

Project 2 Write-up

The data set we used came from the Union of Concerned Scientists' Satellite Database. This database contains 1,459 observations in a csv file, each a satellite that the UCS states is currently active and orbiting Earth as of 12/31/16. We chose this database instead of a more up to date database because we wanted to focus on the satellites currently active in orbit instead of all past satellite launches, and this database deletes observations for satellites that have gone offline.

Each observation consisted of many variables that can be roughly split into three categories. The first category is identification, which includes variables such as: official name, NORAD number, COSPAR number, country of origin, country of contractor, and contractor name. The second category is orbit characteristics, which includes variables such as: perigee, apogee, eccentricity, period, longitude, orbit class, and orbit type. The final category is purpose and capabilities, which includes variables: purpose, detailed purpose, users, dry mass, power, and expected lifetime.

Before we could use the data set in our visualization, extensive preprocessing was required. First, we discarded several variables that we would not be using, such as the COSPAR number, NORAD number, dry mass, power, and sources. Second, variables values had to be cleaned up. For numeric variables, the issue was some kind of parenthetical note appended to the numerical value of a variable. Splitting the input string using spaces and converting the first index into a number solved this problem. For string variables, excess spaces from both ends needed to be trimmed. Third, missing values had to be coded and handled appropriately. For strings, missing values were recoded as "" while missing numeric values were coded as -1. Finally, there is extensive international collaboration in space, so many strings variables needed to be split into arrays to accurately represent the multiple nations/contractors/purposes of each satellite.

Once all of the data was redereed useful, we loaded the data onto the file and focused on visualization. The new yourk city skyline at the bottom is provided for scale and shows the distance between the satelites and the surface of the earth. We used <http://imagemap-generator.dariodomi.de/> to create a path out of an image we found for the NYC skyline. Then we plotted the satellites with respect to their heights on to the svg and colored the background as the color of the night sky. By scaling the skyline and the heights together, we did tried to visually show how far up in the atmospHERE the satelittes were. However, using the same vertical scale for both the skyline and the satellites, renews the skyline completely invisible on the small svg we were using. So we had 2 option, either keep the svg on a single page, or enable scrolling for scale. We chose the former since our control panel is located at the top of the visualisation, and ease of access, and better visualisation is of higher importance than scaled scrolling.

Then we added a sort to show how many different heights, nationalities and purposes the satellites belonged to.

Next up, we created animation functionality, so that we could visualize how the satellites moved with respect to each other. The period of the satellite is scaled to the period it has on screen. Finally, hover capabilities were added to give more information about the satellites on each of the satellites.

The aim of the visualisation was to understand what satellites are present in the sky, why, and where they are.

final status report:

- 1) Richard: sorting
- 2) Daisy: Animation
- 3) Divyansha: Hover, writup and finishing touches