IBM Developer
SKILLS NETWORK

Winning Space Race with Data Science

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Outline

- Executive Summary
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- Methodology
- Results
- Conclusion
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Executive Summary

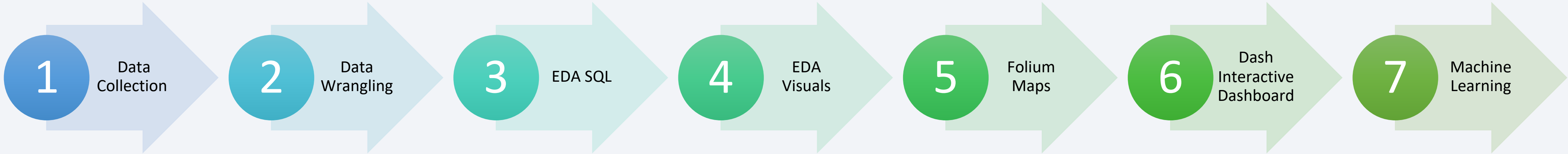
Summary of Methodologies

The research being conducted intends to identify the factors for a successful rocket launch resulting in the first stage landing, and thereby determining the price of each launch. The following methodologies were used:

- **Data Collection** using SpaceX REST API and web scrapping publicly available data on Wikipedia
- **Data Wrangling** to extract rocket launch information to serve as the dependent variable for predictive models
- **EDA with SQL** to calculate the following statistics: total payload, payload range for successful launches, and total number of successful and failed outcomes
- **EDA with Visuals** to generate insight about the data set, including the following factors: payload, launch site, flight number and yearly trend
- **Build Visuals** to explore launch site success/failure rates and proximity to various geographical markers
- **Build Models** to predict landing outcomes using the following algorithms: logistic regression, support vector machine (SVM), decision tree and K-nearest neighbor (KNN)

Summary of Results

- Launch data includes info regarding flight number, data of launch, payload mass, orbit type, launch site, mission outcome and other variables.
- Launch success has shown improvement over time
- KSC LC-39A has the highest success rate among landing sites
- Orbits ES-L1, GEO, HEO, and SSO have a 100% success rate
- Logistic Regression, Support Vector Machine (SVM), and K-Nearest Neighbor (KNN) all perform equally well for predictive models on this dataset



Introduction

Project Background and Context

SpaceX, a leader in the space industry, strives to make space travel affordable for everyone. SpaceX advertises Falcon 9 rocket launches on its website, with a cost of $62 million dollars. Other providers cost upward of $165 million per launch, much of the savings is because SpaceX can reuse the first stage of the Falcon 9 rocket. By determining if the first stage will land, we can determine the cost of the launch. Additionally, this information can be utilized if an alternate company wants to bid against SpaceX for a rocket launch. To do this, we will utilize publicly accessible data and machine learning models to predict the first stage landing and thereby the cost of a Falcon 9 rocket launch.

Questions to answer

- What influences affect if a Falcon 9 rocket will land successfully?
- What impact various Falcon 9 rocket variables, such as payload mass, launch site, number of flights, and orbits, have on first stage landing success?
- Rate of successful landings over time?
- Which machine learning model would work best (provide highest accuracy) to predict the outcome of a Falcon 9 first stage landing for a future launch?
- Will a future Falcon 9 first stage landing be successful?

Section 1

Methodology

Methodology

Executive Summary

- Data Collection Methodology:
  - SpaceX REST API
  - Wikipedia - Web Scrapping publicly available launch data
- Perform Data Wrangling
  - Data collected in the form of JSON object and HTML tables are converted into a Pandas dataframe for data analysis, queries, visualizations and machine learning model creation
- Perform exploratory data analysis (EDA) using visualization and SQL
- Perform interactive visual analytics using Folium and Plotly Dash
- Perform predictive analysis using classification models
  - Use machine learning to determine if the Falcon 9 first stage will land successfully

Data Collection

- **Data Sets collection process:**
  - Make a get request to the publicly accessible SpaceX REST API with launch data in JSON format
  - Wikipedia page (updated on 9th June 2021) with launch data of List of Falcon 9 and Falcon Heavy Launches in HTML tables
  - **Additional datasets were provided:**
    - SpaceX (Spacex.csv)
    - Web Scraped (spacex_web_scraped.csv)
    - Launch Geo (spacex_launch_geo.csv)
    - Launch Dash (spacex_launch_dash.csv)

SpaceX REST API Process

1
- Data request from SpaceX REST API

2
- API returns SpaceX data in JSON

3
- Normalize data into .csv

Wikipedia Web Scraping

1
- GET request the Falcon9 Launch Wiki page

2
- Extract data using BeautifulSoup

3
- Normalize data into .csv

Data Collection – SpaceX API

- Make GET request to the publicly accessible SpaceX REST API with launch data
- Once response has been received, decode content as a JSON and normalize data into a Pandas dataframe for further analysis
- Filter dataframe and deal with missing values
- GitHub URL (Data Collection): https://github.com/Chikaradameshi/Data_Science_Capstone_SpaceX/blob/main/01_spacex_data_collection_api.ipynb

