SPACEX | DATA SCIENCE

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16 February 2024

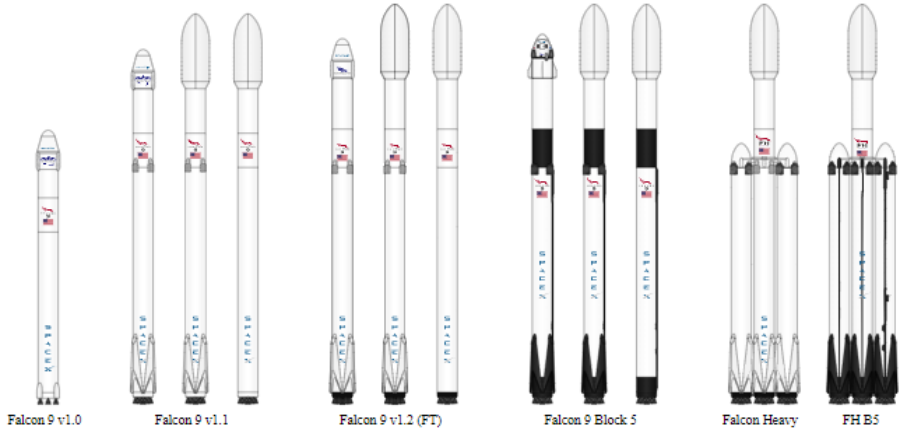
OUTLINE

EXECUTIVE SUMMARY

Highlights SpaceX, a pioneering aerospace manufacturer and space transportation service provider founded by Elon Musk. This disruptive company, akin to Tesla, has rapidly emerged as a significant player in the space industry despite its relatively short existence of less than 20 years.

SPACE X FALCON 9 FIRST STAGE LANDING PREDICTION

https://github.com/nicholasmhlanga/IBM-Data-Science-SpaceX-Capstone



INTRODUCTION

The completion of the IBM professional certification in Data Science on Coursera marks the culmination of my participation in the Applied Data Science Capstone project. This course provided a platform to leverage the skills acquired during an extensive engaging with diverse courses. Through hands-on experience with real-world datasets, I sharpened my abilities in data extraction, cleaning, exploration, and analysis to derive valuable insights. Today, I am pleased to share my reflections on the successful fulfillment of the certification, a journey that began in the first quarter of the year.

METHODOLOGY | DATASETS

DATA COLLECTION | DATA WRANGLING

Data Collection

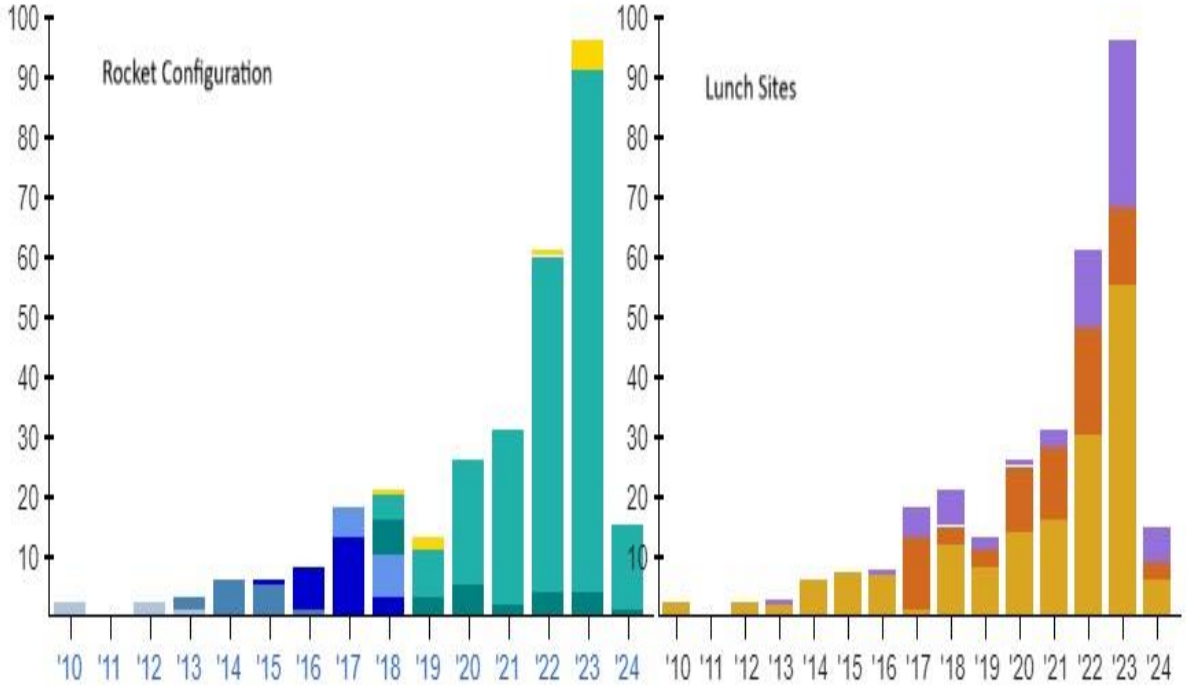
SpaceX wiki extracted data collection involved retrieving data from SpaceX's wiki extracted a set of rules and protocols that allows different lunches applications to communicate with each other. In this context, accessing SpaceX's wiki extracted allows retrieval of specific data related to SpaceX's activities, such as launch schedules, mission details, and other relevant information.

