



**Department of Electronics and Communications Engineering,
Institute of Technology,
Nirma University, Ahmedabad**

GUI BASED EXPENSE RECORD DATABASE

SPECIAL ASSIGNMENT REPORT CUM DOCUMENTATION

*Submitted in Partial Fulfilment of the
Requirements for Completion of*

**Course on
2CSOE08 SCIENTIFIC PROGRAMMING**

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CH 1 | PROJECT DESCRIPTION

1.1 INTRODUCTION :

The project aims to implement a **GUI enabled** database to store, record as well as effectively display the financial activities carried out by an individual so that he/she can efficiently manage his/her finances.

In the initial scope, the application is functional for managing records of three individuals as it has been made for those dwelling in non-native cities and hence require a proper management of their resources and therefore this web application becomes useful for them. In the upcoming upgrades it can be made flexible in terms of number of users as well as can be added with more functionalities.

The entire program is implemented using **Python 3.11** High level programming language using **Jupyter Lab IDE**. The main functional library here is **Streamlit** using which the entire web application is hosted as well as developed. Along with it, file handling is a major focus here so as to manage the entered records and the CSV python library has been used for the same. Other required functions of python libraries such as NumPy, Matplotlib, Pandas, Datetime, etc. have also been incorporated.

1.2 FUNCTIONALITIES OFFERED :

Following functions are possible to be performed on the application :

1. Enter a daily record of the expense incurred for each user as well as the common expense incurred.
2. Have a brief overview of the past expenses which displays the total expense incurred, last expense as well as an average daily expense for each user along with a chart showing the percentage comparison of total expenses incurred by the users.
3. Have a detailed record of the last 10 expenses incurred by each user with expense date, day, label as well as the amount spent.
4. Graphical visualization of the data in terms of weekly, quad-weekly and month on month comparison charts.

CH 2 | CODE DESCRIPTION

Python High Level Programming language (version 3.9.12) is used here to develop the code of the application'. Jupyter is used as the Integrated Development Environment to code the python script. The following sections elaborate the python libraries used as well as the user-defined functions developed to implement the application :

2.1 LIBRARIES USED :

Python offers a wide pool of libraries to accomplish a variety of tasks. In this project some of them have been employed as per requirement and are described as follows :

1. Streamlit : **Version - 1.14.0**

Streamlit is an open-source user-friendly python library developed by Adrien Treuille, Thiago Teixeira and Amanda Kelly and is used to deploy Data Science, Machine Learning Models and custom web-apps. The excellent feature of this library is that, it nullifies the requirement of knowing any frontend frameworks and can deliver an application with effective and intuitive user interface. Additionally, it speeds up computation pipelines using data caching and is compatible with majority of other Python Libraries.

Web link : <https://streamlit.io/>

2. CSV : **Version - 3.6**

The Comma-Separated Values or CSV format is the most common format used for databases and spreadsheets as these are the preferred format for data manipulation and visualization. The CSV module thus provides the user with the ease of reading and writing CSV files as well as processing data from and to these files.

Web link : <https://docs.python.org/3/library/csv.html>

3. Pandas : **Version - 1.4.2**

Pandas Python library enables working with data sets and provides various functions to analyze, clean, explore and manipulate data and thus make rational conclusions based on statistical theories. It has an efficient DataFrame object for data manipulation with integrated indexing, tools for flexible reshaping and pivoting of data sets, intelligent label-based slicing, fancy indexing, high performance

merging and joining of data sets and integrated handling of missing data along with other functions.

Web link : <https://pandas.pydata.org/about/index.html>

4. Numpy : **Version - 1.21.5**

NumPy or Numerical Python library is a fundamental and widely used scientific computing package that provides a multidimensional array object, variety of derived objects and routine assortments for speedy operations on arrays which includes basic as well as higher level mathematics, sorting, shape manipulation, linear algebra, transforms, simulations, etc. Also, vectorization in NumPy makes it concise, easier to read and also faster in operations.

Web link : <https://numpy.org/doc/stable/>

5. Matplotlib : **Version - 3.5.1**

Matplotlib is a visualization library in Python for 2D and 3D plots. It was introduced by John Hunter in 2002 and is built on NumPy arrays and designed to work with SciPy stack. It enables visual access to huge data chunks in easily digestible graphs that are available in variety of line charts, bar charts, pie charts, scatterplots, stack plots, histograms, etc.

Web link : <https://matplotlib.org/stable/index.html>

6. Datetime : **Version - 4.7**

The Datetime module available in python provided various classes to manipulate dates and times as well as basic arithmetic related to the same. The Datetime class of the Datetime module is generally used for working with dates and time at a general level.

Web link : <https://docs.python.org/3/library/datetime.html>

7. Base64 : **Version - 3.4**

The Base64 library is one of a kind library in python that is used to encode and decode binary data to and from printable ASCII characters. It offers encoding and decoding functions for the Base16, Base32, and Base64 encodings defined in RFC 4648 as well as for the de facto standards Ascii85 and Base85 encodings.