1. Request rocket launch data from Space X REST API
2. Extract nested data and convert date format
3. Utilize defined functions to get specific columns of data
4. Construct dataset using collected data by combining columns and create a dataframe
5. Filter dataframe to only include Falcon9 launches
6. Deal with missing values

Data Collection - Scraping

- Wikipedia page (updated on 9th June 2021) with launch data of List of Falcon 9 and Falcon Heavy Launches in HTML tables
- Tables scraped to extract launch data and placed into Pandas dataframe for further analysis
- GitHub URL (Web Scrapping): https://github.com/Chikaradameshi/Data_Science_Capstone_SpaceX/blob/main/02_spacex_webscraping.ipynb

1. Web Scrape Falcon 9 launch data from Wikipedia page
2. Create BeautifulSoup object from HTML response
3. Locate tables with launch records
4. Iterate through table header <th> elements and extract column names
5. Create dataframe by parsing the launch HTML tables

Data Wrangling

- The SpaceX REST API file (dataset_part_1.csv) from API section contains the data needed to be cleaned
- Clean information regarding launch sites, orbit types and mission outcomes
- Convert mission outcome types into binary classification, identifying the Falcon 9 first stage landing as either a failure = 0 (the first stage did not land successfully) or success = 1(the first stage landed successfully).
- Add new classification to the dataframe for further analysis
- GitHub URL (Data Wrangling): https://github.com/Chikaradameshi/Data_Science_Capstone_SpaceX/blob/main/03_spacex_data_wrangling.ipynb

1. Load dataset_part_1.csv data from API section
2. Calculate the number of launches from each site
3. Calculate the number and occurrence of each orbit
4. Calculate the number and occurrence of mission outcome of the orbits
5. Create a landing outcome label from the outcome data
6. Compile everything into a dataframe

EDA with Data Visualization

- Launch Site Trends – visualizations to understand the following relationships
  - Scatterplot to visualize relationship between Flight Number and Payload Mass
  - Scatterplot to visualize relationship between Flight Number and Launch Site
  - Scatterplot to visualize relationship between Payload Mass and Launch Site

- Orbit Type Trends – Visualizations to understand the following relationships
  - Bar chart to visualize relationship between success rate of each orbit type
  - Scatterplot to visualize relationship between Flight Number and Orbit Type
  - Scatterplot to visualize relationship between Payload Mass and Orbit Type

- Mission Outcome Trends
  - Line plot to see mission outcome trend by year

- GitHub URL (EDA with Data Visualization):
  https://github.com/Chikaradameshi/Data_Science_Capstone_SpaceX/blob/main/05_spacex_eda_with_visualization.ipynb

EDA with SQL

- SQL queries performed to extract information regarding:
  - Unique Launch Sites
  - Payload Masses
    - Total payload mass carried by boosters launched by NASA (CRS)
    - Average payload mass carried by booster version F9 v1.1
  - Dates
    - First successful landing outcome in ground pad was achieved
  - Booster Types
    - List boosters which have success in drone ship and have payload mass greater than 4000 but less than 6000
  - Mission Outcomes
    - List total number of successful and failure mission outcomes
    - List names of booster versions which have carried the maximum payload mass
    - Display records for month names, failure landing outcomes in drone ship, booster version launch site for months in year 2015
    - Rank count of landing outcomes between 2010-06-04 and 2017-03-20 in descending order
- GitHub URL (EDA with SQL):
  https://github.com/Chikaradameshi/Data_Science_Capstone_SpaceX/blob/main/04_spacex_eda_sql.ipynb

Build an Interactive Map with Folium

- Summary of map objects created and added to Folium map
  - Markers were added for NASA Johnson Space Center and the following launch sites
    - CCAFS LC-40
    - CCAFS SLC-40
    - KSC LC-39A
    - VAFB SLC-4E
  - Circles were added for the launch sites
  - Markers were added for all launch records for with green (successful) and red (failed)
  - Add MousePosition on map to get coordinates for a mouse over a point on the map
  - Lines were added to show the distance to nearby geographical features:
    - Distance from VAFB SLC-4E to the road
    - Distance from VAFB SLC-4E to the coastline
    - Distance from VAFB SLC-4E to the rail line
    - Distance from VAFB SLC-4E to a city
- GitHub URL (Folium Maps):
  https://github.com/Chikaradameshi/Data_Science_Capstone_SpaceX/blob/main/06_spacex_launch_site_location.ipynb

Build a Dashboard with Plotly Dash

- Created dropdown is used to select all or a specific launch site for the scatterplot and pie chart
- Created callback function to render pie chart visualizing launch success counts based on selected site dropdown:
  - For All Sites – the distribution of successful Falcon 9 first stage landings between all sites
  - For Specific Site – the distribution of successful/failed Falcon 9 first stage landings for specific site
- Created range slider to select payload mass for the scatterplot to identify visual patterns
- Created callback function to render scatterplot to display the distribution of Falcon 9 first stage landings split by payload mass, mission outcome and by booster version category
- GitHub URL (Dashboard File): https://github.com/Chikaradameshi/Data_Science_Capstone_SpaceX/blob/main/spacex_dash_app.py

Predictive Analysis (Classification)

