) => {
   res.redirect('/:user/dashboard')
})
router.get('/logout', async(req, res) => {
   req.logOut(function(err) {
      if (err) { console.log(err) }
      res.redirect('/')
      return
   })
})
```

Code Snippet for Add and Delete Expenses:

```
router.post('/add', async(req, res) => {
    const added_date = req.body.date;
    const title = req.body.title;
    const amount = req.body.amount;
    const newExpense = {
        Amount: amount,
        description: title,
        date: added_date
    };
    try {
        const expense = await Expense.findOne({ user: req.user.id }).populate('user')
        await expense.expense.push(newExpense)
        await expense.save()
        res.redirect(`/${req.params.user}/dashboard`);
    } catch (e) {
        console.log(e)
        res.redirect(`/${req.params.user}/dashboard`);
    }
})
router.post('/delete', async(req, res) => {
    try {
        const expenseId = req.body.expenseId
        const userExpense = await Expense.findOne({ user: req.user.id }).populate('user')
        const expense = userExpense.expense
        for (let i = 0; i < expense.length; i++) {
            if (expense[i]._id == expenseId) {
                expense.splice(i, 1)
                break
            }
        }
        await userExpense.save()
        res.redirect(`/${req.params.user}/dashboard`);
    } catch (err) {
        console.log(err)
        res.redirect(`/${req.params.user}/dashboard`);
    }
})
```

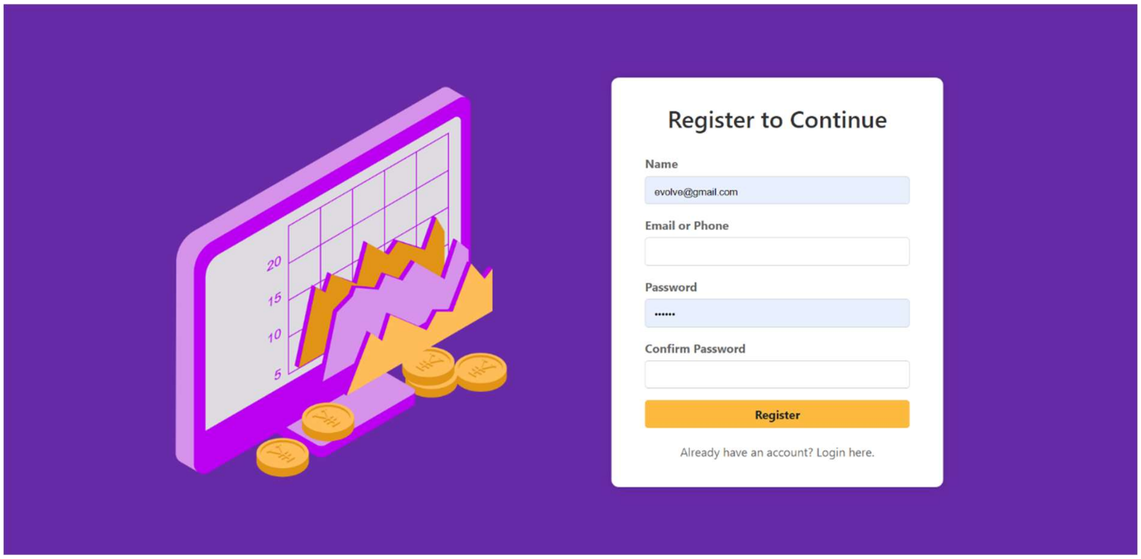
Code Snippet for Loan Management:

```
router.post("/add", async (req, res) => {
  const added_date = req.body.date;
  const loan_type = req.body.loan_type;
  const amount = req.body.amount;
  const reason = req.body.reason;
  let person = req.body.person;
  if (person === "new") {
    person = req.body.newPerson;
  }
  const friend = {
    date: added_date,
    type: loan_type,
    name: person,
    reason: reason,
    amount: amount
  };
  try {
    const userLoans = await Friend.findOne({ user: req.user.id }).populate('user');
    const friends = userLoans.friends;
    friends.push(friend);
    await userLoans.save();
    res.redirect("/:user/loans");
  } catch (err) {
    console.log(err);
    res.redirect("/:user/loans");
  }
});
router.post("/delete", async(req, res) => {
    console.log('Inside delete route')
    try {
        const loanId = req.body.loanid
        const userLoans = await Friend.findOne({ user: req.user.id }).populate('user')
        const friends = userLoans.friends
        for (let i = 0; i < friends.length; i++) {
            if (friends[i]._id == loanId) {
                friends.splice(i, 1)
                break
            }
        }
        await userLoans.save()
        res.redirect("/:user/loans")
    } catch (err) {
        console.log(err)
        res.redirect("/:user/loans")
    }
});
```

LIVE PENNYWISE:

1. Register and login pages :

The user will be able to use all the features by registering first on the register page. Few details about the user such as user’s name, email or phone number and desired password are fetched from this page. Password and confirm password fields are matched and upon successful registration the user will be redirected to the dashboard page.



