# Process

Getting started

At the beginning of the project, we brainstormed different topics that could have accessible data. After discussing five different themes, we chose to look at flights and weather. Our initial plan was to look at historical weather patterns for the month of March in Minneapolis and compare it to the flight patterns at the Minneapolis-St. Paul International Airport (MSP). We thought this could show how spring break travel is impacted because of an active weather period. However, due to paywall issues and accessibility to historical data, we had to pivot to tracking current weather and flight patterns at the three largest airports in Minnesota: Duluth, MSP, and Rochester.

Content recognition

FLIGHTS: [OpenSky Network API](https://openskynetwork.github.io/opensky-api/python.html)

WEATHER: [WeatherAPI](https://www.weatherapi.com/)

RADAR (ISU): <https://www.mesonet.agron.iastate.edu/ogc/>

ICONS:

Airports: <https://icons8.com/icon/L2B2Tdq6VfWN/airport>

Airplanes: <https://icons8.com/icon/59723/plane>

Steps taken

1. Find different sites to access flight and weather APIs that are free.
2. Work on the code in Jupyter Notebook to gather flight information in real time from [OpenSky Network API](https://openskynetwork.github.io/opensky-api/python.html) (flight patterns) and on the code to gather weather information from [WeatherAPI](https://www.weatherapi.com/) from the three airports, using their zip codes.
3. Use a new python library for scheduling a pull of information. This schedule is used to set up an hourly pull of real time data for the flights and the weather.
4. Create a Mongo database titled Project 3 to store the data from the hourly API calls for both flight and weather patterns.
5. Use the code for radar supported by Iowa State University (<https://www.mesonet.agron.iastate.edu/ogc/>) for real time weather developments
6. Create Flask to protect API password information to access OpenSky Network
7. Find and add icons for custom markers on the map
   1. Airport icon: <https://icons8.com/icons/set/airport>
   2. Airplane icon: <https://icons8.com/icons/set/airplane>
   3. Grounded planes: <https://icons8.com/icon/set/airplane-landed/group-small>
8. Design group presentation

Instructions on how to use the map

This interactive map has different options for people to access a variety of content. At the base level, users can access a topographical or street map. One feature beyond the maps is that users can see the three largest airports in Minnesota, and they can use the quick link popup to get to the airport’s website when they click on the airport icon. The website links could be helpful for people planning a trip or those who already booked a trip. Another option for the map is the weather feature. Because this is updated every 5 minutes, it can give the public useful real time information about the radar display for the area. It could assist people on the ground who are waiting for a flight to see if there are any potential disruptions due to incoming weather. Lastly, the aircraft information provides multiple on-click features: call signs, altitude, and trajectory. The scale of the airplanes is dependent on the altitude. The larger the plane icon, the higher its altitude.

Data ethics considerations

Because weather and airspace is public information, we did not get consent from each radar tower or airline/pilot regarding the basic content shared as it does not provide any individuals’ private information. However, privacy when traveling is something to consider when looking at the flight data, and there is an option to send a request to the FAA for people to either remove their flight information or they can create a Limiting Aircraft Data Displayed (LADD), or alternate address. Users can follow this link for more information: <https://nbaa.org/aircraft-operations/security/privacy/limiting-aircraft-data-displayed-ladd/>. One real-life application about this privacy breach would be when [Jack Sweeney](https://www.bbc.com/news/world-us-canada-68248168) tracked Elon Musk and Taylor Swift’s plane routes. Being able to track airplanes can create unease among fliers and can potentially lead to illegal actions such as stalking.

Our initial scope is limited to the upper Midwest and three Minnesota airports, but could be easily adjusted to include a larger portion of the U.S. As much transparency as possible is available through clear comments embedded in the code to help others understand where information is coming from. We also cited links to sources we used in our code for others to receive credit for their work.

Next steps

This data and visualization is beneficial for businesses and individuals alike. Businesses, especially those who rely on transporting goods using airplanes, could benefit from additional components such as the flight trajectory, layovers, etc. Travelers, especially those beyond the upper Midwest would benefit from a larger scope and other airport information.