A Report on

Smart Expense Tracker

Submitted By:

Tanisha Shaha

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I. Summary

The Smart Expense Tracker with Data Visualization is a simple Python project that intends to help individuals in managing their expenses. It enables them to input, monitor, analyze, and create visualizations of their expenditure in different categories including Travel, Food, Entertainment, Shopping other categories, and self-created ones. Through the use of both textual and graphical data, the project aids users in understanding their spending patterns and making informed financial decisions.

II. Problem Definition

In each person's life, there is a certain period or a moment when they face the issue of proper handling of cash. These particular expenditures can be accounted for and monitored on a manual basis which may prove to be tiresome besides being associated with a certain level of inaccuracy. The Smart Expense Tracker addresses these challenges by providing a user-friendly interface to input, track, and visualize expenses, thereby enabling users to manage their finances more efficiently.

III. Approach

1. **Data Storage:**

Python Dictionaries: The expenses dictionary is used to store expense data, with categories as keys and corresponding amounts as values.

2. **File Handling:**

Cost information is stored and retrieved over a text file labeled as expenses. txt with file operations. Keeps expense data saved between sessions for easy access later

3. **Data Visualization:**

Matplotlib: For data visualization, the matplotlib library is used to compile the Bars plots and Pie charts of the expense data.

4. **Data Analysis:**

The structural framework of a data frame from the pandas package is used to arrange the expense data into a tabular structure this makes it easy to categorize and filter the data.

5. **Exception Handling:**

The code includes ways to handle errors, like using try-except blocks. This helps manage issues like wrong user inputs for example - entering a wrong amount or problems with file operations.

6. **Functions:**

The code is sectioned into specific functions: add_expense(), view_expenses(), and so forth as not only to make it more readable and user-friendly but also to avoid redundancy and time-consuming work. This approach helps to break down the code into smaller, manageable chunks, making it simpler to understand and update.

7. **Control Flow:**

Loops, such as while and for, and conditional statements, like if, elif, and else, control the program's flow. This helps with repetitive tasks like checking if values entered are valid or navigating through menus based on what the user chooses."

8. **Documentation:**

Comments are added in the code so that it could be understood easily by any other user who would need to modify the code in the future or even read the code.

IV. Key Actions

1. Adding Expenses
2. Viewing Expenses
3. Filtering Expenses
4. Editing Expenses
5. Removing Expenses
6. Visualizing Expenses