- The dataset was split into training and testing sets.
- Machine Learning Models for Logistic Regression, SVM (Support Vector Machines), Decision Tree, and KNN (k-Nearest Neighbor) were trained on the training data set.
- Hyper-parameters were evaluated using GridSearchCV() and the best parameters were selected using '.best_params_'
- Using the best hyper-parameters, each of the four models were scored on accuracy by using the testing data set
- GitHub URL (Machine Learning): https://github.com/Chikaradameshi/Data_Science_Capstone_SpaceX/blob/main/07_spacex_ml_prediction.ipynb

1. Create dataframe with the cleaned data and standardize
2. Split data into training and testing sets
3. Training data set trained on each of the four models
4. Evaluated the four models based on the testing data set
5. Compare models based on accuracy scores

Results

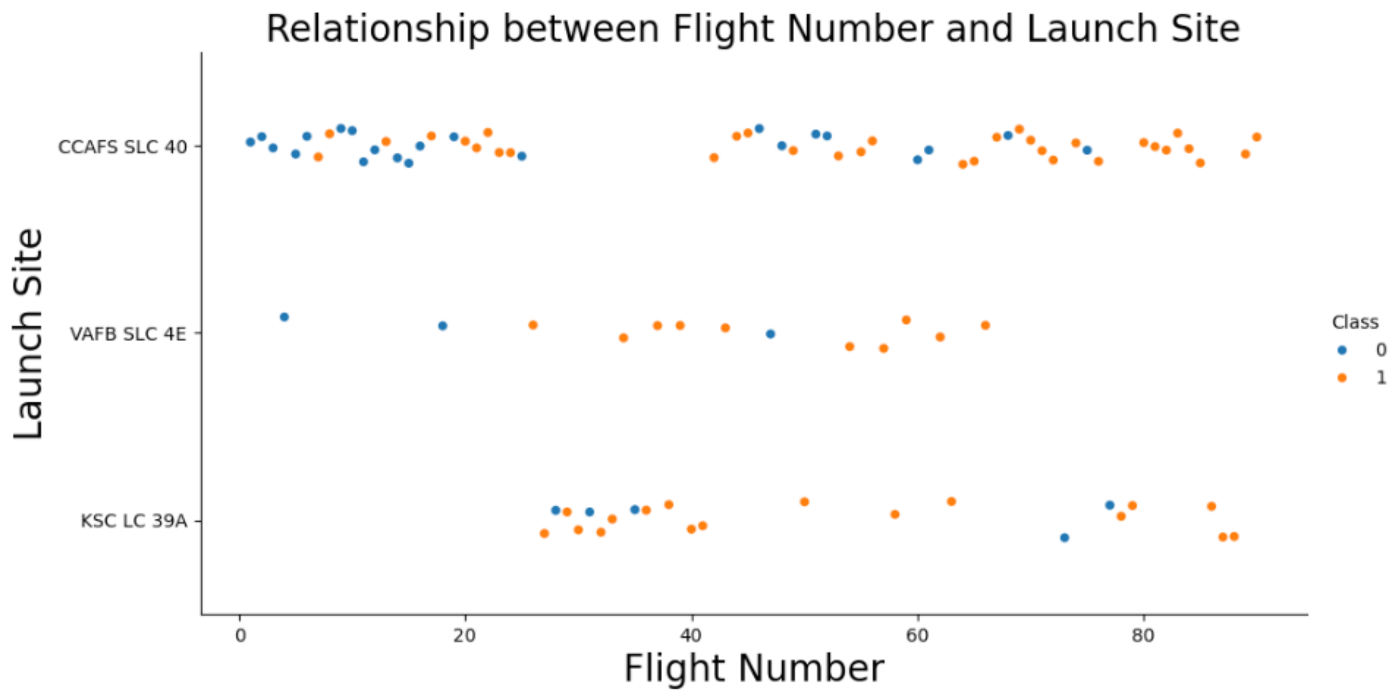
- Exploratory data analysis results
- Interactive analytics demo in screenshots
- Predictive analysis results