Data Wrangling

SpaceX involved preparing and organizing raw data related to SpaceX missions, launches, and related information for analysis. :

EXPLORATORY DATA ANALYSIS

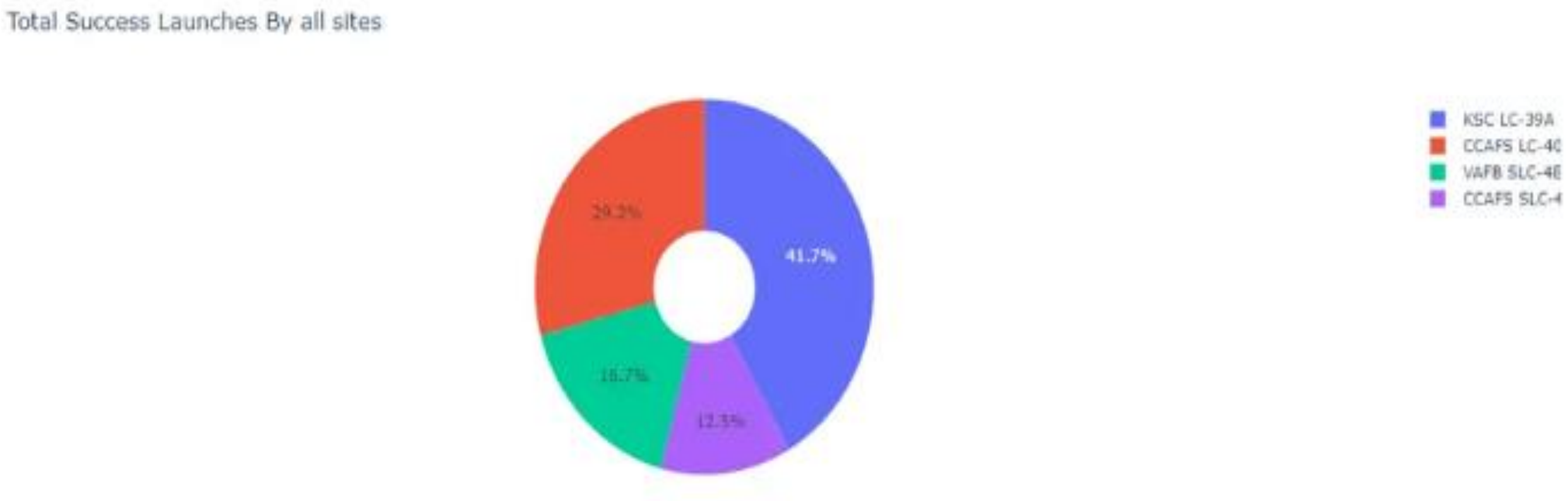
Data cleaning, we embark on exploratory data analysis, utilizing visualization techniques to glean insights into the launches.