Register to Continue

Name: evolve@gmail.com

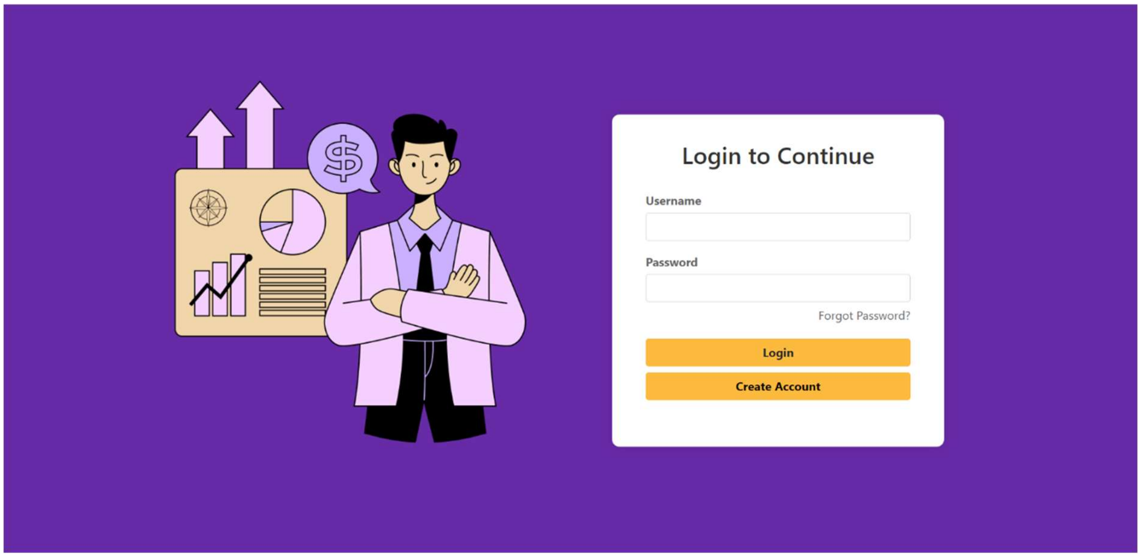
Email or Phone:

Password: ••••••

Confirm Password:

Fig 5.1: Register page

If the user is already having an account, they he must log in by entering username and password on the login page. Once the username and password fields are verified, the user will be redirected to the dashboard page.