Section 2

Insights drawn from EDA

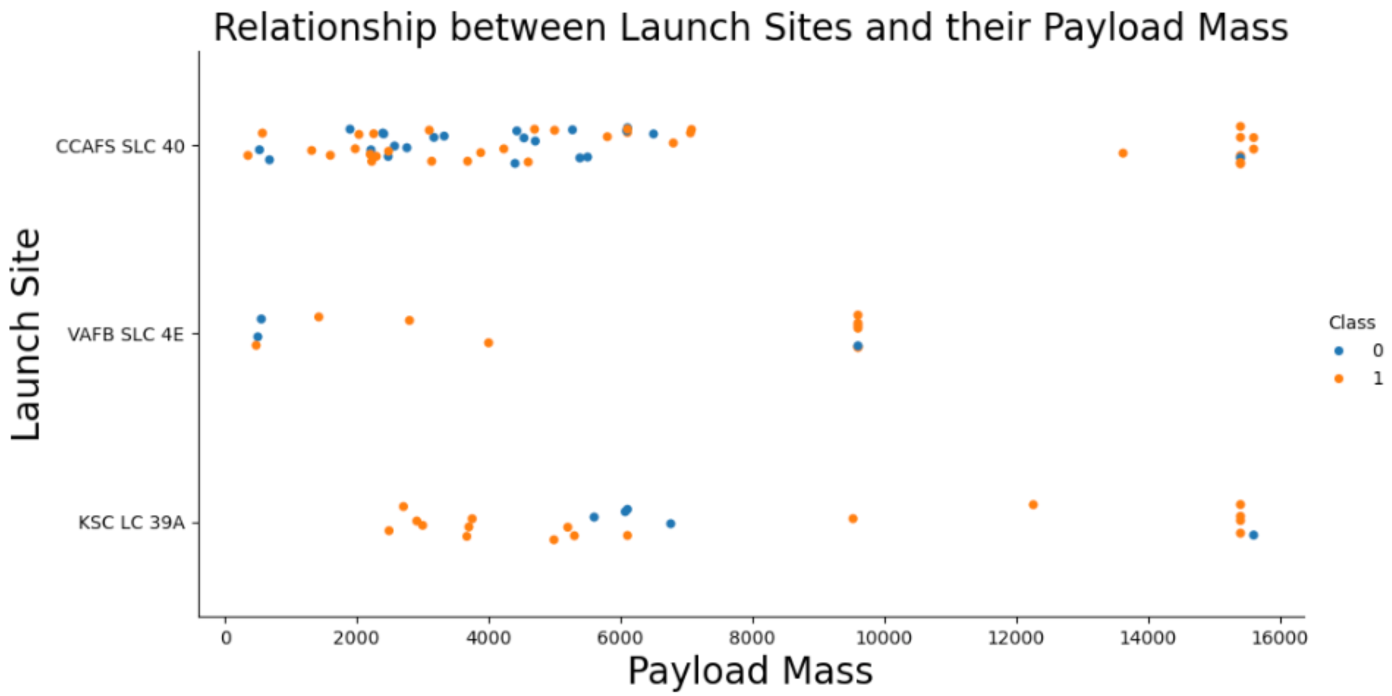
Flight Number vs. Launch Site

- Success rate varies by launch site with gradual improvement for each site over time
- Earlier flights had a lower success rate (blue = fail)
- Later flights had a higher success rate (orange = success)
- Most significant improvement was with site CCAFS SLC-40 where more than half of the launches took place
- VAFB SCL-4E and KSC LC-39A have higher success rates but with only one third of the total launches



