Final Visualization Report: All Space Missions from 1957

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GitHub Repository: https://github.com/ibraheem32/final-visualization-report.git

Introduction

All Space Missions from 1957 is an extensive dataset that consists of information on 4,301 space missions performed by different organizations around the world. This paper examines the trends of mission launches, the roles of specific organizations, and the performance of rockets. Through the analysis of more complex data handling methods, the trend of space expansion and the overall outcome of public and private initiatives are identified.

Dataset Overview

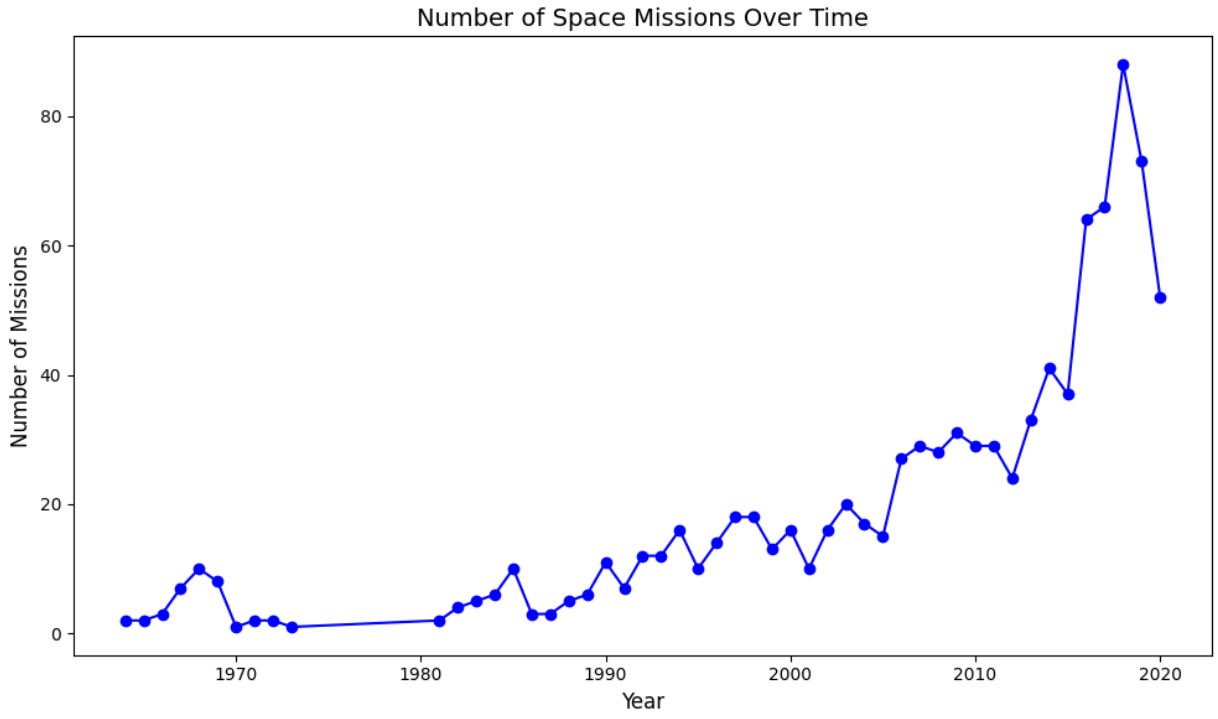
The dataset contains eight columns:

1. Index: A mission can be defined by a unique number.
2. Company Name: This organization is responsible for the mission.
3. Location: Launch site of the mission.
4. Datum: The converted date of the mission in analysis datetime format.
5. Detail: More details concerning the mission of the assignment.
6. Status Rocket: General result of the rocket performance (e.g., Successful, Unsuccessful).
7. Rocket: Particular rocket in terms of mission.
8. Status Mission: The result of the mission's goal.

The missing data was handled, the duplicates were removed, and the launch date was split into year to allow time series and categorical analysis.