Login to Continue

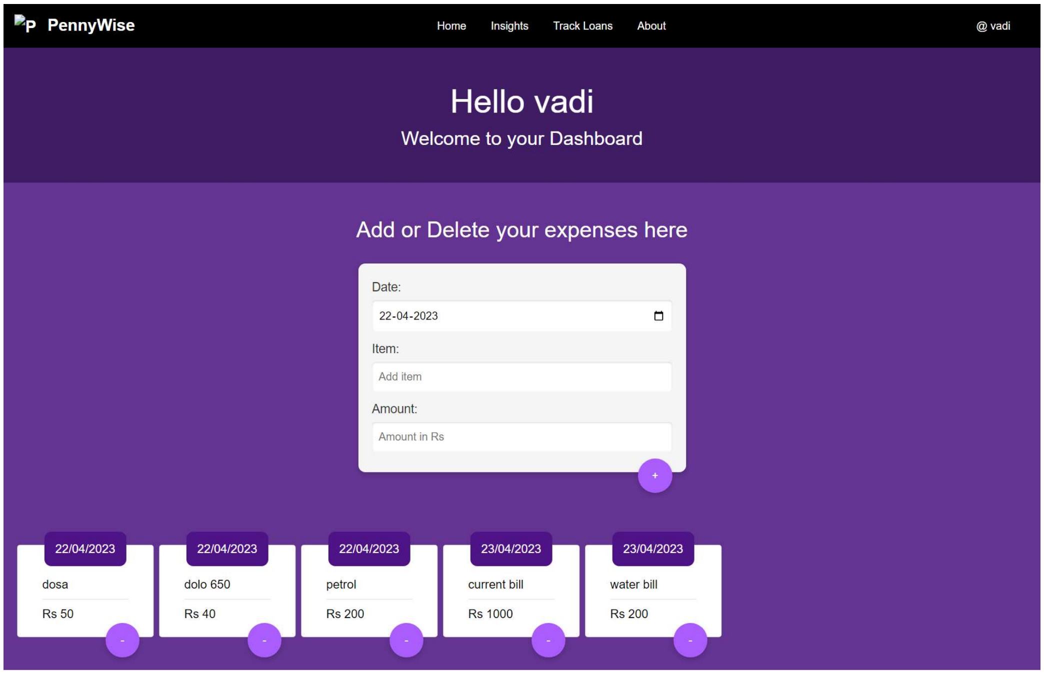
Username:

Password:

Fig 5.2: Login page

2. Dashboard page :

User will be able to add or delete the expenses in the dashboard page. Few details about the expense such as item, amount and date is entered by the user and if he clicks on the + (plus) button, a post request is sent to the server and the expense data will be added and displayed in the dashboard page itself. Upon clicking the – (minus) button, expense data will be deleted from the user's dashboard.



Hello vadi

Welcome to your Dashboard

Add or Delete your expenses here

Date: 22-04-2023

Item: Add item

Amount: Amount in Rs

22/04/2023 dosa Rs 50

22/04/2023 dolo 650 Rs 40

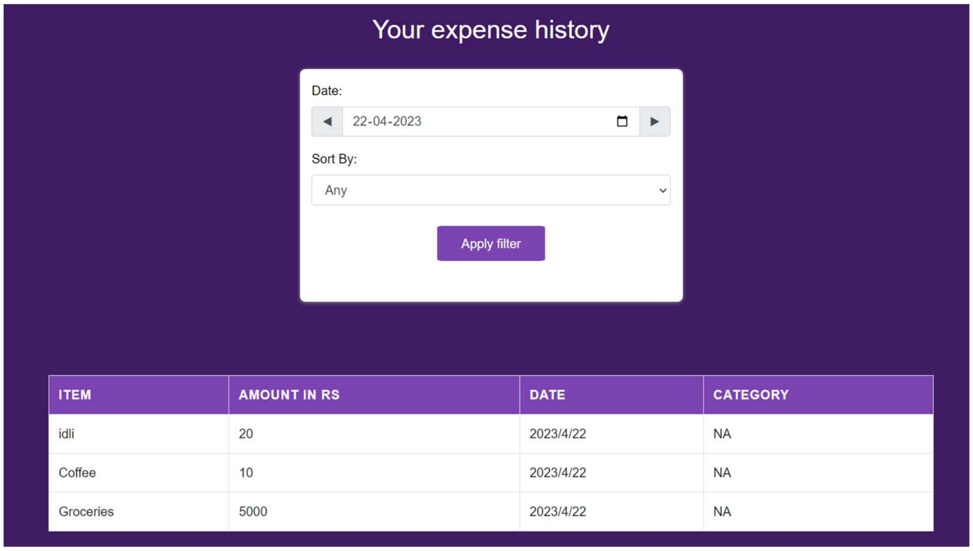
22/04/2023 petrol Rs 200

23/04/2023 current bill Rs 1000

23/04/2023 water bill Rs 200

Fig 5.3: Dashboard add & delete

Users will be able to view their date wise expense history by giving the date in the dashboard page. Various filtering options such as sort by amount, date, items, category in ascending and descending orders are also provided.



