Applied Data Science Capstone

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OUTLINE

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EXECUTIVE SUMMARY

- SpaceY plans to join the space race and compete with SpaceX.

- SpaceY will compete with SpaceX's Falcon9 rockets.

- The Falcon9 rockets are special because SpaceX reuses the first stage.

- SpaceY will create a machine learning algorithm to determine when SpaceX will be able to reuse the first stage of their rocket.

- The algorithm will allow SpaceY to pursue more competitive pricing.

INTRODUCTION

- SpaceX's historical Falcon9 rocket data will be collected and analyzed.

- SpaceX's rockets see success because their Falcon9 rockets have a cheaper price point compared to their competitors.

- The cheaper price point is due to the fact that Falcon9 can reuse the first stage of their rockets.

- Following collection of SpaceX's data, questions to answer are:
  - Which elements of a Falcon9 rocket have the biggest effect on if the first stage is successfully retrieved?
  - When will SpaceX be able to successfully retrieve the first stage of their rockets?

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METHODOLOGY

- Data Collection via Web Scraping

- Data Wrangling

- Data Analysis via SQL

- Data Analysis via Pandas and MatPlotLib
  - Line Plots, Scatter Plots, and Bar Plots
  - One-hot Encoding

- Interactive Analytics Dashboard via Folium

- Predictive Analysis
  - Logistic Regression, Support Vector Machine, Decision Tree, and K Nearest Neighbors
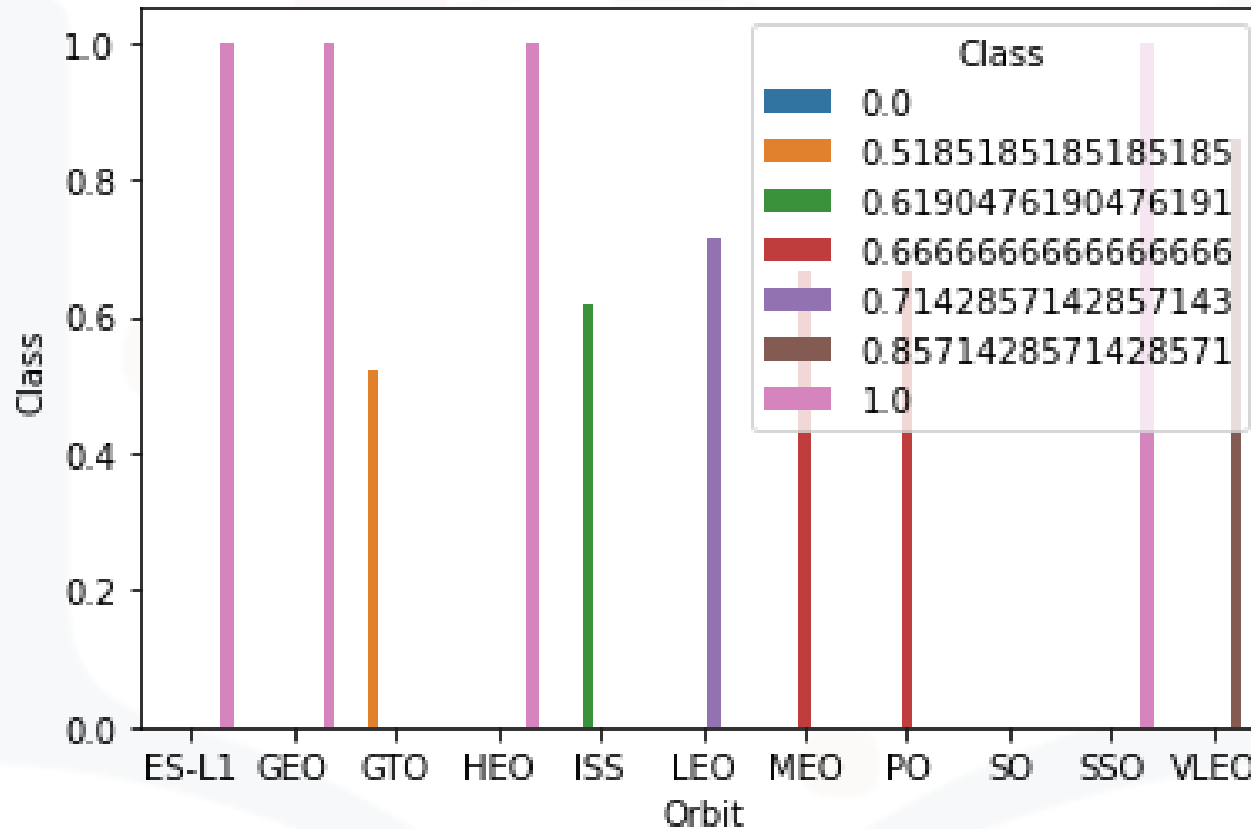
RESULTS
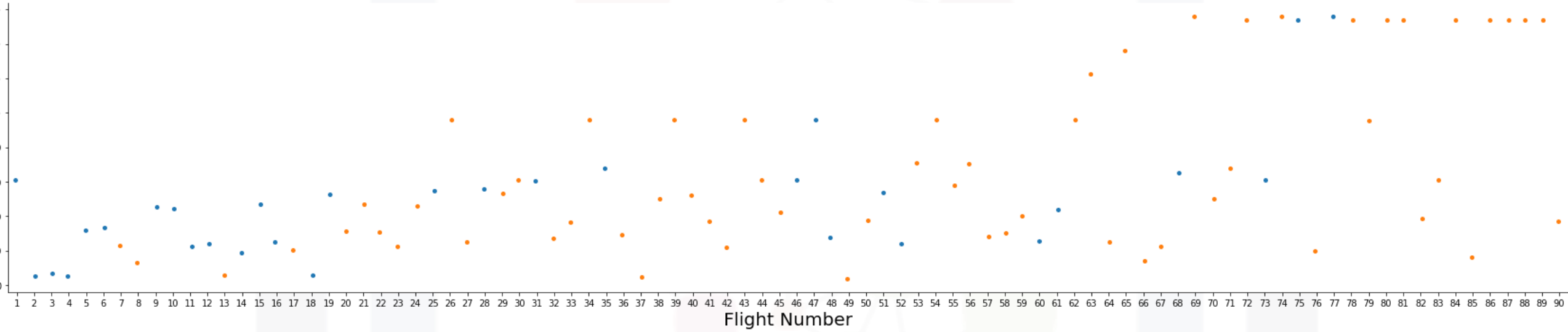
The higher the flight number, the more likely the first stage of the Falcon9 would be successfully retrieved. Falcon9 rockets with higher payload masses were also more likely to have their first stage reused
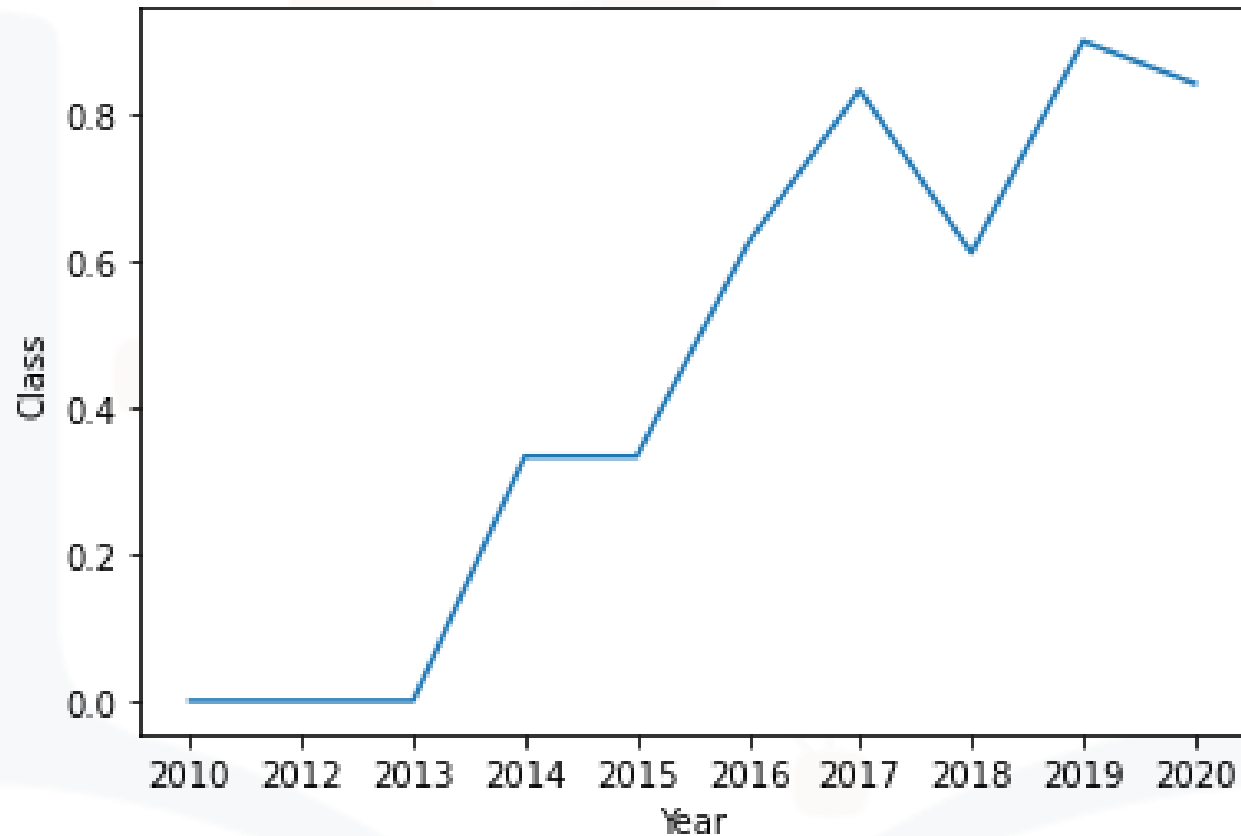
RESULTS