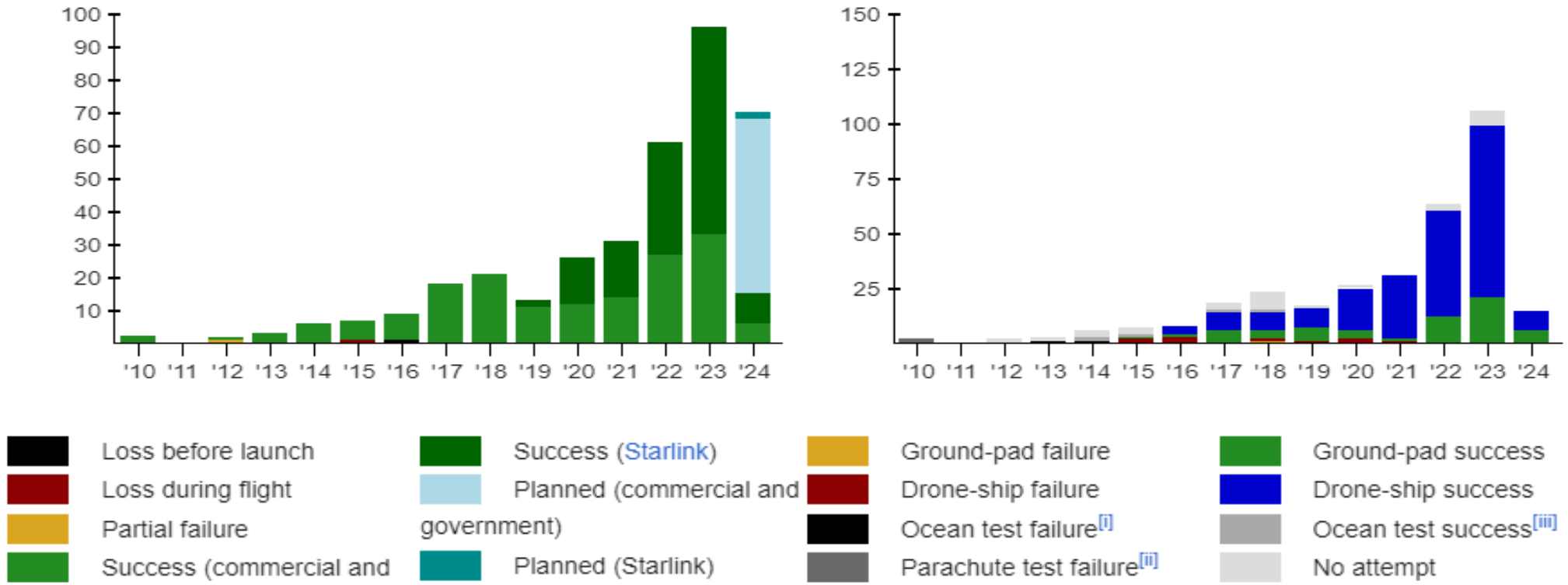
INTERACTIVE MAP WITH FOLIUM

Given that SpaceX launches originate from various launch sites, I've visualized the data of both failed and successful launches as clusters on the map. By zooming in and out, observers can discern the clusters of successful and failed launches.

INTERACTIVE DASHBOARD WITH PLOTLY DASH



GWYNNE SHOTWELL EXPRESSED SPACEX'S ASPIRATIONS FOR UP TO 24 LAUNCHES DEDICATED TO STARLINK SATELLITES IN 2020, ALONGSIDE 14 OR 15 LAUNCHES UNRELATED TO STARLINK. WITH A TOTAL OF 26 LAUNCHES, INCLUDING 14 FOR STARLINK SATELLITES, FALCON 9 ACHIEVED ITS MOST PRODUCTIVE YEAR, MAKING FALCON ROCKETS THE SECOND MOST PROLIFIC ROCKET FAMILY OF 2020.



LAUNCH STATISTICS

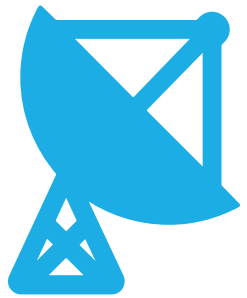
Over the course of 14 years, rockets belonging to the Falcon 9 family have been launched a total of 309 times. Among these launches, there have been 307 full successes, accounting for a success rate of 99.4%. There was one in-flight failure, notably SpaceX CRS-7, and one partial success, as SpaceX CRS-1 managed to deliver its cargo to the International Space Station (ISS), albeit with a secondary payload stranded in a lower-than-planned orbit. Furthermore, one rocket along with its payload, AMOS-6, was destroyed before launch during an on-pad static fire test. The current active version, Falcon 9 Block 5, has completed 244 missions, all of which have been full successes.