Your expense history

Date: 22-04-2023

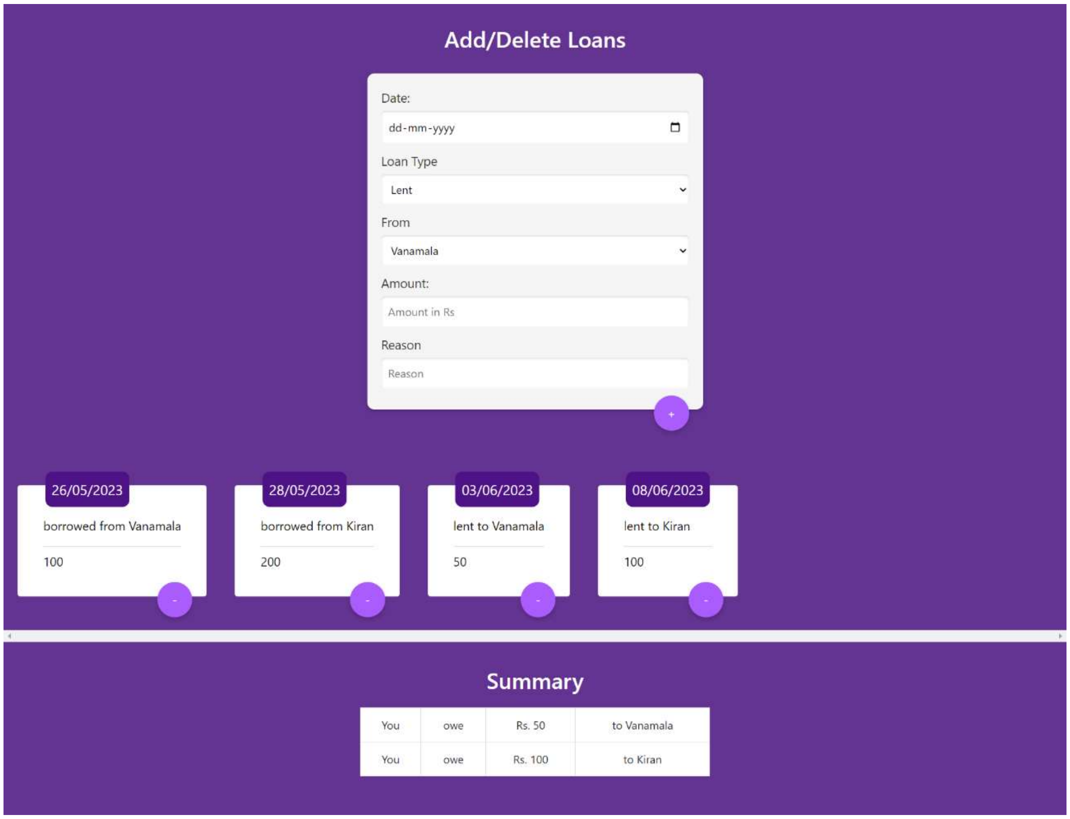
Sort By: Any

ITEM	AMOUNT IN RS	DATE	CATEGORY
idli	20	2023/4/22	NA
Coffee	10	2023/4/22	NA
Groceries	5000	2023/4/22	NA

Fig 5.4: Expense history

3. Loans page:

Users will be able manage their loans by adding a few details about the loans as shown here. A small summary of the loans is also displayed which shows the total amount lent or borrowed from each person.


