SpaceX Report

IBM Final Report

Outline

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Executive Summary

Introduction

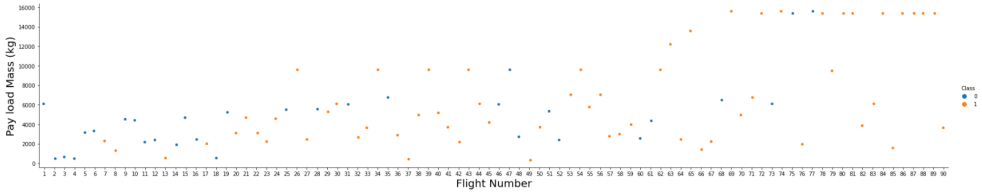
- In this capstone, we will predict if the Falcon 9 first stage will land successfully.
- SpaceX advertises Falcon 9 rocket launches on its website, with a cost of 62 million dollars; other providers cost upward of 165 million dollars each, much of the savings is because SpaceX can reuse the first stage. Therefore if we can determine if the first stage will land, we can determine the cost of a launch

- Data collection
- SpaceX API
- Webscrapping
- Data Anaysis
- Performed data wrangling ,sql, Folium and Plotly Dash

Methodology

EDA with Data Visualization

- To explore data, scatterplots and barplots were used to visualize the relationship between pair of features: • Payload Mass X Flight Number, Launch Site X Flight Number, Launch Site X Payload Mass, Orbit and Flight Number, Payload and Orbit

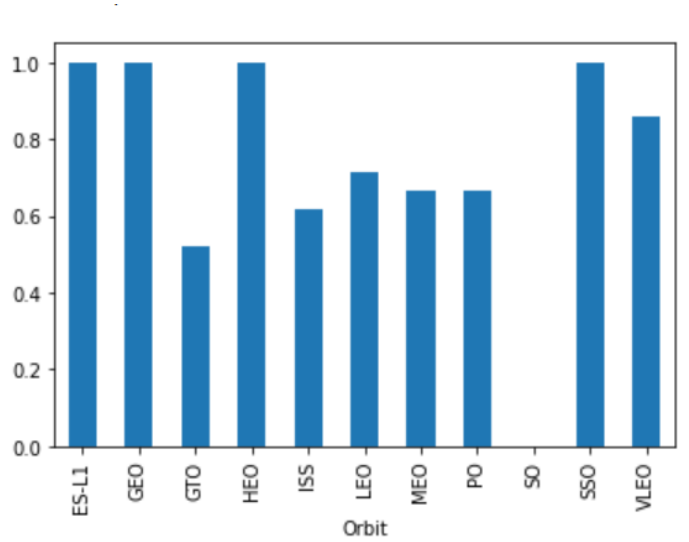


Predictive Analysis (Classification)

- Four classification models were compared: logistic regression, support vector machine, decision tree and k nearest neighbors

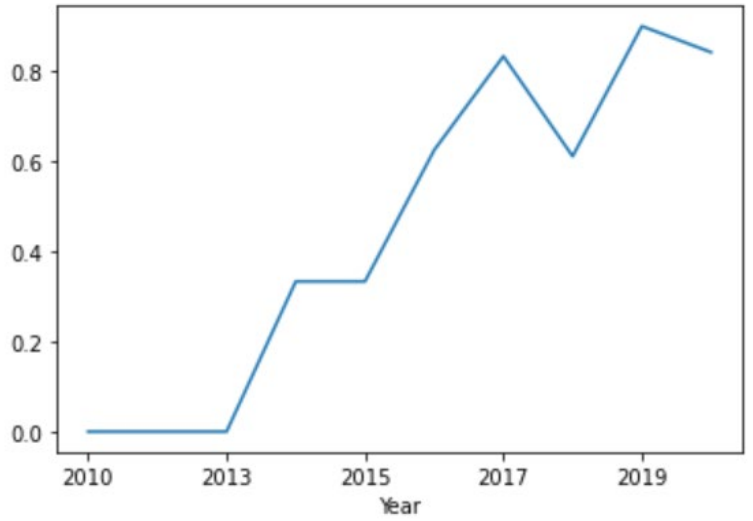
Results

- EDA Data visualtion
- The bar chart show successful landing on an orbit



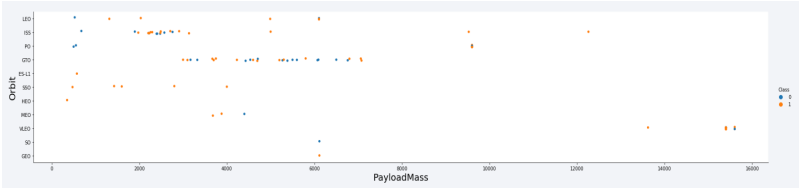
Results

The line graph showed how the succuss rate increased as time goes



PayLoad and Orbit

- • Apparently, there is no relation between payload and success rate to orbit GTO; • ISS orbit has the widest range of payload and a good rate of success; • There are few launches to the orbits SO and GEO