RESULTS

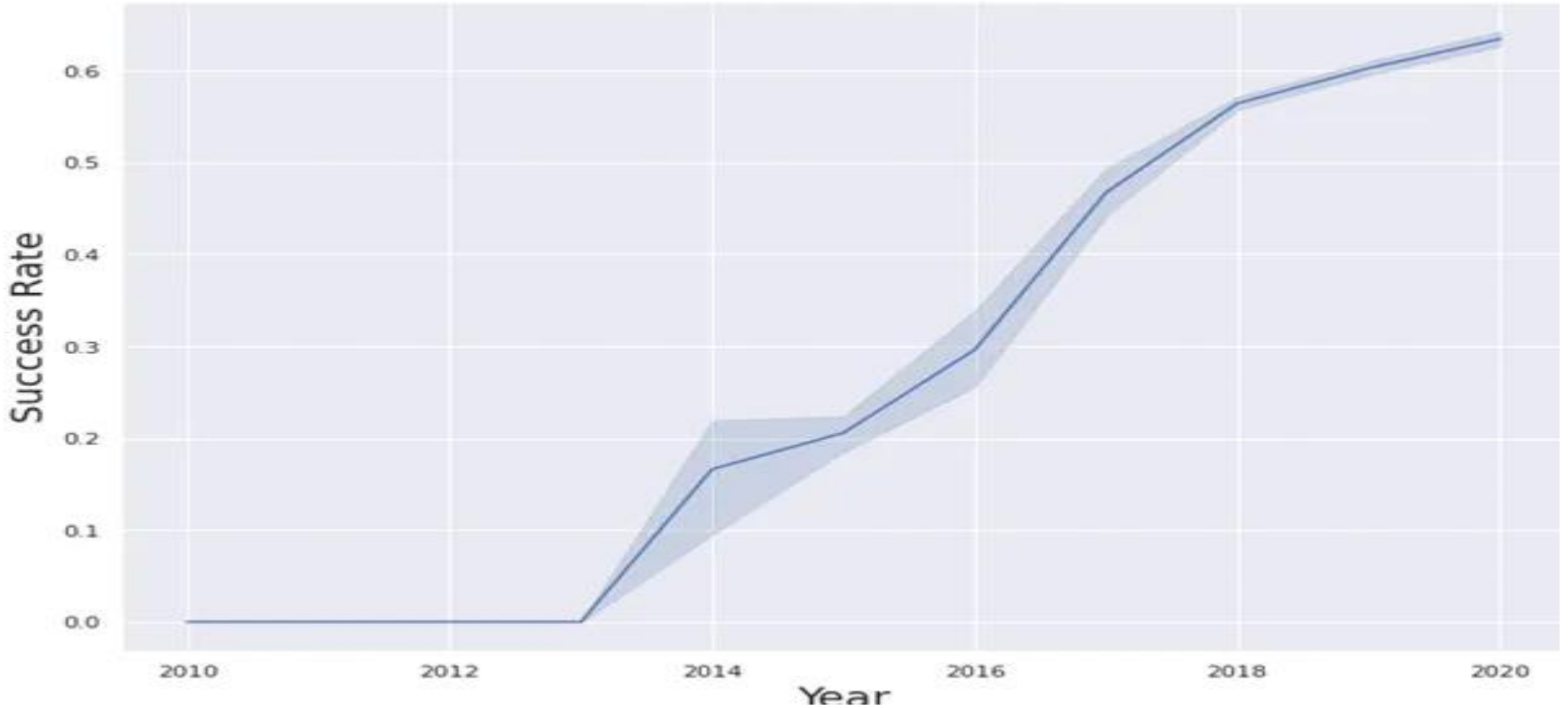
ANALYSING DATA

After analyzing the data, I found that the majority of launches originated from the Kennedy Space Center (KSC). This preference can be attributed to its proximity to SpaceX's production facility. Specifically, most launches occurred from KSC PAD 39A, primarily for missions to Very Low Earth Orbit (VLEO), Geostationary Orbit (GEO), or the International Space Station (ISS), making it an ideal launch site. Additionally, Falcon Heavy launches frequently carried full payloads to optimize Falcon's payload capacity.