V. Code

```
                                        #SMART EXPENSE TRACKER WITH DATA VISULIZATION

import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

expenses = {}               #Initializes the expense data dictionary

def add_expense():
    while True:
        print(" ")
        print("Select a category:")
        print("1. Travel")
        print("2. Food")
        print("3. Entertainment")
        print("4. Shopping")
        print("5. Other (manual entry)")
        category_choice = input("Enter choice: ")
        if category_choice == "1":
            category = "Travel"
            break
        elif category_choice == "2":
            category = "Food"
            break
        elif category_choice == "3":
            category = "Entertainment"
            break
        elif category_choice == "4":
            category = "Shopping"
            break
        elif category_choice == "5":
            category = input("Enter custom category: ")
            break
        else:
            print("Invalid choice. Please try again.")
    while True:
        try:
            amount = float(input("Enter expense amount: "))
            if amount <= 0:
                print("Amount must be a positive number. Please try again.")
                continue
            if category in expenses:
                expenses[category] += amount              #Adds the new amount to the existing amount
            else:
                expenses[category] = amount
            save_expenses()
            print("Expense added successfully!")
            break
        except ValueError:
            print("Invalid amount. Please enter a valid number.")


def view_expenses():
    if len(expenses) == 0:
        print("No expenses to display.")
    else:
        print(" ")
        print("*" * 167)
        print(" "*75 + "Expenses" + " "*75)
        print("*" * 167)
        print(" ")
        for category, amount in expenses.items():
            print(f"{category}: Rs.{amount:.2f}")
```

```python
def filter_expenses():
    category = input("Enter category to filter: ")
    filtered_expenses = {k: v for k, v in expenses.items() if k == category}
    if not filtered_expenses:
        print("No expenses found for this category.")
    else:
        print(" ")
        print(f"Expenses for {category}:")
        for k, v in filtered_expenses.items():
            print(f" Rs.{v:.2f}")


def edit_expenses():
    while True:
        category = input("Enter category to edit: ")
        if category not in expenses:
            print("Category not found. Please try again.")
            continue
        try:
            amount = float(input("Enter new amount: "))
            if amount <= 0:
                print("Amount must be a positive number. Please try again.")
                continue
            expenses[category] = amount
            save_expenses()
            print("Expense edited successfully!")
            break
        except ValueError:
            print("Invalid amount. Please enter a valid number.")
```

```python
def remove_expenses():
    category = input("Enter category to remove: ")
    if category not in expenses:
        print("Category not found. Please try again.")
    else:
        del expenses[category]
        save_expenses()
        print("Expense removed successfully!")


def save_expenses():
    try:
        with open("expenses.txt", "a") as f:            #Using "a" to append instead of "w" to avoid overwriting of the amount
            for category, amount in expenses.items():
                f.write(f" {category}: Rs.{amount}\n")
    except IOError as e:
        print(f"Error saving expenses: {e}")


def load_expenses():
    global expenses
    expenses = {}                                       #Clears expenses to avoid duplicates
    try:
        with open("expenses.txt", "r") as f:
            for line in f:
                category, amount = line.strip().split(":")
                if category in expenses:
                    expenses[category] += float(amount)  #Adds the amount to the existing category if present
                else:
                    expenses[category] = float(amount)   #Else adds the amount to the respective category
    except FileNotFoundError:
        pass
    except IOError as e:
        print(f"Error loading expenses: {e}")
```

```
def visualize_expenses():
    if not expenses:
        print("No expenses to visualize.")
    else:
        df = pd.DataFrame(list(expenses.items()), columns=['Category', 'Amount'])
        print("Choose a visualization option:")
        print("1. Bar Plot")
        print("2. Pie Chart")
        choice = input("Enter choice: ")

        #BAR PLOT
        if choice == "1":
            plt.bar(df['Category'], df['Amount'])
            plt.xlabel("Category")
            plt.ylabel("Amount")
            plt.title("Expenses")
            plt.show()

        #PIE CHART
        elif choice == "2":
            plt.pie(df['Amount'], labels=df['Category'],autopct='%1.1f%%')
            plt.title("Expenses")
            plt.tight_layout()
            plt.show()

        else:
            print("Invalid choice. Please try again.")

#Main program
load_expenses()
print(" ")
print(" ")
print(" "*30 + "-" * 106)
print(" "*30 + "|" + " "*104 + "|")
print(" "*30 + "|" + " " * 104 + "|")
print(" "*30 + "|" + " " * 30 + "SMART EXPENSE TRACKER WITH DATA VISUALIZATION" + " " * 29 + "|")
print(" "*30 + "|" + " "*104 + "|")
print(" "*30 + "|" + " "*104 + "|")
print(" "*30 + "|" + " " * 74 + "BY:- " + " " * 25 + "|")
print(" "*30 + "|" + " " * 78 + "TANISHA SHAHA" + " " * 13 + "|")
print(" "*30 + "|" + " " * 104 + "|")
print(" "*30 + "-" * 106)
print(" ")
print(" ")

while True:
    print(" ")
    print("*" * 167)
    print(" "*75 + "Main Menu" + " "*75)
    print("*" * 167)
    print(" ")
    print("1. Add new expense")
    print("2. View all expenses")
    print("3. Filter expenses by category")
    print("4. Edit expense")
    print("5. Remove expense")
    print("6. Visualize expenses")
    print("7. Quit")
    choice = input("Enter choice: ")
    if choice == "1":
        add_expense()
    elif choice == "2":
        view_expenses()
    elif choice == "3":
        filter_expenses()
    elif choice == "4":
        edit_expenses()
    elif choice == "5":
        remove_expenses()
    elif choice == "6":
        visualize_expenses()
    elif choice == "7":
        break
    else:
        print("Invalid choice. Please try again.")
```