Total Number of Successful and Failure Mission Outcomes

- Number of successful and failure mission outcomes: •
- Grouping mission outcomes and counting records for each group led us to the summary above

Mission Outcome	Occurrences
Success	99
Success (payload status unclear)	1
Failure (in flight)	1

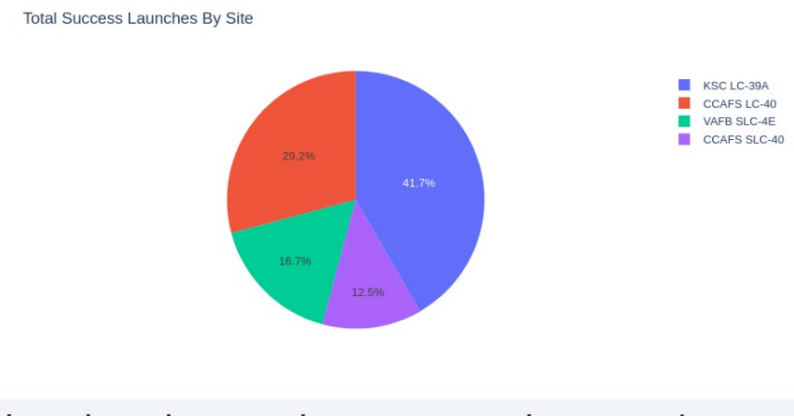
All Launch Site Names

- According to data, there are four launch sites:
- They are obtained by selecting unique occurrences of “launch_site” values from the dataset