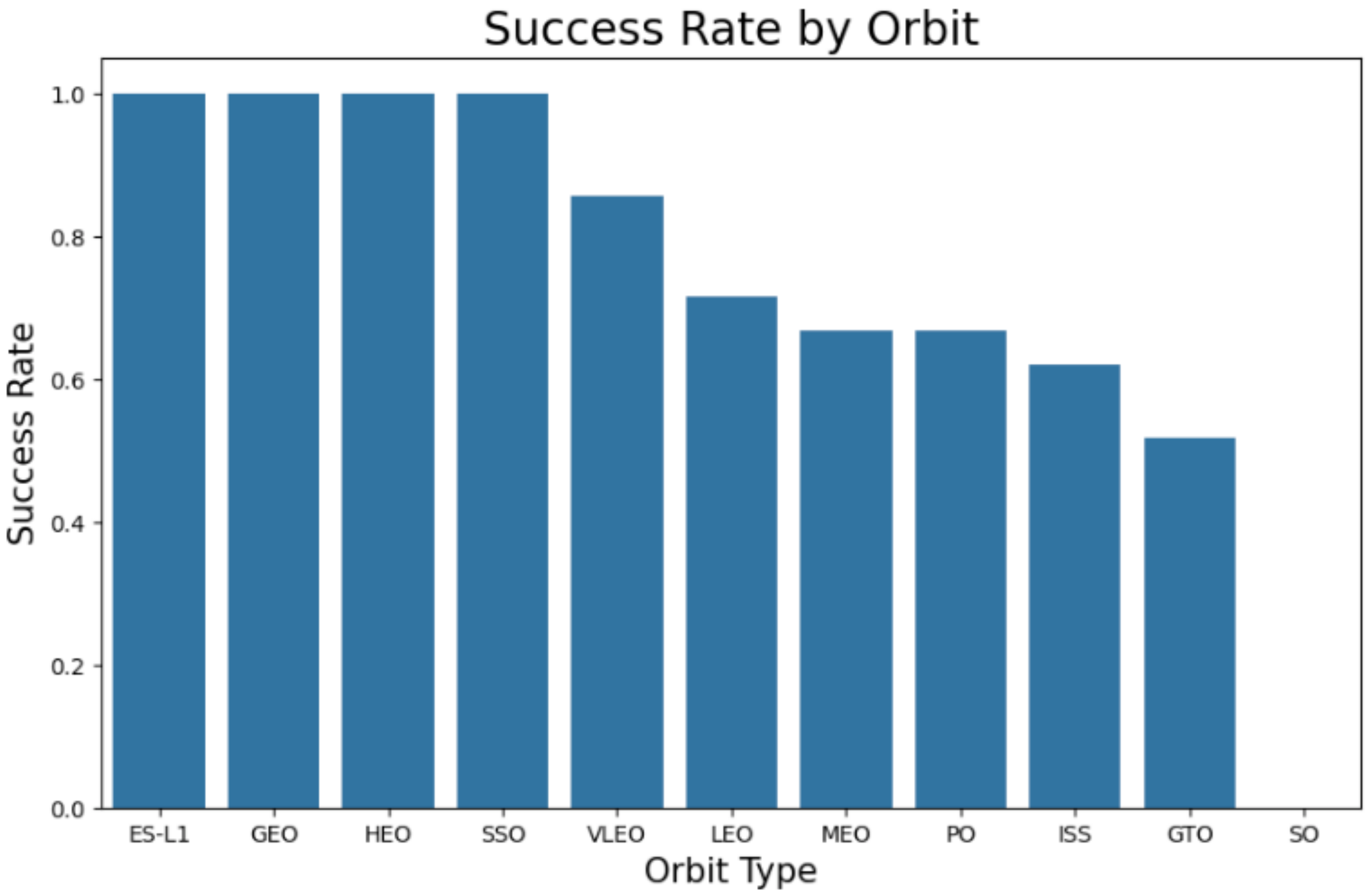
Payload vs. Launch Site

- Majority of launches with payload mass greater than 7000kg were successful
- Infer, the higher the payload mass the higher the success rate
- CCAFS SLC-40 shows no strong correlation between payload mass and landing outcome
- VAFB SLC-4E has no launches with payload mass greater than 10000kg
- KSC LC-39A has no launches with payload mass lower than 2000kg
- KSC LC-39A has 100% success rate for launches less than 5000kg



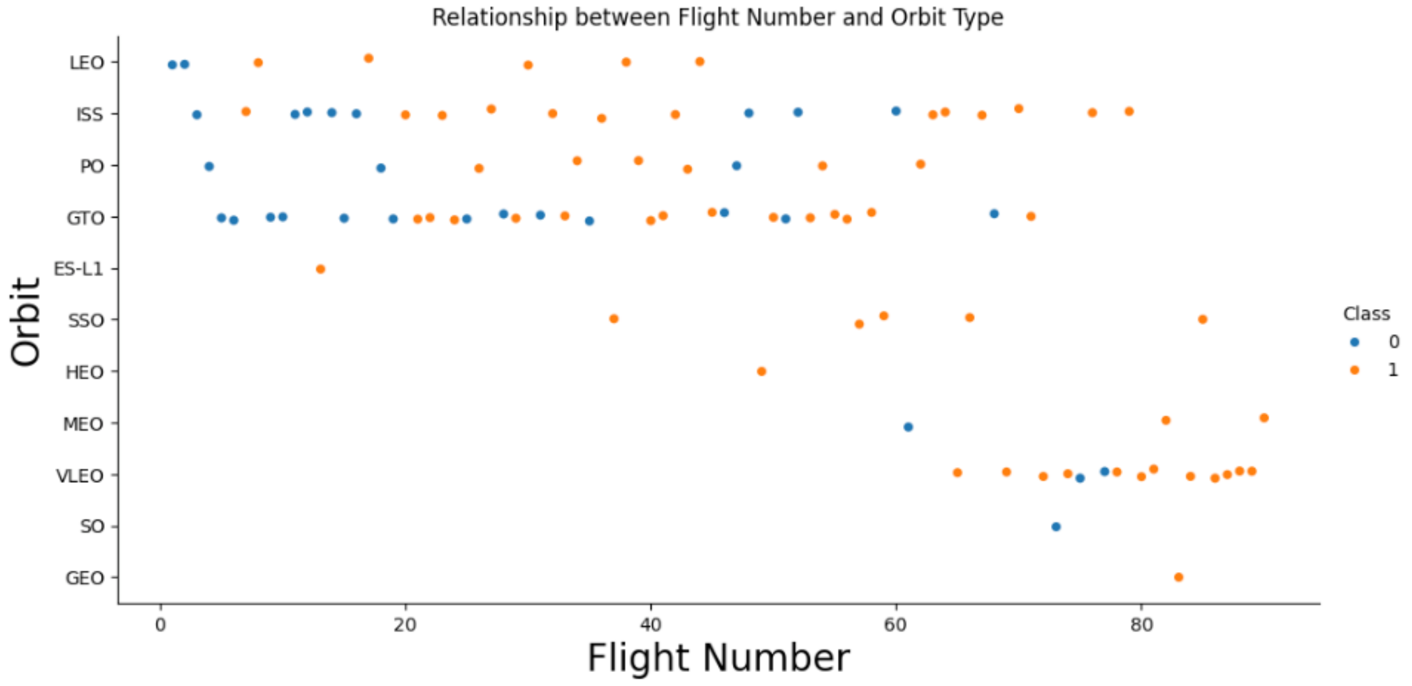
Success Rate vs. Orbit Type

- ES-L1, GEO, HEO, and SSO Orbits have 100% first stage landing success
- SO Orbit shows no successful first stage landings