Web link : <https://docs.python.org/3/library/base64.html>

2.2 USER DEFINED FUNCTIONS :

1. **Overview** : This specified function reads the Hostel Expense Records.csv file, which is the primary csv file, and returns three lists, each of which contains the user's daily expenses.
2. **Plotter** : Six dictionaries are returned by this function. The first three dictionaries have dates as their keys and the costs incurred by each user on those dates as their values. The final three dictionaries provide back the months as keys and the overall spending totals for each user as values.
3. **graph_wiz** : This defined function groups the data into three distinct data sets using plotter values. The first includes the amount and dates for the user's past seven expenses. The second one includes the latest 30 transactions' dates as well as each user's spending total. The month-by-month spending details for each user are included in the third set. Finally, it creates the graphs for the above-mentioned data based on the user's requirements.
4. **Update** : This user-defined function updates the CSV file with the most recent expenses by taking the value from the users.
5. **latest_records** : This function returns the most recent 10 data from a CSV file, returning them as a 2-d list along with the transaction dates, days on which the transaction is made, expenditure label information, and amount spent by each user.
6. **display_pdf** : This function uses the base64 library to show any specified PDF on the page that is hosted by Streamlit platform.
7. **Days** : The function involves using the datetime module to calculate the number of days passed since the first expense in order to determine weekly, and monthly as well as overall average expenditure.

CH 3 | APP DESCRIPTION

The Expense Record Web Application is deployed using the Streamlit python library and is hosted on the Streamlit Cloud using GitHub, and is currently live on the internet, available on the following link :

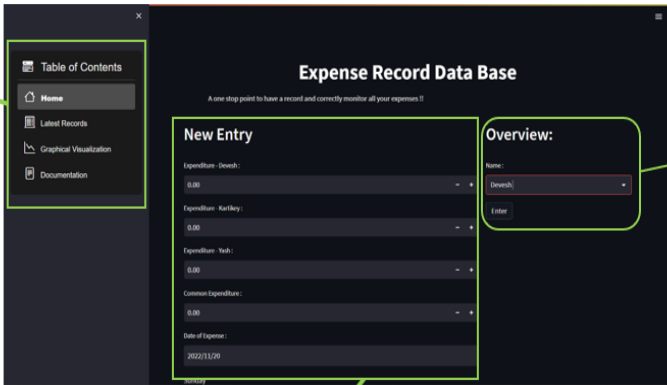
Weblink : <https://expense-rec-sp-2022-23137.streamlit.app/>

Local Server Link : <http://localhost:8501/>

The web application is containing 4 sub - pages and each of them is attributed with some functionalities. The last section contains the documentation and related information on the development of the web application. The first 3 sub - pages are explained as follows :

3.1 HOME PAGE :

HOME PAGE



Using the table of contents, the user can choose the page they want to view.

Home: To obtain a user overview and enter the most recent expense.

Latest Record: To get details of the latest 10 expenses.

Graphical Visualization: To obtain a graphic representation of the user's expense during various time periods.

Documentation: To obtain a thorough understanding of the entire project.

Provides information about the user for :

- The total amount spent to date.
- The most recent expense.
- The average amount spent each day.
- A chart showing the overall analysis of all users.

This part offers the option to enter each user's spending information for the selected date as well as the expense label.

3.2 LATEST RECORDS :

RECORD FOR LATEST TRANSACTIONS

Latest Entries

Name: Yash

Dropbox to select the user

Date	Day	Particulars	Expense
2022-11-21	Monday	Lunch	Rs. 75.0
2022-11-11	Friday	Print	Rs. 88.0
2022-11-11	Friday	Lunch	Rs. 51.0
2022-11-10	Thursday	Lunch	Rs. 80.0
2022-11-09	Wednesday	Transport	Rs. 10.0
2022-11-09	Wednesday	Lunch	Rs. 70.0
2022-11-09	Wednesday	Print	Rs. 31.0
2022-11-09	Wednesday	Transport	Rs. 10.0
2022-11-09	Wednesday	Lunch	Rs. 0.0
2022-11-07	Monday	Lunch	Rs. 20.0

Dates for the last 10 transactions

Last 10 days on which expense is made

Labels for the expense made

Amount spent for each of the expense

Latest Entries

3.3 GRAPHICAL VISUALIZATION :



CONCLUSION AND FUTURE SCOPE

The driving force behind the choice of this particular topic is that, anyone will benefit from this application in maintaining their daily expenses, visualizing their expenses, and making appropriate plans. The concept of the project was realized as a result of the problems faced on a daily basis, such as failing to track spending records and eventually going over budget or being forced to stick to a strict spending plan.

For the implementation of this project, we discovered the **Streamlit frontend library** for Python. Additionally, we used our knowledge in file management to keep track of the expenses incurred. Additionally, **PyPlot from Matplotlib** has been used to obtain the graphical visualizations needed to more thoroughly assess our spending pattern along with **CSV library** for data handling.

This project ultimately aids in applying the knowledge of Python as well as tests our aptitude in logic building to an issue that is commonly encountered in the real world.

At par with the current functionalities, following features can be added to the application to make it more interactive, user – friendly as well as functional :

- The project can be customizable depending on the user base. So, we may create a functionality that will allow us to add more users .
- If the cost for a period of time exceeds the set limit, an alert can be appended.
- The users' graphical visualizations can be improved.
- It is possible to add a representation of the user's expenses for specific labels so that the user may determine how much money he spends on a given item. (For e.g. expense made on lunch)
- The current application is operatable on the web-browsers. It can further be optimized utilizable on mobile and other hand-held devices.

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