IST 256:

The Final Project

Explanation of Contributions & Code

Group: Drone Airspace Analyzer

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Explanation of Contributions:

In short, our group was a dynamic team of doers. All we had at the beginning was a vision—to provide recreational drone users with valuable information about safe flying, and avoiding the pitfalls of potentially flying into restricted, or controlled, airspace. We had an ambitious project, with multiple components and a specific task; however, we ultimately believe we have delivered a capable prototype for our problem—we ended up creating the Drone Airspace Analyzer.

The initial architect of our solution was Nicholas, as initially Brady and Christopher were unsure of how to approach our solution. In the beginning, there were many components—APIs, synthesizing only the relevant data, accuracy concerning location—that needed further investigation and figuring out in order to achieve a working project. Nevertheless, Nicholas spent time and got the Google Maps, Air Map, and Dark Sky APIs to work. From there, Nicholas put the APIs into two functions which enabled the project to begin to take shape. Ultimately, Nicholas' work provided our project with the necessary foundation to create a user-friendly and thorough solution. Additionally, Nicholas also provided feedback on the poster and through helping with the demonstration.

If Nicholas was the initial architect, then Brady would be the main builder of the final project. Brady completed the four remaining functions for the code, which ultimately provides the necessary information for the end users. Specifically, Brady was instrumental in retrieving the information to display the map, with the airspace advisories, and display the weather in a manner that benefitted the drone operator. Moreover, Brady also created the majority of the exceptions, to protect against user errors. Beyond the code, Brady contributed by crafting the construction paper circles to supplement the poster, and also in helping with the demonstration.

Christopher played a different role in the project, by serving as the primary communicator of the material. Regarding the code, Christopher aided by reviewing the final product, connecting some of the components, and working with the user interaction (i.e. print statements). However, Christopher's primary contributions were in creating the written deliverables: the poster and the explanations. Christopher was the designer of the poster and developed the concept to display the information (i.e. the easel, the connection with the demonstration, the mounting board, etc.). Furthermore, Christopher was the primary author behind the explanation of contributions and the code. For these deliverables, he wanted to communicate the cohesion of the team and the utility delivered by the code, all in a straightforward and engaging manner. After drafting these deliverables, he shared them with his team where they were able to give feedback and provide final recommendations. Fundamentally, Christopher had the role of presenting the project, and the process, in the best light.

Explanation of the Code:

The first block of our code retrieves the necessary packages for the program. It is established as a try/ except function to ensure that the program will not run if all the packages are not obtained. An important feature of this block is the use of pandas, which enables the remainder of the program to be written in an efficient manner, built for the processing of many data variables.

The second block of our code has four components. The first component defines a function that holds the purpose of calling the Google Map API, which essentially retrieves geographic coordinates for the location which the user will input. The second component utilizes the AirMap API, which retrieves the Federal Aviation Administration (FAA) data related to the coordinates of the location inputted by the user. The third component is what creates the actual map the user sees. There is a lot going on in this function, as the AirMap API is working with the Folium map to plot locations in proximity to the coordinates inputted by the user. The locations plotted indicate zones the FAA indicate as being restricted or controlled. The plotting is indicated through either red, yellow, or green circles which indicate the following classifications of airspace: red being restricted airspace (flying is not allowed here, i.e. the White House), yellow, controlled airspace where permission is required (i.e. airports), green, airspace which is controlled at times but one should exercise caution as a restriction may be in effect (i.e. stadiums). The locations are plotted in proximity to the marker that is generated based on the inputted location. The final component generates a DataFrame for the weather of the location inputted by the user, done by calling the Dark Sky API. This DataFrame displays hourly temperature, windspeed, precipitation probability, and humidity for the location. Moreover, the DataFrame makes a recommendation on whether or not to fly—either "good" or "poor"—based on the respective weather conditions through a data analysis. Additionally, the DataFrame is generated as part of an if/else statement to ensure extra caution in retrieving good data.

The third block is where the user makes their actual request based on their location. Essentially, this is where the user has their first interaction with code, as everything else was in preparation for this moment. This block is completed as a series of try-except functions that are built to handle and process information that relates to location inputted by the user. The user communicates with the Drone Airspace Analyzer through a series of print statements.

The fourth and fifth blocks simply execute the functions that display the map and the weather data frame. There is no additional code placed in these blocks, the service is complete when these blocks are executed.