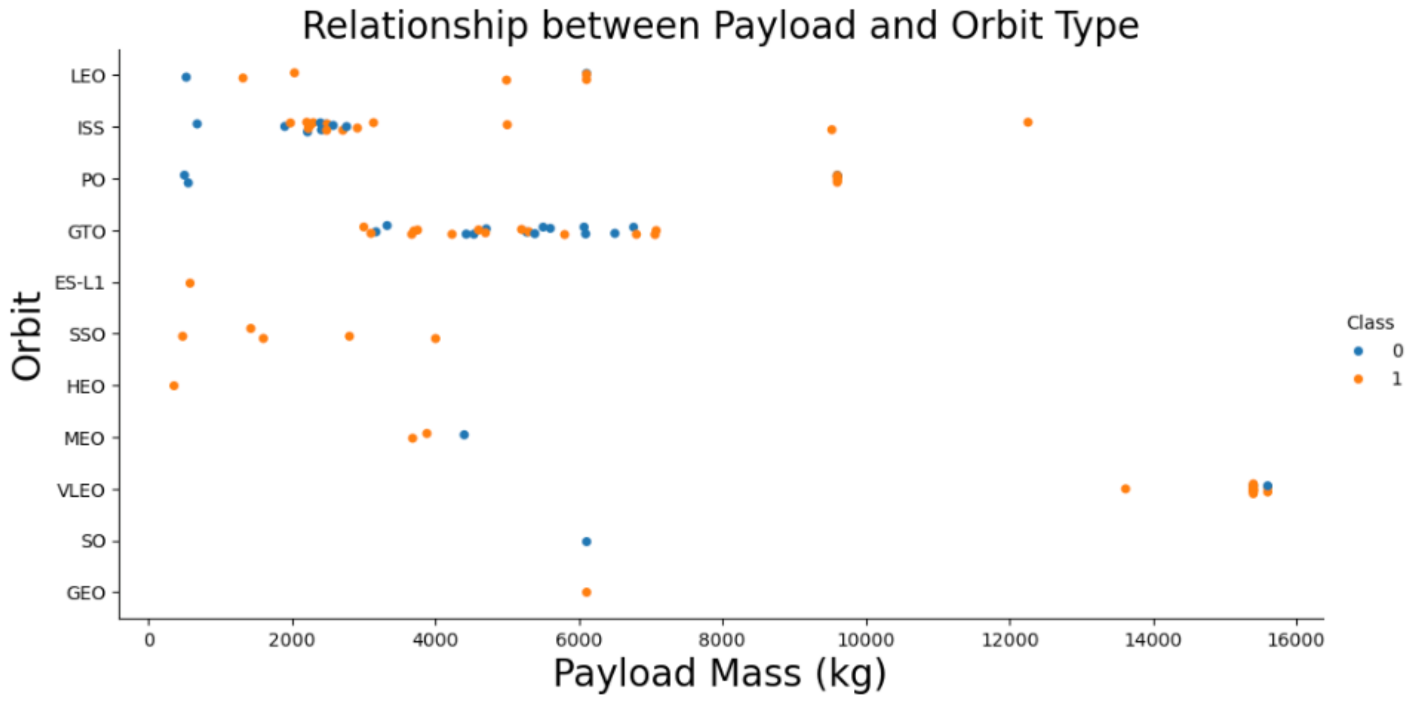
Flight Number vs. Orbit Type

- Orbit success rate increases over time with the number of flights
- VLEO shows higher flight numbers and higher success rate
- ISS and GTO have the highest launch totals and lowest success rate
- Orbits with lower launch totals have higher success rates