Certain orbits have higher success rates when it comes to reusing the first stage of the Falcon9 rocket. Specifically, orbits ES-L1, GEO, HEO, and SSO.
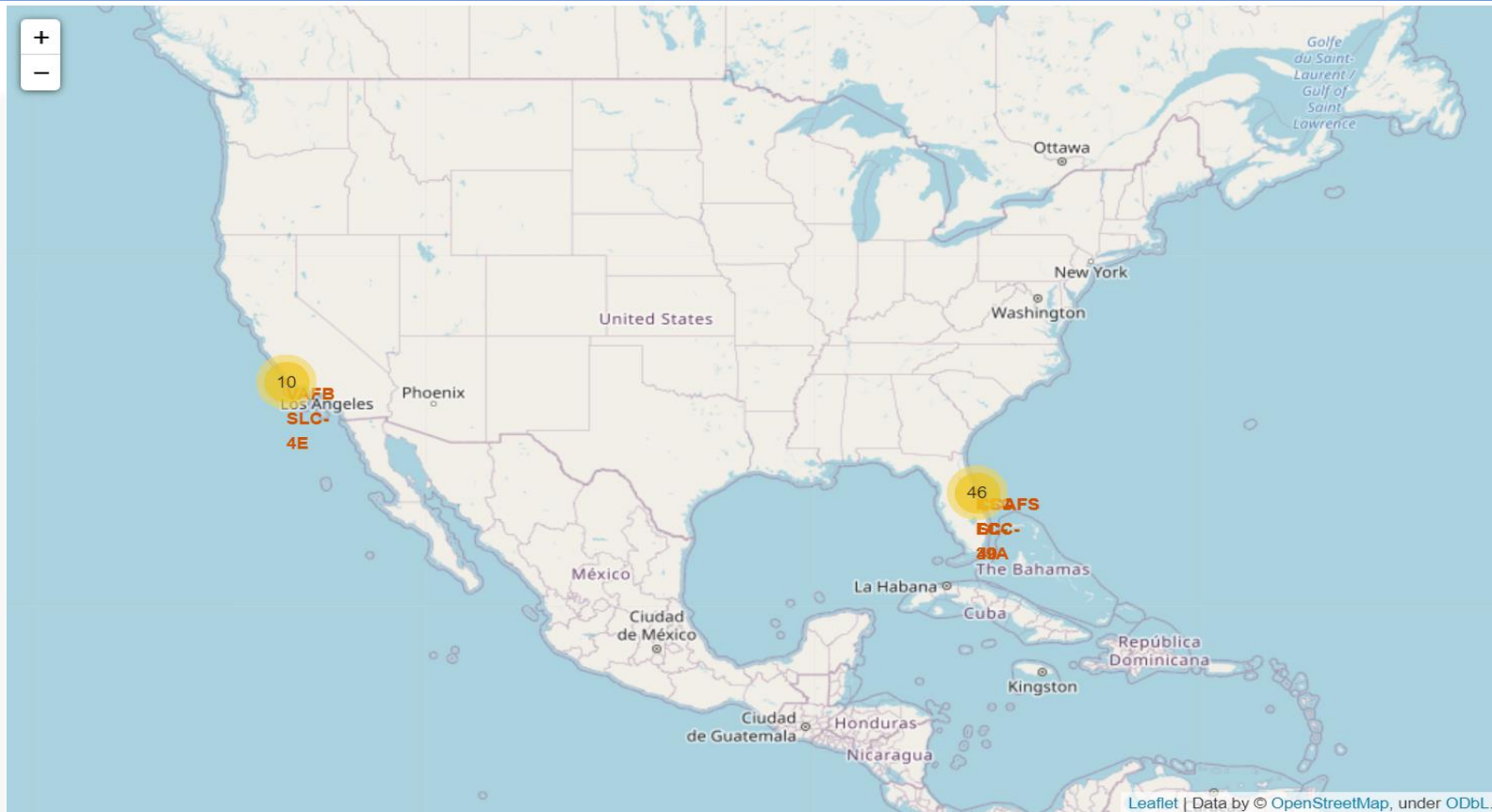
RESULTS