Over time, the probability of successful booster landings increased as evidenced by the data collected from previous failed attempts. Notably, SpaceX achieved its first successful booster landing on June 5, 2016

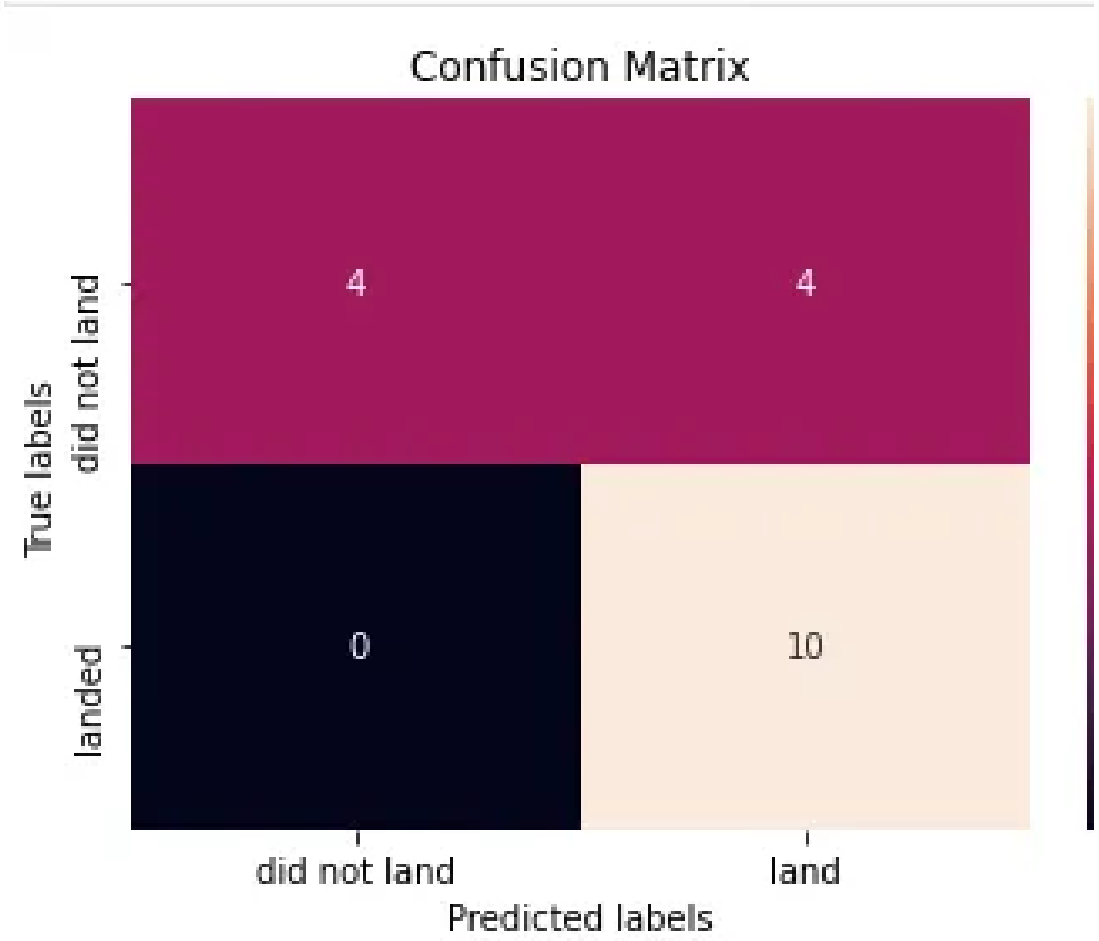


SUCCESS RATE



PREDICTIVE ANALYSIS

I utilized the data to train machine learning models, including the KNeighborsClassifier.