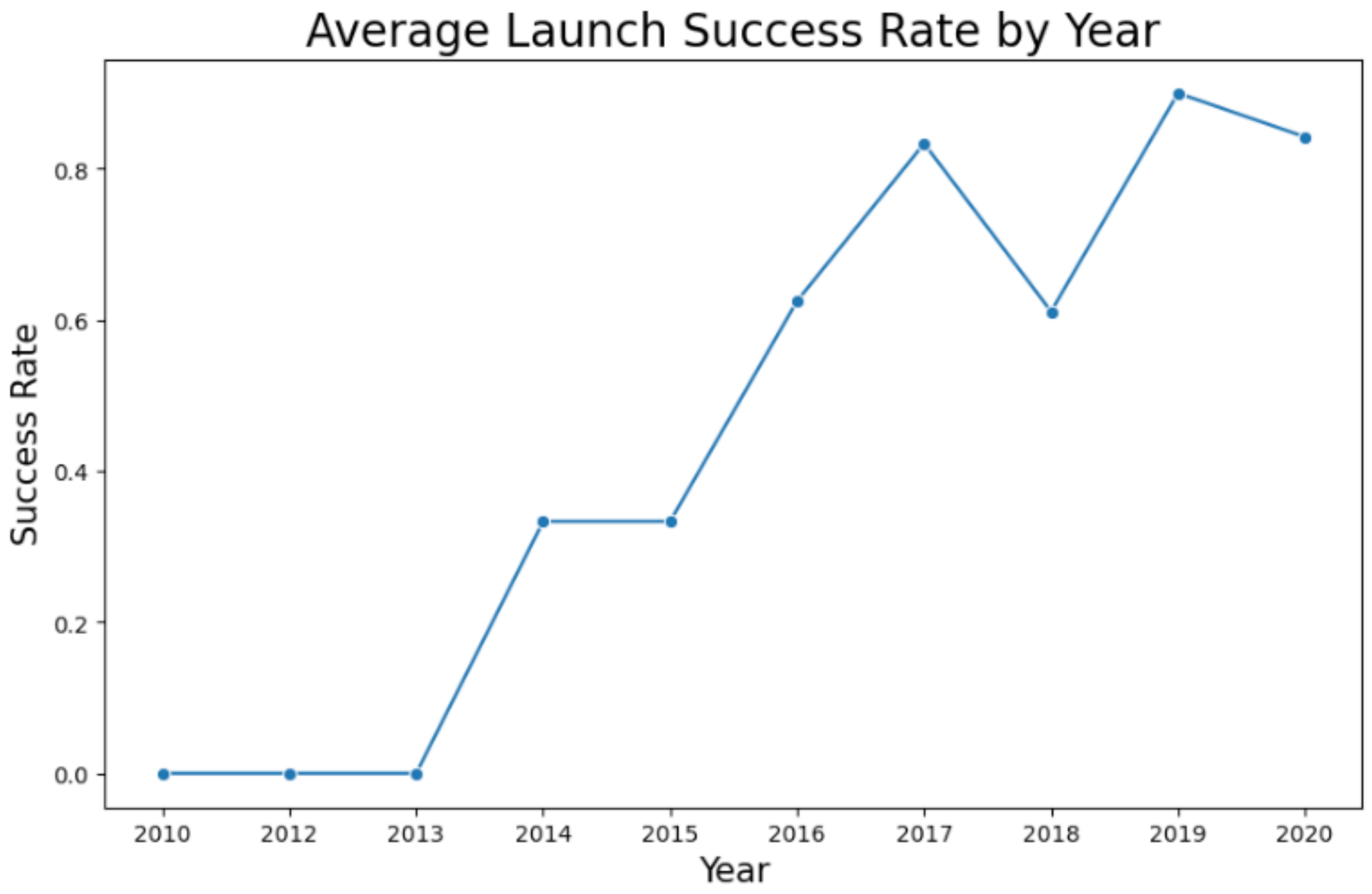
Payload vs. Orbit Type

- Orbit success rate varies
- Less than 10 launches with payload mass greater than 8000kg have been conducted with 77.8% success rate – ISS, PO and LEO
- Success rate shows no obvious correlation with payload mass as evidenced by GTO



Launch Success Yearly Trend

- Overall improvement with success rate over time
- Success rate increased during :
    - 2013– 2014
    - 2015– 2017 (greatest improvement)
    - 2018 – 2019
- Success rate declined during:
    - 2017 – 2018
    - 2019 - 2020



All Launch Site Names

- Query to Identify Unique Launch Site Names:
  - CCAFS LC-40
  - CCAFS SLC-40
  - KSC LC-39A
  - VAFB SLC-4E

```
%sql SELECT DISTINCT "Launch_Site" FROM SPACEXTABLE
```

```
 * sqlite:///my_data1.db
Done.
```

Launch_Site
CCAFS LC-40
VAFB SLC-4E
KSC LC-39A
CCAFS SLC-40

Launch Site Names Begin with 'CCA'

- Query to find 5 records where launch sites begin with `CCA`
- Sample representation to understand the data in the database table

```
%sql SELECT * FROM SPACEXTABLE WHERE "Launch_Site" LIKE 'CCA%' LIMIT 5;
```

```
 * sqlite:///my_data1.db
Done.
```

Date	Time (UTC)	Booster_Version	Launch_Site	Payload	PAYLOAD_MASS__KG_	Orbit	Customer	Mission_Outcome	Landing_Outcome
2010-06-04	18:45:00	F9 v1.0 B0003	CCAFS LC-40	Dragon Spacecraft Qualification Unit	0	LEO	SpaceX	Success	Failure (parachute)
2010-12-08	15:43:00	F9 v1.0 B0004	CCAFS LC-40	Dragon demo flight C1, two CubeSats, barrel of Brouere cheese	0	LEO (ISS)	NASA (COTS) NRO	Success	Failure (parachute)
2012-05-22	7:44:00	F9 v1.0 B0005	CCAFS LC-40	Dragon demo flight C2	525	LEO (ISS)	NASA (COTS)	Success	No attempt
2012-10-08	0:35:00	F9 v1.0 B0006	CCAFS LC-40	SpaceX CRS-1	500	LEO (ISS)	NASA (CRS)	Success	No attempt
2013-03-01	15:10:00	F9 v1.0 B0007	CCAFS LC-40	SpaceX CRS-2	677	LEO (ISS)	NASA (CRS)	Success	No attempt

Total Payload Mass

- Query to calculate the total payload carried by boosters from NASA
- Total payload mass carried by boosters from NASA is 45,596 kg

```
%sql SELECT SUM("Payload_Mass__kg_") AS "Total Payload Mass (kg)" FROM SPACEXTABLE WHERE "Customer" = 'NASA (CRS)';
```

```
 * sqlite:///my_data1.db
Done.
```