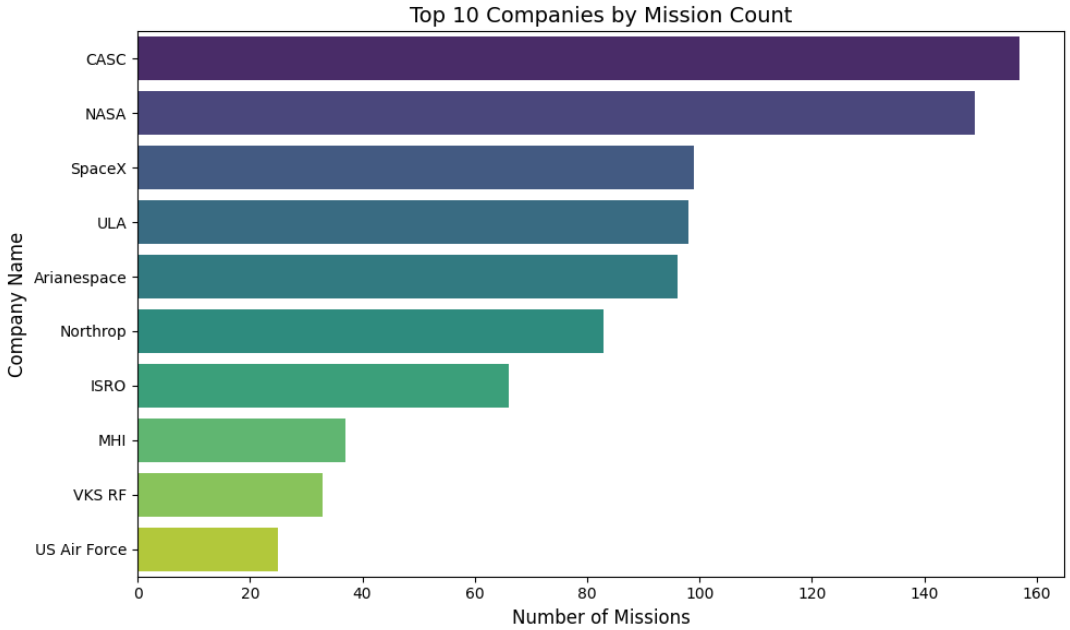
Missions Over Time

Figure indicates the yearly mission and highlighted that over the years, the activity has been gradually rising. The first increase can be observed in the 1960s-1970s with the so-called 'Space Race', the most recent increase marks the start of private space companies such as SpaceX. The maximum annual value of missions was above 80, which indicates the increasing availability and development of space technology.



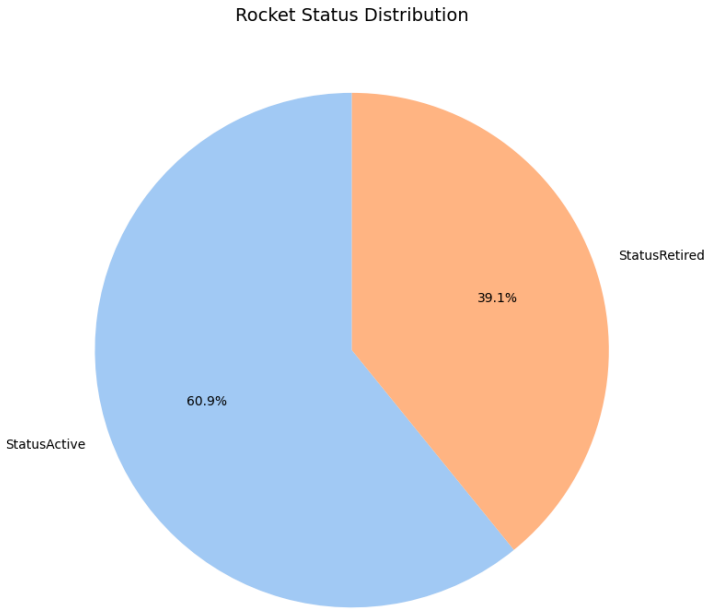
Top 10 Companies Leading Space Exploration

There are significant players in space exploration as depicted by figure. Currently, CASC has 157 missions, NASA with 149 and SpaceX with 99. This concentration of activities clearly reveals how a few companies are leading the way in the development of space technology. Private companies have particularly grown in the industry, and this has helped to decentralize the access to space.



Rocket Status Distribution

The dataset also helps to understand the characteristics of rocket propulsion. This is illustrated in the Figure 3 below; showing that successful rockets accounted for 60.9% while rockets that failed accounted for 39.1%. This suggests some advancement in engineering, and testing as compared to previous missions, which had low success levels. Indeed, contemporary organizations have evolved to attain greater reliability especially private sector organizations this is due to improvements in aerospace technology.



Summary Statistics by Company

The performance of the top 5 companies can be viewed in table below. ULA has modern techniques and is committed to lifting often as it stands with the 10 distinct rocket designs. CASC and NASA have launched more total missions, but they use less rocket designs, due to the differences in their operational management. These metrics help to show how much the approaches to sustainable development of the space sector vary within different organizations.

Company Name	Total Missions	Unique Rockets
CASC	175	8
NASA	149	2
SpaceX	99	6
ULA	98	10
Arianespace	96	5

Conclusion

The analysis proves the growth of the market at an increased rate with the involvement of the leading players such as SpaceX, Arianespace, and Roscosmos. The improvement of the success rates of rockets and the number of missions carried out also delineate improvements of technology and availability. Nevertheless, issues like rocket reliability are constantly considered to be worked on and improved. What the dataset shows is a story of mankind making its way into the space and the advances made, new technologies used, and places to explore.