Add/Delete Loans

Date: dd-mm-yyyy

Loan Type: Lent

From: Vanamala

Amount: Amount in Rs

Reason: Reason

26/05/2023
borrowed from Vanamala
100

28/05/2023
borrowed from Kiran
200

03/06/2023
lent to Vanamala
50

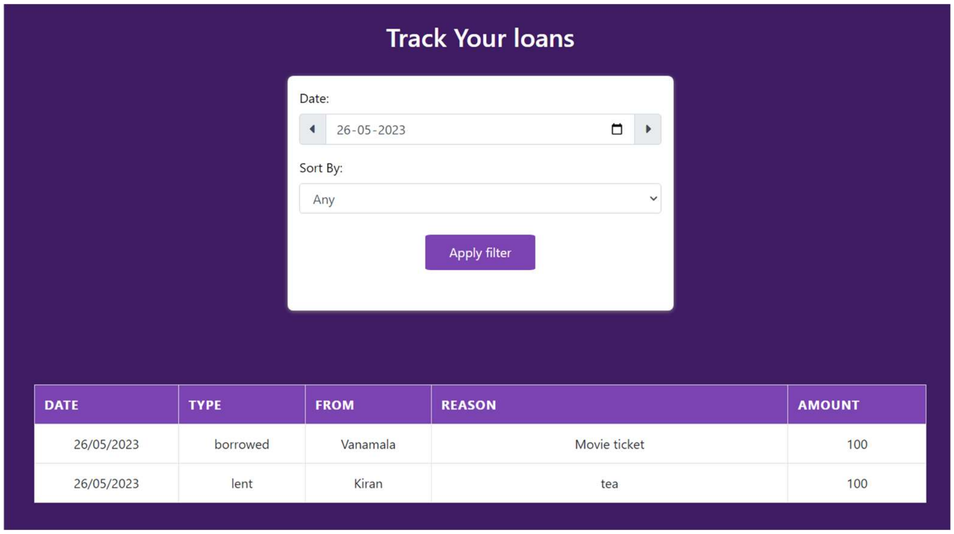
08/06/2023
lent to Kiran
100

Summary

You	owe	Rs. 50	to Vanamala
You	owe	Rs. 100	to Kiran

Fig 5.5: Loan Management

Users will be able to track their date wise loan history by applying various filtering options such as sort by amount, date in ascending and descending order.


Track Your loans

Date: 26-05-2023

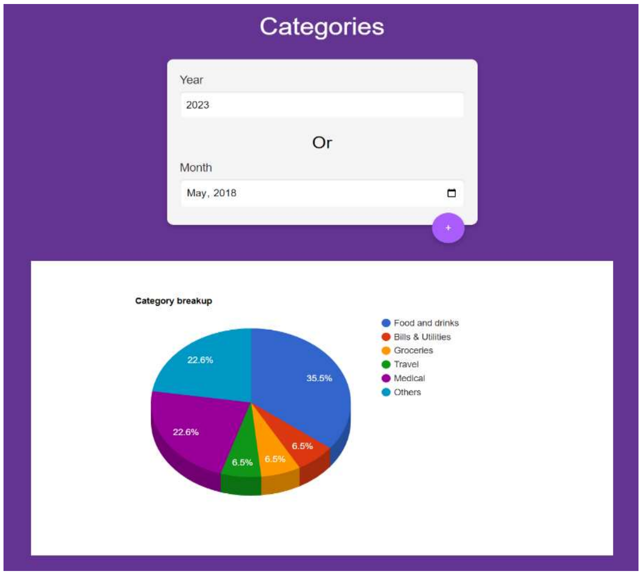
Sort By: Any

DATE	TYPE	FROM	REASON	AMOUNT
26/05/2023	borrowed	Vanamala	Movie ticket	100
26/05/2023	lent	Kiran	tea	100

Fig 5.6: Loan history

4. Insights page :

A pie chart representing category wise breakup in the selected month or year is displayed in the insights page.