Launch Site
CCAFS LC-40
CCAFS SLC-40
KSC LC-39A
VAFB SLC-4E

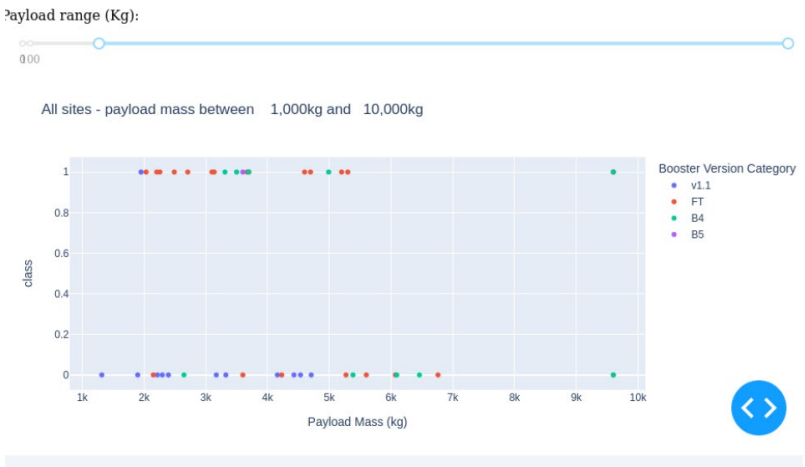
Build a DashBoard and with plotty Dash

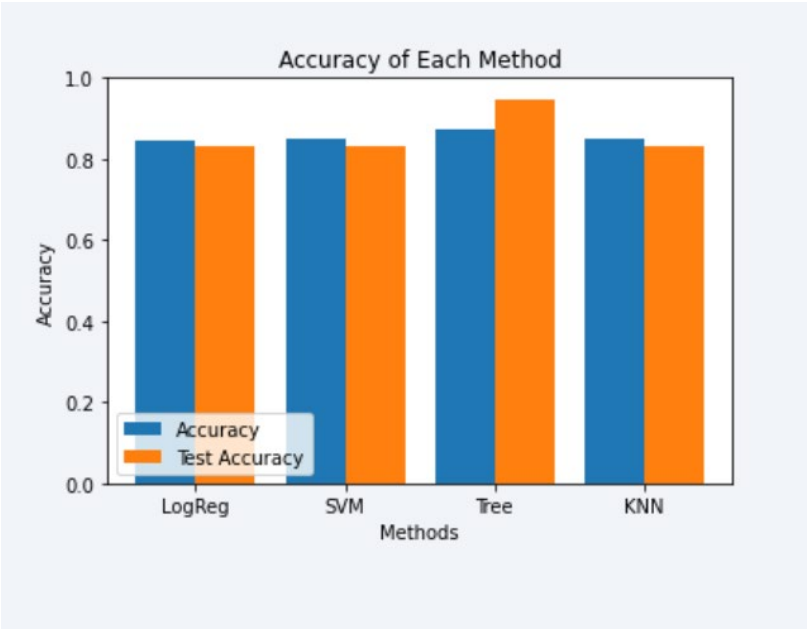
- Successful launch by site



Payload vs. Launch Outcome

- Payloads under 6,000kg and FT boosters are the most successful combination



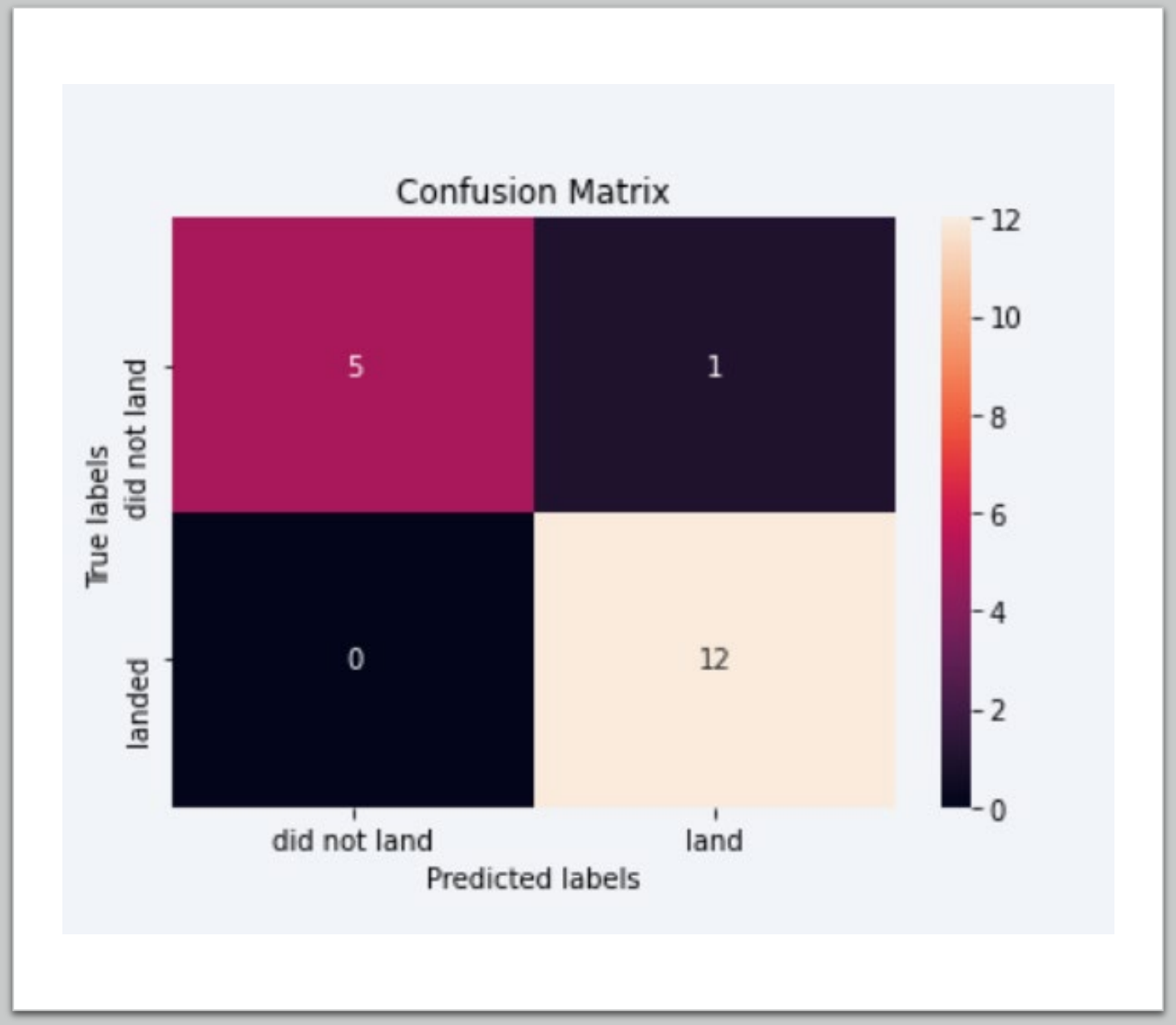


Classification

- Four classification models were tested, and their accuracies are plotted beside
- The model with the highest classification accuracy is Decision Tree Classifier, which has accuracies over than 87%.

Confusion Matrix of Decision Tree Classifier

- Confusion matrix of Decision Tree Classifier proves its accuracy by showing the big numbers of true positive and true negative compared to the false ones



Conclusion

- The technology of the landing is getting better with the years making more accurate landing of the space x
- The amount of weight of space x is getting bigger and the safe landing is getting better too
- Decision Tree Classifier can be used to predict successful landings and increase profits.