

Project 3 Final Report

By Ming Cheng, Nupur Kale and Luis Plaz

A. A description of the work done by each team member. (Consider this your final status update.)

B. A description of the data. Report where you got the data. Describe the variables. If you had to reformat the data or filter it in any way, provide enough details that someone could repeat your results. If you combined multiple datasets, specify how you integrated them. Mention any additional data that you used, such as shape files for maps. Editing is important! You are not required to use every part of the dataset. Selectively choosing a subset can improve usability. Describe any criteria you used for data selection.

C. A description of the mapping from data to visual elements. Describe the scales you used, such as position, color, or shape. Mention any transformations you performed, such as log scales.

D. The story. What does your visualization tell us? What was surprising about it?

Section A: Team member contributions

Ming Cheng (mc2637)

Tasks performed:

- Worked on pie charts visualizations
- Worked on legends, backgrounds, and other stylings
- Worked on the descriptions of the data
- Worked on Line Graph

Nupur Kale (nak85)

Tasks performed:

- Worked on initial geo projection for the globe and plotted the satellite launch locations.
- Worked on showing the satellites for the launch location selected in the respective orbit visually classifying the image for successful mission (green icon) and failed mission (red icon), animating the display.
- Worked on creating the pop up for showing mission details on click of a satellite in the orbit.

Luis Plaz

Tasks performed:

- Worked on globe and satellites animation, specifically showing launches on globe and their respective icons.
- Worked on styling and color coordination.
- Created classes for missions.
- Refactored code seeking code DRYness.

Section B: Data description

We used the SpaceX missions database (2006 to present) from Kaggle ([link to dataset](#)). We also found another dataset which gives the location (latitude and longitude of satellite launch sites). SpaceX is a private organization which designs, manufactures and launches advanced rockets and spacecrafts for clients all across the globe. The dataset consists of many mission data variables like launch date and launch time, launch site, vehicle type, satellite name and type, orbit, mass of the satellite, the customer name, type and country, mission and landing outcomes and the reason in case of mission failure. Also from the other dataset, we had the latitude and longitude variables for the launch locations. As the number of satellites launched by SpaceX in the timeframe of the dataset are not overwhelming, we included all entries. Some issue with the data was missing column values for mass, orbit, type of satellite and customer details. For such cases, we filtered that data out. Our criteria of data selection was based on focussing on the relationship of SpaceX satellite type, its customers and the mission outcome for the visualization.

Section C: Mapping data to visual elements

The centerpiece of our visualization is the globe with launch locations displayed using svg circles and text. We used the d3 geo orthographic projection for the globe. The launch locations are displayed on top of the screen as buttons. On click of any location, the page scrolls to the view of the globe and the orbits above it, an animation begins where all satellites from that location start appearing one by one, going into outer space. The icons for satellite differ, based on the type of satellite (communication, human remains, research etc.). As this animation is in progress, the satellites also appear in the respective orbits right above the globe. If the icon is green, that means the mission was successful, but if the icon is red, the mission outcome was failure and hence these satellites do not appear in any orbit but in a separate row called as failed missions.

Clicking on any satellite in the orbit will open a popup which displays more information: name of the satellite, customer name, type of satellite, mission outcome and reason for failure in case the mission had failed.

The line chart displays the overall satellite missions from different launch sites from the year 2006 to 2017. The line chart displays the number of satellites launched from each site in each year, which provides a data overview. From the line graph, we know that SpaceX satellites missions launched mostly at Cape Canaveral AFS LC-40 launching site since 2011. In 2016, Cape Canaveral AFS LC-40 was damaged in pad explosion and currently inactive pending repairs, which caused SpaceX to work with a new launching site - Kennedy Space Center LC-39A starting 2017.

The pie charts display crucial data visualizations of the percentage of mission outcomes, payload, and countries for the satellites that launched on each launch sites. It is aimed to provide more detailed of the launched satellites. The "Success and Failure Outcomes" displays the numbers of success launches and failed launches; the "Payload Types" displays the

different types and uses of the satellites; and the “Countries” displays the countries that the customers of SpaceX from on each launch site.

Section D: Story of our visualization

Through this visualization we wanted to explore what space missions are really all about. For what purposes are these satellites utilized? Which countries are engaging actively with SpaceX as its customers? What are some of the factors that lead to success and failure of these missions? We found a surprising satellite mission that was commissioned to send human remains in space! We also observed that government clients of SpaceX engage in all types of space missions, be it communication/ weather/ research or space station supplies, whereas the business clients mostly send communication satellites. Also, we found that not all successful space missions resulted in successful landing of the satellites, so we estimate huge amount of losses must be occurring due to these failures.

From the more detailed line chart and pie charts, we are able to get deeper information about SpaceX and the trend of satellite missions.

We want to convey information about all space missions that were launched by SpaceX and give key details about every mission available in an interactive manner.