Categories

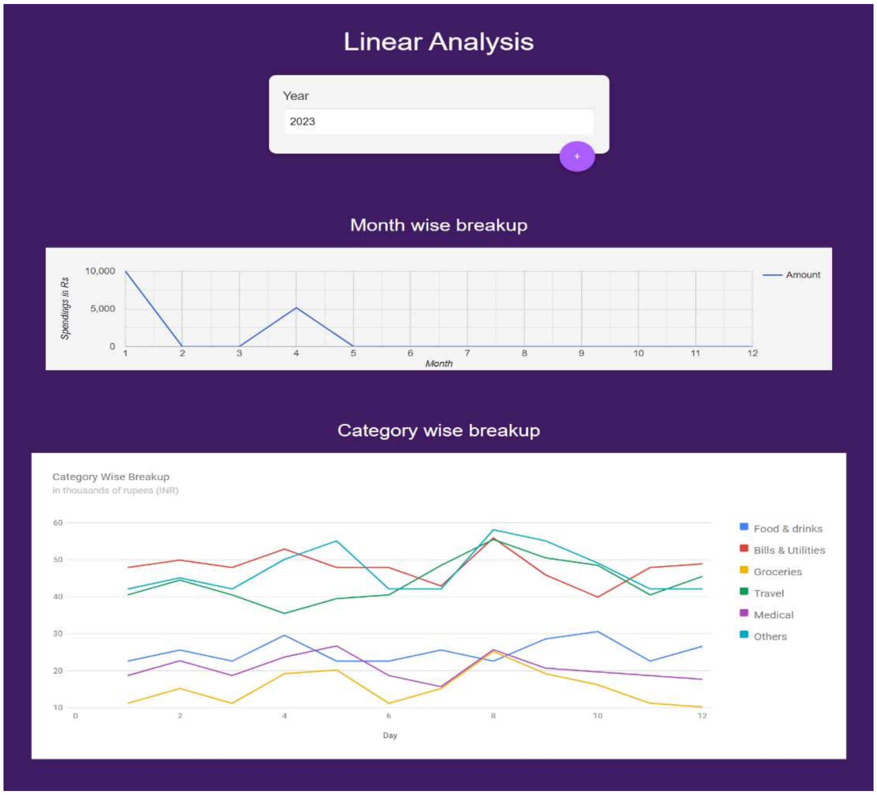
Year: 2023

Or

Month: May, 2018

5.7: Pie Chart

Linear graphs such as month wise and category wise breakups are displayed. Users will be able to see how much amount they have spent and on which category they have spent every month in a selected year.



Linear Analysis

Year: 2023

Fig 5.8: Month and Category wise Breakup

CHAPTER 6:

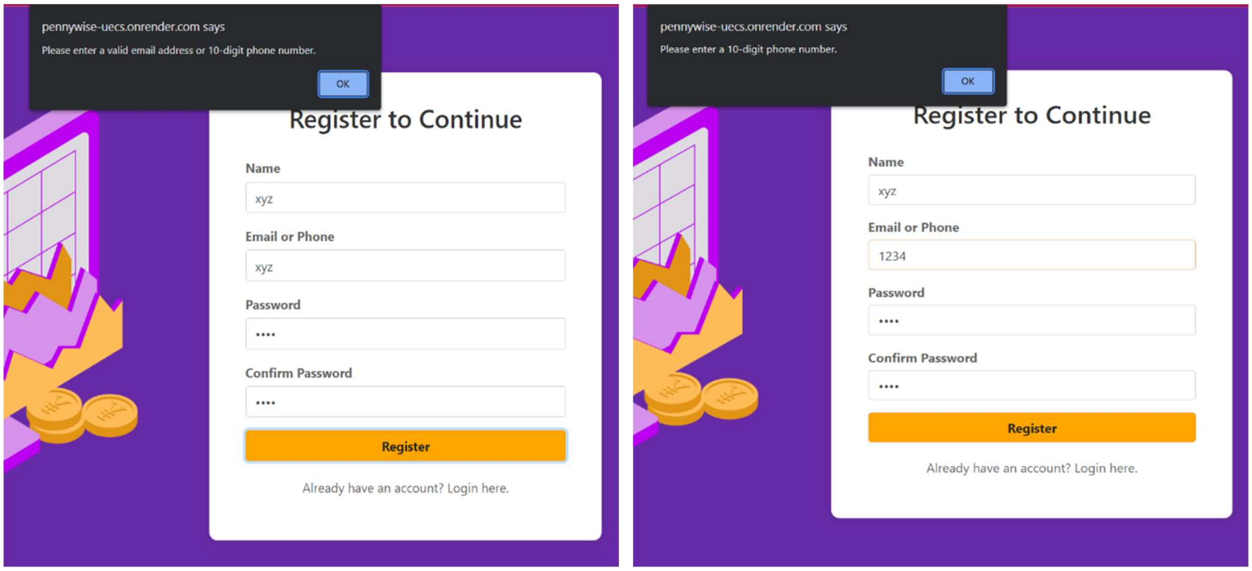
SYSTEM TESTING

The Project has undergone two levels of testing that is unit testing and integration testing . In the unit testing phase, each individual component of the project was thoroughly tested to ensure its functionality and correctness. By testing each unit in isolation, any issues or bugs specific to that unit were identified and addressed, ensuring the reliability and accuracy of the system. In the integration testing phase, the different components of the project such as ML models, backend and front end systems were tested together to ensure they work seamlessly as a unified system. This testing phase focused on verifying the interactions and communication between the components, ensuring that they integrate smoothly and function as intended.