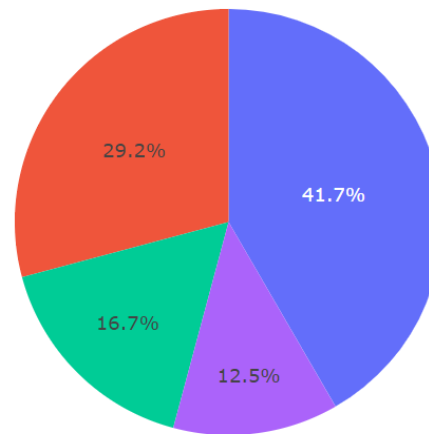Success rates overall have generally increased year-by-year

RESULTS

The Falcon9 launch sites are all located in either California or Florida, and are close to their state's respective coastlines
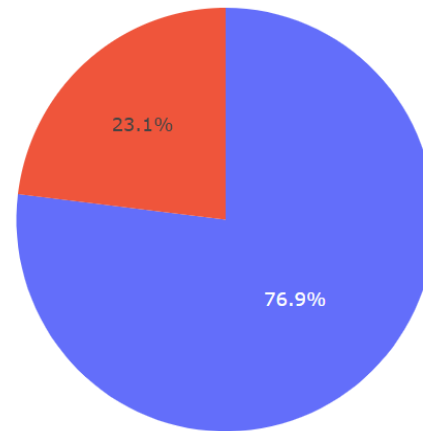
DASHBOARD

Total Success Launches By Site

KSC LC-39A
CCAFS LC-4(
VAFB SLC-4E
CCAFS SLC-4

41.7%
29.2%
16.7%
12.5%

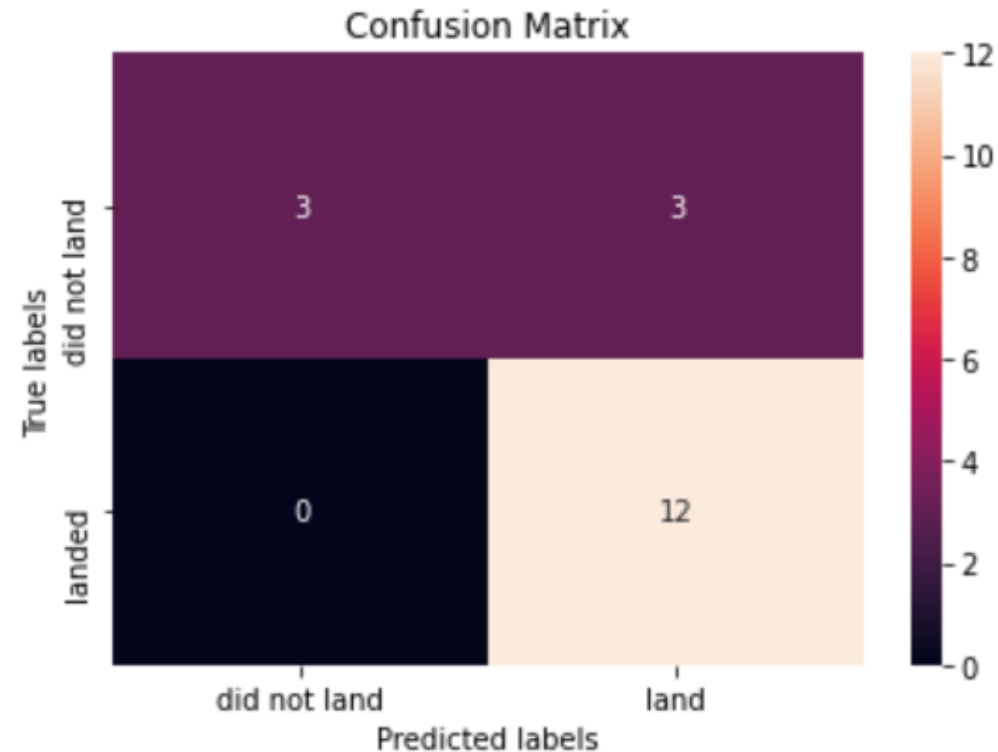Launch site KSC LC-39A had the largest amount of successful launches

DASHBOARD

Total Success Launches for site KSC LC-39A

Launch site KSC LC-39A also had the highest percentage of successful launches

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Predictive Analysis

All of the methods gave identical accuracy scores of 83.33%. The methods also all gave identical confusion matrices.

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CONCLUSION

- Any of the predictive analysis methods can be used for this dataset.

- The success rates for retrieving the Falcon9's first stage has increased with every passing year.

- Heavier-weighted payloads are more likely to have a first stage that is successfully retrieved and reused

- Launch site KSC LC-39A has historically had the most success with Falcon9 launches