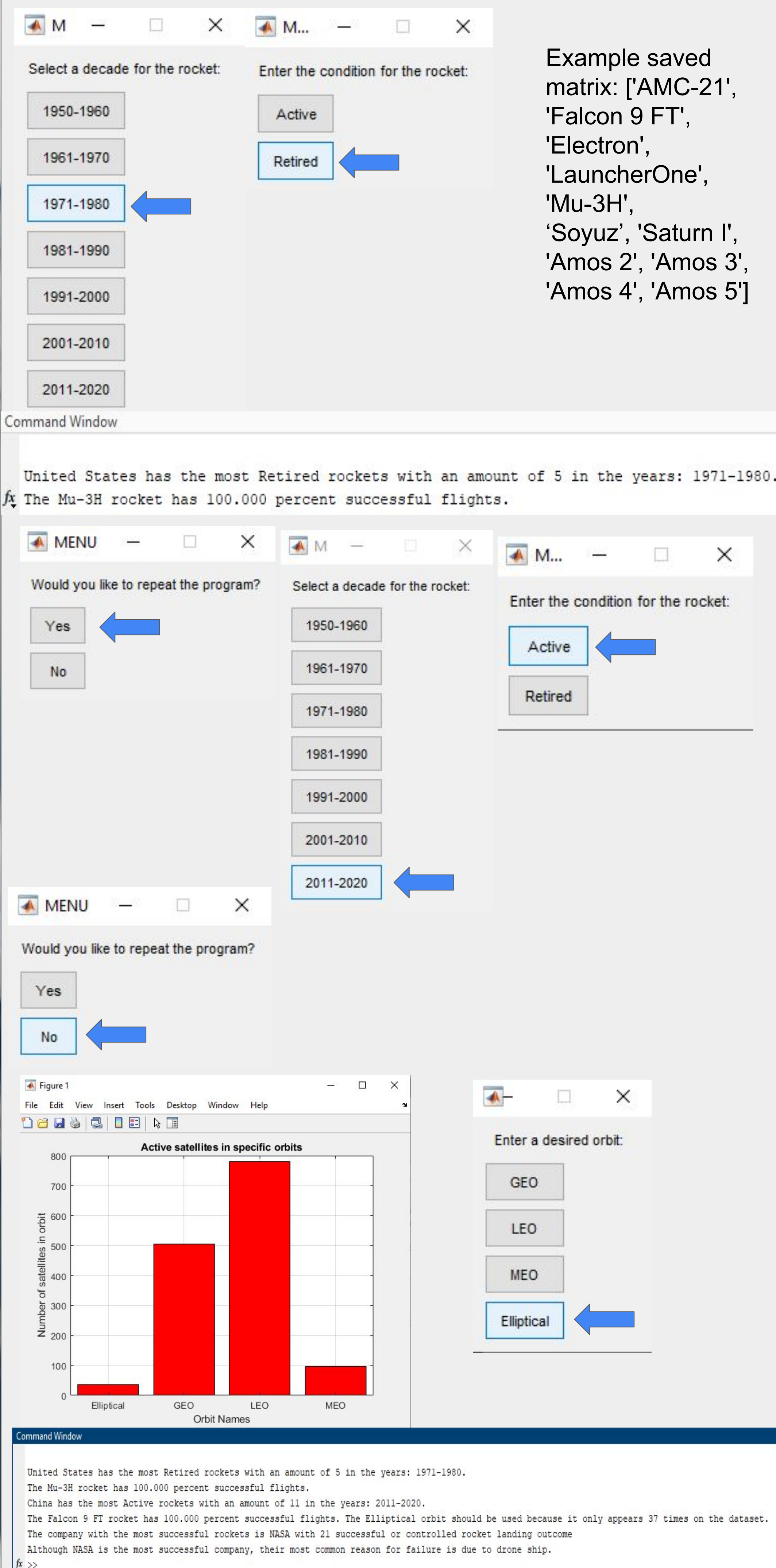


**Background:** Satellites are an invaluable tool for humanity that allow us to see large areas at a time, making them efficient at collecting salient information of our planet, Earth. They occupy the thermosphere which allow us to gain better view of space and beyond. Our program aims to improve the success rate of launching and maintaining satellites by using data to identify points of failure in the satellites. Furthermore, our program allows us to balance the cost to performance ratio in the process and to decrease the space debris by providing the optimal conditions in orbit. Our data is using the launch data from SpaceX, a SpaceFund data set detailing the costs, and Orbit Data to count the amount of satellite and determine the types of orbit.