Unit testing :

i) Register page testing:

In the email or phone number section, a valid email id format and phone number length is tested. If the entered email format is not valid or if the phone number length is not equal to 10 then an alert message is displayed which tells the user to enter a valid email or phone number. Also password and confirm password fields are checked if they are the same or not , if it is not matching an alert message is displayed to check the password fields again.



pennywise-uecs.onrender.com says

Please enter a valid email address or 10-digit phone number.

Register to Continue

Name: xyz

Email or Phone: xyz

Password: ••••

Confirm Password: ••••

pennywise-uecs.onrender.com says

Please enter a 10-digit phone number.

Register to Continue

Name: xyz

Email or Phone: 1234

Password: ••••

Confirm Password: ••••

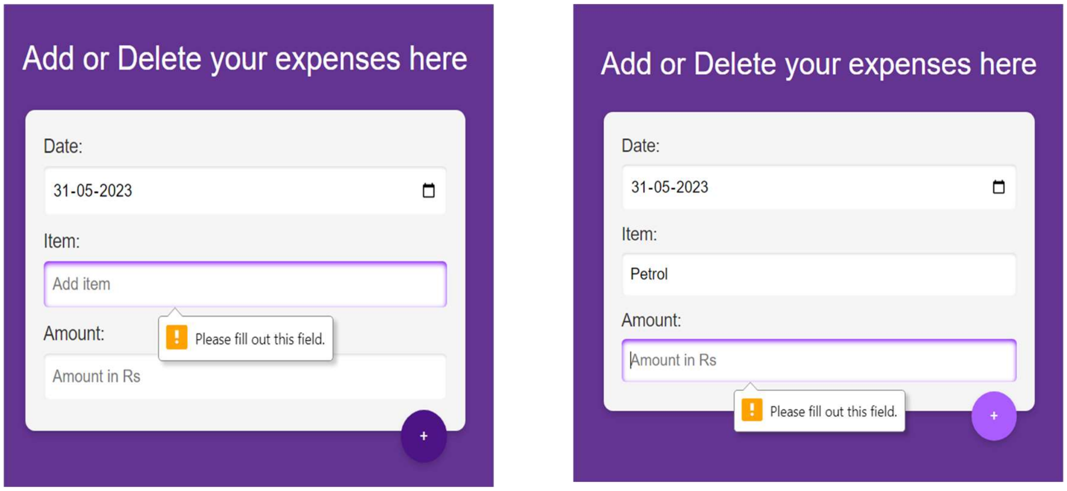
OK
Register
Already have an account? Login here.
OK
Register
Already have an account? Login here.

Fig 6.1: Register page testing

Above figures show how an alert message is displayed if the correct credentials are not given in the register page.

ii) Expense page testing :

In the expense page, if the user leaves out any required field while entering the expenses, then a small overlay is displayed to convey that the user has left out this field. This ensures that null values are not entered for specific entries while adding the expenses.



Add or Delete your expenses here

Date: 31-05-2023

Item: Add item

Please fill out this field.