VI. Output

Add Expenses

```
                    ------------------------------------------------------------------------------------------
                    |                                                                                        |
                    |                                                                                        |
                    |                          SMART EXPENSE TRACKER WITH DATA VISUALIZATION                  |
                    |                                                                                        |
                    |                                                                                        |
                    |                                                                BY:-                    |
                    |                                                                    TANISHA SHAHA       |
                    |                                                                                        |
                    ------------------------------------------------------------------------------------------


**************************************************************************************************************************************************************

                                                            Main Menu
**************************************************************************************************************************************************************


1. Add new expense
2. View all expenses
3. Filter expenses by category
4. Edit expense
5. Remove expense
6. Visualize expenses
7. Quit
Enter choice: 1

Select a category:
1. Travel
2. Food
3. Entertainment
4. Shopping
5. Other (manual entry)
Enter choice: 1
Enter expense amount: 30
Expense added successfully!
```

```
**************************************************************************************************************************************************************
                                                            Main Menu
**************************************************************************************************************************************************************


1. Add new expense
2. View all expenses
3. Filter expenses by category
4. Edit expense
5. Remove expense
6. Visualize expenses
7. Quit
Enter choice: 1

Select a category:
1. Travel
2. Food
3. Entertainment
4. Shopping
5. Other (manual entry)
Enter choice: 1
Enter expense amount: 20
Expense added successfully!
```

```
**********************************************************************************************************************************************************************
                                                                    Main Menu
**********************************************************************************************************************************************************************

1. Add new expense
2. View all expenses
3. Filter expenses by category
4. Edit expense
5. Remove expense
6. Visualize expenses
7. Quit
Enter choice: 1

Select a category:
1. Travel
2. Food
3. Entertainment
4. Shopping
5. Other (manual entry)
Enter choice: 2
Enter expense amount: 50
Expense added successfully!
```

```
**********************************************************************************************************************************************************************
                                                                    Main Menu
**********************************************************************************************************************************************************************

1. Add new expense
2. View all expenses
3. Filter expenses by category
4. Edit expense
5. Remove expense
6. Visualize expenses
7. Quit
Enter choice: 1

Select a category:
1. Travel
2. Food
3. Entertainment
4. Shopping
5. Other (manual entry)
Enter choice: 4
Enter expense amount: 60
Expense added successfully!
```

```
**********************************************************************************************************************************************************************
                                                                    Main Menu
**********************************************************************************************************************************************************************

1. Add new expense
2. View all expenses
3. Filter expenses by category
4. Edit expense
5. Remove expense
6. Visualize expenses
7. Quit
Enter choice: 1

Select a category:
1. Travel
2. Food
3. Entertainment
4. Shopping
5. Other (manual entry)
Enter choice: 5
Enter custom category: General
Enter expense amount: 80
Expense added successfully!
```

View Expenses

```
*****************************************************************************************************************************************************
                                                                      Main Menu
*****************************************************************************************************************************************************

1. Add new expense
2. View all expenses
3. Filter expenses by category
4. Edit expense
5. Remove expense
6. Visualize expenses
7. Quit
Enter choice: 2

*****************************************************************************************************************************************************
                                                                      Expenses
*****************************************************************************************************************************************************

Travel: Rs.50.00
Food: Rs.50.00
Shopping: Rs.60.00
General: Rs.80.00
```

Filter Expenses

Filters the amount based on category Travel

```
*****************************************************************************************************************************************************
                                                                      Main Menu
*****************************************************************************************************************************************************

1. Add new expense
2. View all expenses
3. Filter expenses by category
4. Edit expense
5. Remove expense
6. Visualize expenses
7. Quit
Enter choice: 3
Enter category to filter: Travel

Expenses for Travel:
 Rs.50.00
```

Edit Expenses

```
**********************************************************************************************************************************************************************
                                                                    Main Menu
**********************************************************************************************************************************************************************

1. Add new expense
2. View all expenses
3. Filter expenses by category
4. Edit expense
5. Remove expense
6. Visualize expenses
7. Quit
Enter choice: 1

Select a category:
1. Travel
2. Food
3. Entertainment
4. Shopping
5. Other (manual entry)
Enter choice: 3
Enter expense amount: 20
Expense added successfully!

**********************************************************************************************************************************************************************
                                                                    Main Menu
**********************************************************************************************************************************************************************

1. Add new expense
2. View all expenses
3. Filter expenses by category
4. Edit expense
5. Remove expense
6. Visualize expenses
7. Quit
Enter choice: 4
Enter category to edit: Entertainment
Enter new amount: 40
Expense edited successfully!
```

Here we first added an expense in category Entertainment and then edited it to its new amount.

```
**********************************************************************************************************************************************************************
                                                                    Main Menu
**********************************************************************************************************************************************************************

1. Add new expense
2. View all expenses
3. Filter expenses by category
4. Edit expense
5. Remove expense
6. Visualize expenses
7. Quit
Enter choice: 2

**********************************************************************************************************************************************************************
                                                                    Expenses
**********************************************************************************************************************************************************************

Travel: Rs.50.00
Food: Rs.50.00
Shopping: Rs.60.00
General: Rs.80.00
Entertainment: Rs.40.00
```