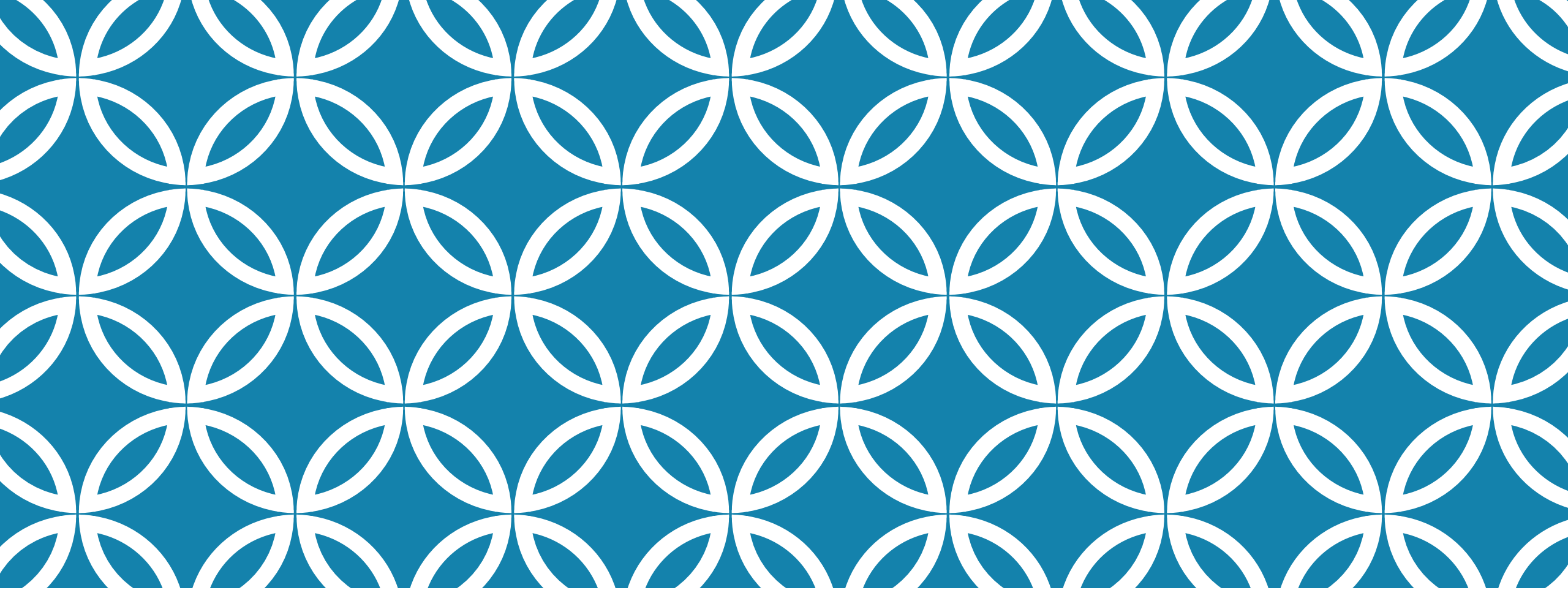
INNOVATIVE INSIGHTS

SpaceX has demonstrated significant innovation in the aerospace industry, particularly in space transportation. Some key insights into SpaceX's innovation include:

Reusable Rockets: SpaceX has pioneered the development of reusable rocket technology, significantly reducing the cost of space travel. By successfully landing and reusing rocket boosters, they have disrupted traditional cost structures associated with launching payloads into space.

Falcon 9 and Falcon Heavy: The Falcon 9 and Falcon Heavy launch vehicles have become reliable workhorses, offering a range of payload capacities. Falcon Heavy, in particular, is one of the most powerful operational rockets globally, capable of carrying large payloads.

Starship Project: SpaceX is actively working on the Starship project, a fully reusable spacecraft intended for missions to Mars and other destinations. This ambitious project aims to further reduce the cost of space travel and enable human colonization of other planets.



CONCLUSION

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By leveraging existing data and conducting thorough analysis, SpaceX and other rocket companies can identify optimal strategies to minimize launch costs. This proactive approach allows them to adapt and innovate, avoiding the risk of becoming obsolete and losing clients due to traditional expensive launches.

THANK YOU!