Amount: Amount in Rs

Add or Delete your expenses here

Date: 31-05-2023

Item: Petrol

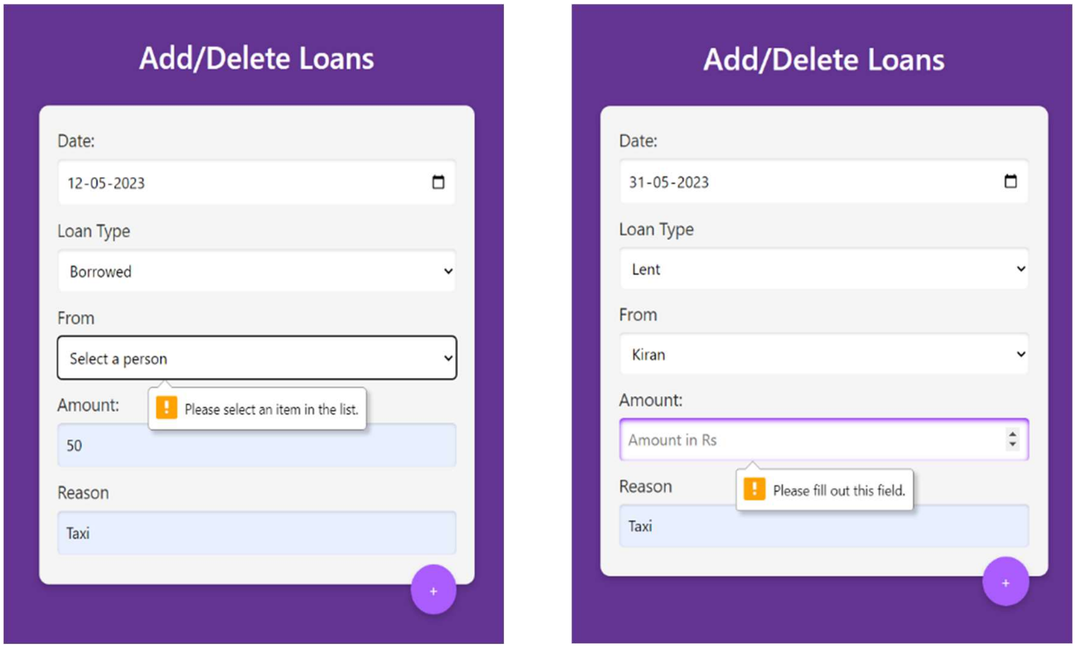
Amount: Amount in Rs

Please fill out this field.

Fig 6.2: Expense page testing

iii) Loan page testing

Loan page entries are also tested similar to expense page. An overlay is displayed if any required fields are left out . Also proper format for all the fields are tested and verified.



Add/Delete Loans

Date: 12-05-2023

Loan Type: Borrowed

From: Select a person

Please select an item in the list.

Amount: 50

Reason: Taxi

Add/Delete Loans

Date: 31-05-2023

Loan Type: Lent

From: Kiran

Amount: Amount in Rs

Please fill out this field.

Reason: Taxi

Fig 6.2: Loan page testing

CONCLUSION

In conclusion, all the defined objectives have been successfully implemented and user-friendly web application has been designed and developed that simplifies expenses and loan tracking.

Pennywise serves as a trusted and reliable tool for efficient expense management. It simplifies the tracking process, offers secure storage, and ensures accurate financial analysis. With its user-friendly interface and other features, Pennywise empowers users to achieve better financial control, paving the way for improved financial health.

Extensive testing procedures have been implemented to verify the functionality, performance, and security aspects of the application. Through these tests, any potential issues or bugs have been identified and addressed, resulting in a stable application.

Overall, this project delivers an efficient solution for managing expenses and loans, empowering users to make informed financial decisions and improve their financial well-being.

FUTURE ENHANCEMENTS

1. Integration with Digital Wallets and Payment Platforms: Expand integration capabilities to include popular digital wallets and payment platforms. This enhancement would allow users to track expenses made through platforms like PayTm, PhonePay or mobile payment apps, providing a more comprehensive view of their financial transactions.

2. Expense Sharing and Splitting: Introduce features that enable users to share and split expenses with friends, family, or colleagues. This functionality would be particularly useful for group trips, shared expenses, or business reimbursements, streamlining the process and ensuring accurate expense tracking for all parties involved.

3. Enhanced Receipt Management: Integrate with optical character recognition (OCR) technology to automatically extract and store receipt details accurately. Additionally, enable users to attach receipts directly to expense entries, making it easier to track and retrieve relevant information when needed.

4. Enhanced user accessibility: Developing mobile versions of PennyWise for Android and iOS devices. These versions will enable users to conveniently track their expenses instantly.

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Learning resources:

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