**OS and network infrastructure (1108)**

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**Assignment 2**

**Submitted to: Prof. Sohaib Mohiuddin**

**Part 1: Identify the Problem**

**Problem 1: Personalized Weather-Based Daily Planner**

A common problem many people face is deciding what to do each day based on unpredictable weather. Many individuals spend time trying to figure out whether it's appropriate to go for a walk, work out outside, or stay indoors. This uncertainty can be frustrating, especially when planning activities like exercise, social events, or outdoor chores. The weather is constantly changing, and without proper guidance, it can lead to wasted time or missed opportunities for outdoor activities.

I think encoding a solution to this problem would be very beneficial. Setting up weather cues, the application provides prompts about what action is appropriate considering current weather conditions. For instance, when it is sunny the program may advice you to go for some outdoor activities or when it is raining, then you should enjoy some indoor games. The goal is to allow the users to organize their day better without spending ages trying to factor in the weather.

To address this issue, which is one of the primary functions of this application, I intend to employ the OpenWeatherMap API to obtain real-time information regarding weather and subsequently employ conditional statements in recommending the appropriate activities depending on the weather. I will also see if it is possible to add a log feature that will facilitate the monitoring of user engagements with the application added to make it a bit complex. In this I think I will employ Python libraries such as requests for accessing the API and datetime for Timestamps while logging. This will be difficult mainly because of the involvement of an external API as well as the necessity to offer correct recommendations.

**Problem 2: Personal Budget Tracker**

Personal finance is an area that may often prove difficult to handle for most individuals primarily in addressing issues to do with expenditure, budgeting, and saving. An idea that is related to the first one is that many individuals have a problem determining where their money goes and if they have a problem with overspending. While some businesses have a weak understanding of expenses, other businesses completely do not comprehend expenses at all.

Solution Approach: To the users, an ideal witness is a Python program for identification of various expenses they make and subsequent assistance in the management of their money. The program could allow users to type in their income and each expenditure item, categorize the expenditures such as food, entertainment, bills, and so forth, then compare actual expenditures to budgeted figures. It also could give more data: how many dollars are left in each group, how much the user is spending, or even how to save money.

To make this solution more powerful, you could:

* Use pandas for organizing and analyzing the expense data (handling expenses as a DataFrame).
* Use matplotlib to create visualizations, such as pie charts or bar graphs, to represent the user’s spending habits or compare income to expenses.

**Part 3: Reflection on the Solution**

**1. What was the most challenging aspect of solving this problem?**

The biggest point of contention when resolving this issue of this problem was the proper handling of weather data from the API to provide apt recommendations. I must take into consideration different types of weather which I mentioned earlier as rain, snow, and sunshine among others and them ensure that the program can respond to each appropriately. Also, there was always a requirement that if the weather data cannot be retrieved (for example, while passing a bad city name or no internet connection), the program should give some feedback and should not freeze.

**2. What resources did you use to learn about the libraries (or any other new features) you used?**

I attempted to use the knowledge I have gained from the lecture and had to turn to official documentation of the requests library to see how to make API requests and handle exceptions, and the datetime library for work with timestamps for log. Also, I explored some guides online about detailed usage of the OpenWeatherMap API which showed me the format of the weather data and how I could get the required data (like temp., weather) for the program.

**3. What was the most valuable thing you learned from this assignment?**

The most profound thing I gained of this assignment was the knowledge of work with data from an external API and the necessity of using conditional statements for making some specific recommendations based on using these data. I also discovered how to organize a program and divide functionalities, such as getting the weather data or people interactions while making various suggestions and logging the interactions based on users’ inputs; ways to improve program interfaces so they are friendly for users while presenting different error handling techniques.

**4. Is there something you would still like to add to this, or something it makes you want to try next?**

Another addition that might be useful is the opportunity to send the weather proposal in the mail or in the form of a text message, that is, the user might receive recommendations of what to do in the daytime. I also think it will also be useful to implement machine learning to recommend activity suggestions based on user history or liking. Furthermore, improvement in proper error operation and inclusion of more cities would further enrich the program.