Meteorites & Fireballs
Interactive Dashboard

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Motivation & Summary

Objectives:

- Explore NASA data on meteorite landings and fireball sighting for changes over time.
- Use dropdowns based on years to drive visualizations.
- Use layers on leaflet maps to study locations of landings and sightings over time.

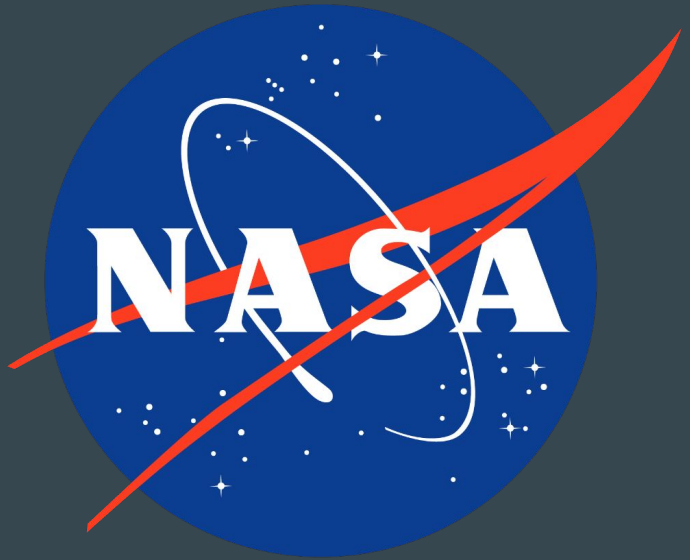
Summary:

- Exploring the data showed an increase in reporting over time with technology advancement and a spreading of locations beyond Europe as migration occurred across the globe.

The Data

Data Sources:

- NASA Open Data Portal: Meteorite Landings
  - https://data.nasa.gov/Space-Science/Meteorite-Landings/
- NASA Science: Asteroids, Comets & Meteors
  - https://solarsystem.nasa.gov/asteroids-comets-and-meteors/overview/
- CNEOS Fireball and Bolide Data
  - https://cneos.jpl.nasa.gov



Data Cleaning

Jupyter Notebooks:

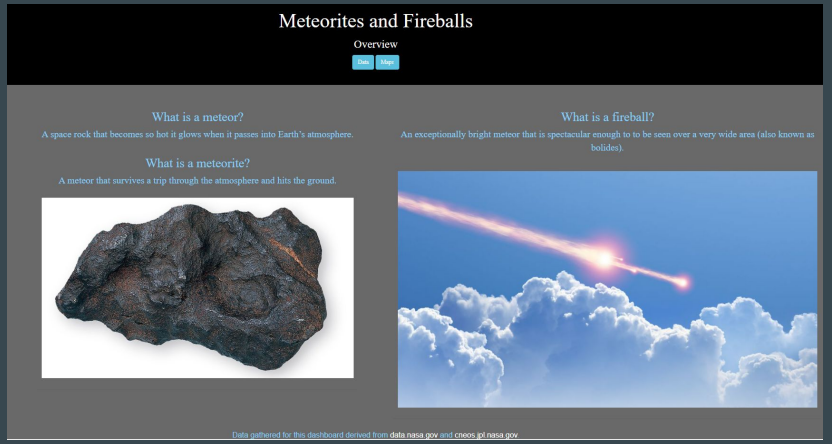
- ConvertDateTime
  - Formatted date data to year only format for meteorite and fireball csv data (Meteorite_Landings_Years.csv, Fireball_Data_Years.csv).
  - Added function to count meteorites by year (Meteorites_Count.csv).
- YearDropdown
  - Added functions to calculate Min, Mean, Max, and Total count of Fireball sightings by year (fb_altitude.csv).

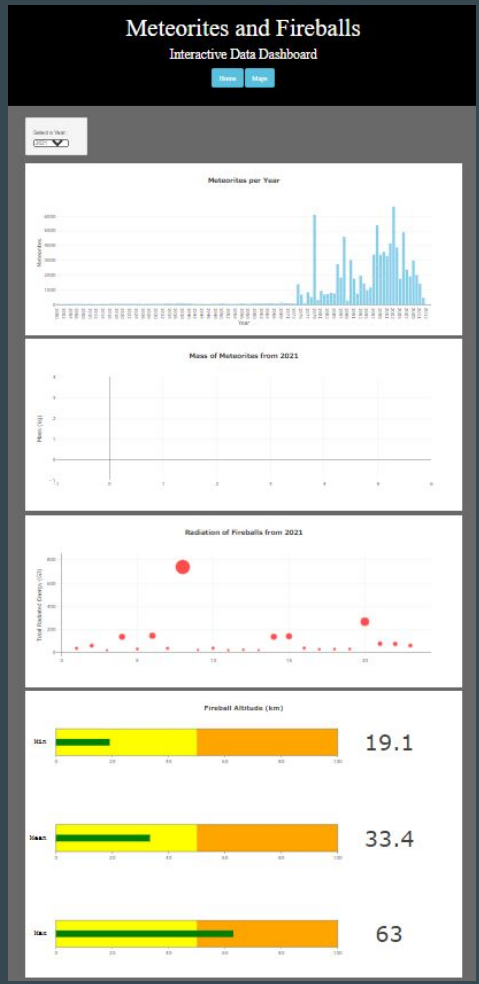
Data and Data Delivery

- Flask:
  - Distribute data stored in MongoDB to HTML and JavaScript applications.
  - Navigate the web pages.
- JavaScript:
  - **D3:** pull API from source and CSV data.
  - **Typeface JS:** format web page text.
  - **Plotly:** graph Meteorite count by year, Meteorite mass, Fireball radiated energy, Fireball count by year, and Fireball altitude using a date provided by the user via dropdown.
  - **Leaflet:** map data with markers and layers to allow population of data by date increments.
    - *Leaflet-color-markers:* Additional marker colors.
- Bootstrap:
  - HTML page structure.

Dashboard Visualizations

Dashboard page:
https://teamprojectmeteorites.herokuapp.com/





Findings

Leaflet mapping shows increase in reporting over time and a spreading of locations beyond Europe as migration occurred across the globe.

Fireball sightings noted to be prevalent in open water sources possibly due to reduced light pollution.

Bar graph of meteorite count by years shows significant increase in documented landings after 1974, likely corresponding to technological advances and increased interest in space exploration.

Reflections

What went well

- Teamwork - multiple problems solved in group sessions.
- Planning - developed framework for web pages based on data resources prior to coding.
- Data Cleaning - modified CSV data prior to graphing.
- Delegation - workload divided to prevent duplication of tasks.
- Troubleshooting - difficulties led to skill development in Flask and JavaScript.

Difficulties faced

- Flask compatibility with JavaScript.
- D3 calls with local host CSV data for graphing.
- Dropdown menu connectivity across multiple graphs.
- Toggling Leaflet maps and layers control when swapping between two unique maps.
- Adding hooks to Leaflet maps to interact with them after initialization.


Questions?