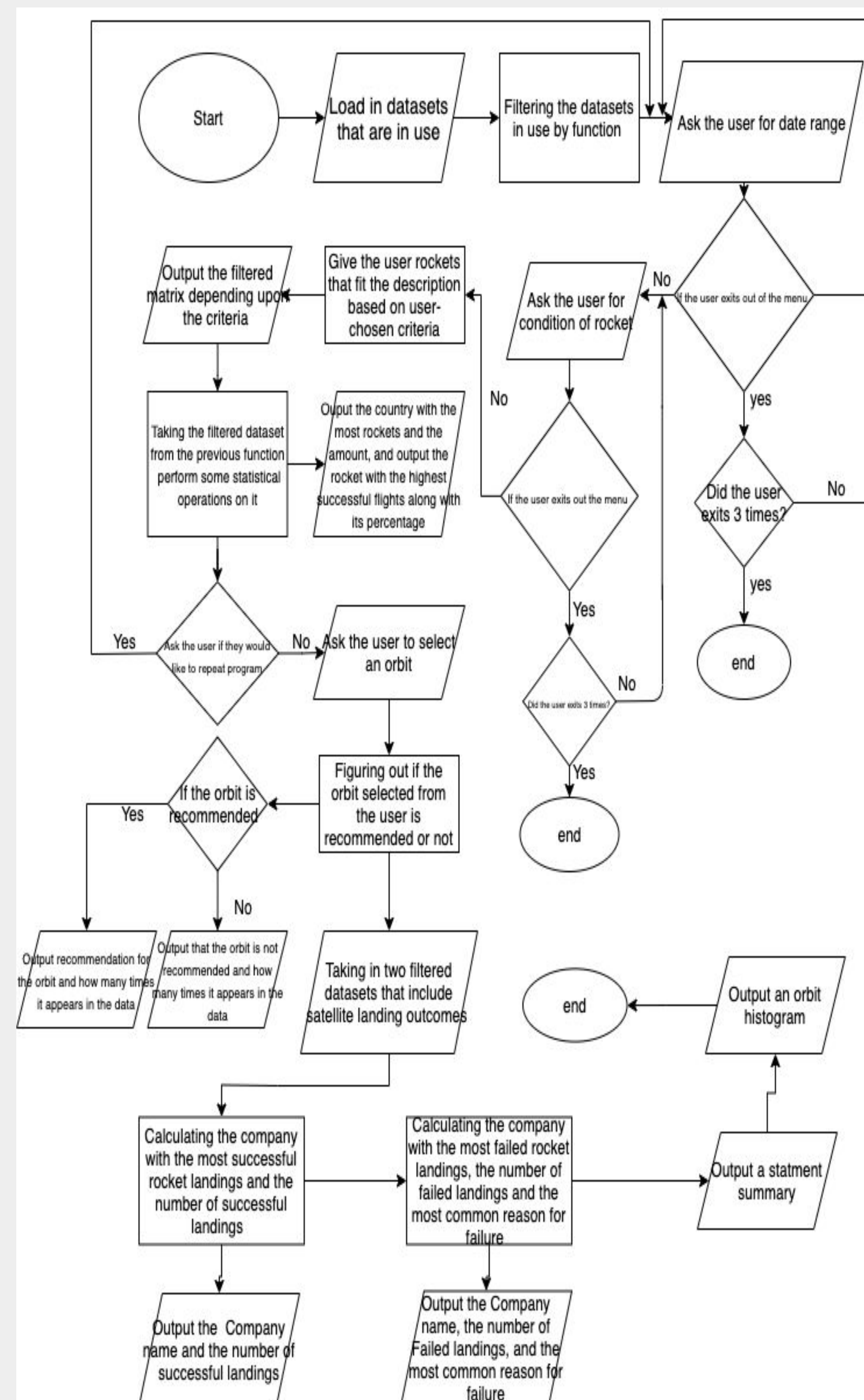
### Test Case:



The screenshot displays the application's user interface with several windows:

- Select a decade for the rocket:** A list of decades from 1950-1960 to 2011-2020. The 1971-1980 decade is selected.
- Enter the condition for the rocket:** Two buttons, 'Active' and 'Retired'. 'Retired' is selected.
- Example saved matrix:** A list of rocket names: ['AMC-21', 'Falcon 9 FT', 'Electron', 'LauncherOne', 'Mu-3H', 'Soyuz', 'Saturn I', 'Amos 2', 'Amos 3', 'Amos 4', 'Amos 5']
- Command Window:** Displays text results: "United States has the most Retired rockets with an amount of 5 in the years: 1971-1980." and "The Mu-3H rocket has 100.000 percent successful flights."
- MENU Window:** A window with a 'Yes' button selected for the question "Would you like to repeat the program?".
- Orbit Selection Window:** A window with buttons for 'Active' and 'Retired'. 'Active' is selected.
- Figure 1 Window:** A bar chart titled "Active satellites in specific orbits". The x-axis shows "Orbit Names" (Elliptical, GEO, LEO, MEO) and the y-axis shows "Number of satellites in orbit". The bars are red, with LEO having the highest count (approx. 750).
- Orbit Selection Window (Bottom):** A window with buttons for "GEO", "LEO", "MEO", and "Elliptical". "Elliptical" is selected.
- Command Window (Bottom):** Displays text results: "United States has the most Retired rockets with an amount of 5 in the years: 1971-1980.", "The Mu-3H rocket has 100.000 percent successful flights.", "China has the most Active rockets with an amount of 11 in the years: 2011-2020.", "The Falcon 9 FT rocket has 100.000 percent successful flights. The Elliptical orbit should be used because it only appears 37 times on the dataset.", "The company with the most successful rockets is NASA with 21 successful or controlled rocket landing outcome", and "Although NASA is the most successful company, their most common reason for failure is due to drone ship."

### Algorithm:



### Inputs:

1. Date Range
2. Condition
3. Repeat
4. Select orbit

### Outputs:

1. Country with most rockets
2. Rocket with the most successful flights
3. Decade
4. Rocket with the highest percentage of success
5. Percentage of success
6. Company with most successful rockets
7. Most common reason of failure
8. Plot

**Conclusions:** We concluded that to limit space debris, we could take into consideration the best orbit to launch the rockets, the best rockets to launch the satellites, the companies with the highest success rate and the most common reason for landing failures, so they could improve their points of failure.

**Future Steps:** We could incorporate the data that we have and elaborate on it by continuing research on reasons that make a satellite successful. We could also implement a function that determines the best weather conditions for satellite launch.

**Limitations:** Some limitations to our project is that we had limited access to private company data. Another limitation would be the incompleteness of the data we gathered.

### Citations:

- Grush, Loren. *SPACEX CONTINUES TO BLAST SATELLITES INTO ORBIT AS THE SPACE COMMUNITY WORRIES*, The Verg, 14 Jan. 2020, [www.theverge.com/2020/1/14/21043229/spacex-starlink-satellite-mega-constellation-concerns-astronomy-space-traffic](https://www.theverge.com/2020/1/14/21043229/spacex-starlink-satellite-mega-constellation-concerns-astronomy-space-traffic).
- National Academy of Engineers. *Grand Challenges - 14 Grand Challenges for Engineering*, [www.engineeringchallenges.org/challenges.aspx](http://www.engineeringchallenges.org/challenges.aspx).(Restore and Improve Urban Infrastructure)