Remove Expenses

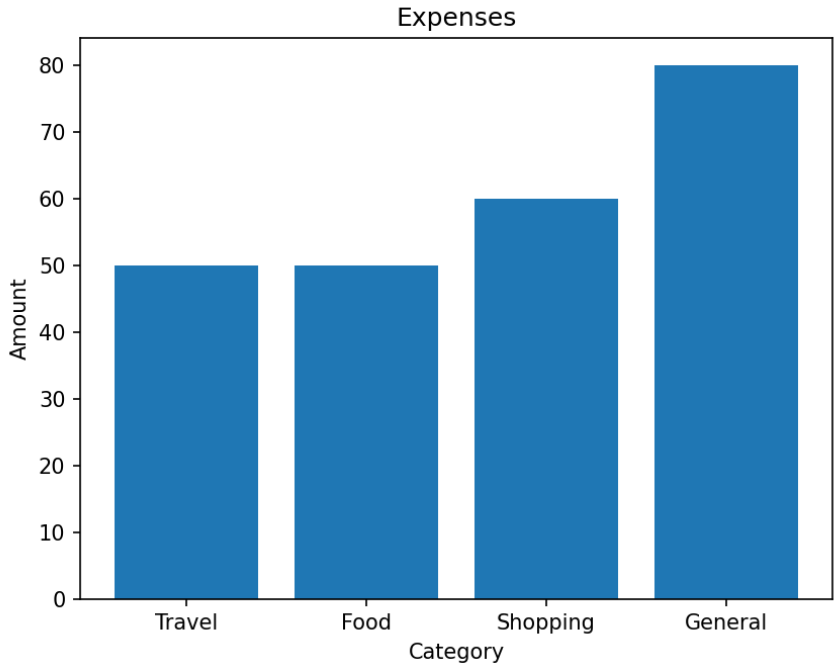
Here will remove the expense of the category Entertainment.

```
**********************************************************************************************************************************************************************
                                                                Main Menu
**********************************************************************************************************************************************************************

1. Add new expense
2. View all expenses
3. Filter expenses by category
4. Edit expense
5. Remove expense
6. Visualize expenses
7. Quit
Enter choice: 5
Enter category to remove: Entertainment
Expense removed successfully!

**********************************************************************************************************************************************************************
                                                                Main Menu
**********************************************************************************************************************************************************************

1. Add new expense
2. View all expenses
3. Filter expenses by category
4. Edit expense
5. Remove expense
6. Visualize expenses
7. Quit
Enter choice: 2

**********************************************************************************************************************************************************************
                                                                Expenses
**********************************************************************************************************************************************************************

Travel: Rs.50.00
Food: Rs.50.00
Shopping: Rs.60.00
General: Rs.80.00
```

Visualize Expenses

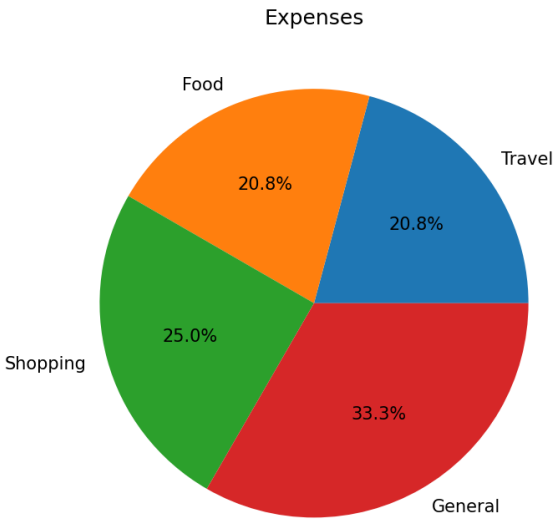
1. Bar Plot:

```
**********************************************************************************************************************************************************************
                                                                Main Menu
**********************************************************************************************************************************************************************

1. Add new expense
2. View all expenses
3. Filter expenses by category
4. Edit expense
5. Remove expense
6. Visualize expenses
7. Quit
Enter choice: 6
Choose a visualization option:
1. Bar Plot
2. Pie Chart
Enter choice: 1
```



2. Pie Chart:

```
**********************************************************************************************************************************************************************
                                                                Main Menu
**********************************************************************************************************************************************************************

1. Add new expense
2. View all expenses
3. Filter expenses by category
4. Edit expense
5. Remove expense
6. Visualize expenses
7. Quit
Enter choice: 6
Choose a visualization option:
1. Bar Plot
2. Pie Chart
Enter choice: 2
```



VII. Conclusion

Through this project, I have significantly enhanced my skills in programming, data analysis, and visualization. I have successfully developed an expense tracker with data visualization capabilities, demonstrating my ability to design and implement complex software solutions. This experience hasn't just sharpened my coding abilities but has also given me the confidence to handle real-world challenges effectively.

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