Total Payload Mass (kg)
45596

Average Payload Mass by F9 v1.1

- Query to calculate the average payload mass carried by booster version F9 v1.1
- The average payload mass carried by booster version F9 v1.1 is 2,928.4 kg

```
%sql SELECT AVG("Payload_Mass__kg_") AS "Average Payload Mass" FROM SPACEXTABLE WHERE "Booster_Version" = 'F9 v1.1';
```

```
 * sqlite:///my_data1.db
Done.
```

Average Payload Mass
2928.4

First Successful Ground Landing Date

- Query to find the dates of the first successful landing outcome on ground pad
- The first successful landing outcome on ground pad happened on December 22, 2015

```
%sql SELECT MIN("Date") AS "First Successful Landing Date" FROM SPACEXTABLE WHERE "Landing_Outcome" = 'Success (ground pad)';
```

```
 * sqlite:///my_data1.db
Done.
```

First Successful Landing Date
2015-12-22

Successful Drone Ship Landing with Payload between 4000 and 6000

- Query to list the names of boosters which have successfully landed on drone ship and had payload mass greater than 4000 but less than 6000
- There are 4 booster versions that have successfully landed on drone ship with a payload mass greater than 4000 but less than 6000
  - F9 FT B1022
  - F9 FT B1026
  - F9 FT B1021.2
  - F9 FT B1031.2

```
%sql SELECT DISTINCT "Booster_Version" FROM SPACEXTABLE WHERE "Landing_Outcome" = 'Success (drone ship)' AND "Payload_Mass__kg_" > 4000 AND "Payload_Mass__kg_" < 6000;
```

```
 * sqlite:///my_data1.db
Done.
```

Booster_Version
F9 FT B1022
F9 FT B1026
F9 FT B1021.2
F9 FT B1031.2

Total Number of Successful and Failed Mission Outcomes

- Query to calculate the total number of successful and failure mission outcomes
- There were a total of 99 successful, 1 success (payload status unclear), and 1 failure (in flight)

```
%sql SELECT "Mission_Outcome", COUNT(*) AS Total_Count FROM SPACEXTABLE GROUP BY "Mission_Outcome";
```

```
 * sqlite:///my_data1.db
Done.
```

Mission_Outcome	Total_Count
Failure (in flight)	1
Success	98
Success	1
Success (payload status unclear)	1

Boosters Carried Maximum Payload

- Query to list the names of the booster which have carried the maximum payload mass
- The maximum payload mass carried in this dataset is 15,600 kg. There are 12 separate Falcon 9 boosters that have carried this maximum payload mass

```
%sql SELECT "Booster_Version", "Payload_Mass__kg_" FROM SPACEXTABLE WHERE "Payload_Mass__kg_" = (SELECT MAX("Payload_Mass__kg_") FROM SPACEXTABLE);
```

```
 * sqlite:///my_data1.db
Done.
```

Booster_Version	PAYLOAD_MASS__KG_
F9 B5 B1048.4	15600
F9 B5 B1049.4	15600
F9 B5 B1051.3	15600
F9 B5 B1056.4	15600
F9 B5 B1048.5	15600
F9 B5 B1051.4	15600
F9 B5 B1049.5	15600
F9 B5 B1060.2	15600
F9 B5 B1058.3	15600
F9 B5 B1051.6	15600
F9 B5 B1060.3	15600
F9 B5 B1049.7	15600

2015 Launch Records

- Query to list the failed landing_outcomes in drone ship, their booster versions, and launch site names for in year 2015
- There were two failed landing outcomes in drone ship which happened in January and April of 2015. Both launches occurred from site CCAFS LC-40

```
%sql SELECT strftime("%m", "Date") AS Month, "Landing_Outcome", "Booster_Version", "Launch_Site" FROM SPACEXTABLE WHERE "Landing_Outcome" \
    LIKE "Failure (drone ship)%" AND strftime("%Y", "Date") = "2015";
```

```
 * sqlite:///my_data1.db
Done.
```

Month	Landing_Outcome	Booster_Version	Launch_Site
01	Failure (drone ship)	F9 v1.1 B1012	CCAFS LC-40
04	Failure (drone ship)	F9 v1.1 B1015	CCAFS LC-40

Rank Landing Outcomes Between 2010-06-04 and 2017-03-20

- Query to rank the count of landing outcomes such as Failure (drone ship) or Success (ground pad)) between the date 2010-06-04 and 2017-03-20, in descending order
- Understanding the landing outcomes and their frequency. The most common being “No attempt” and least common being “Precluded (drone ship)”

```
%sql SELECT "Landing_Outcome", COUNT(*) AS Count FROM SPACEXTABLE WHERE "Date" BETWEEN "2010-06-04" AND "2017-03-20" \
GROUP BY "Landing_Outcome" ORDER BY Count DESC;
```

```
 * sqlite:///my_data1.db
Done.
```

Landing_Outcome	Count
No attempt	10
Success (drone ship)	5
Failure (drone ship)	5
Success (ground pad)	3
Controlled (ocean)	3
Uncontrolled (ocean)	2
Failure (parachute)	2
Precluded (drone ship)	1

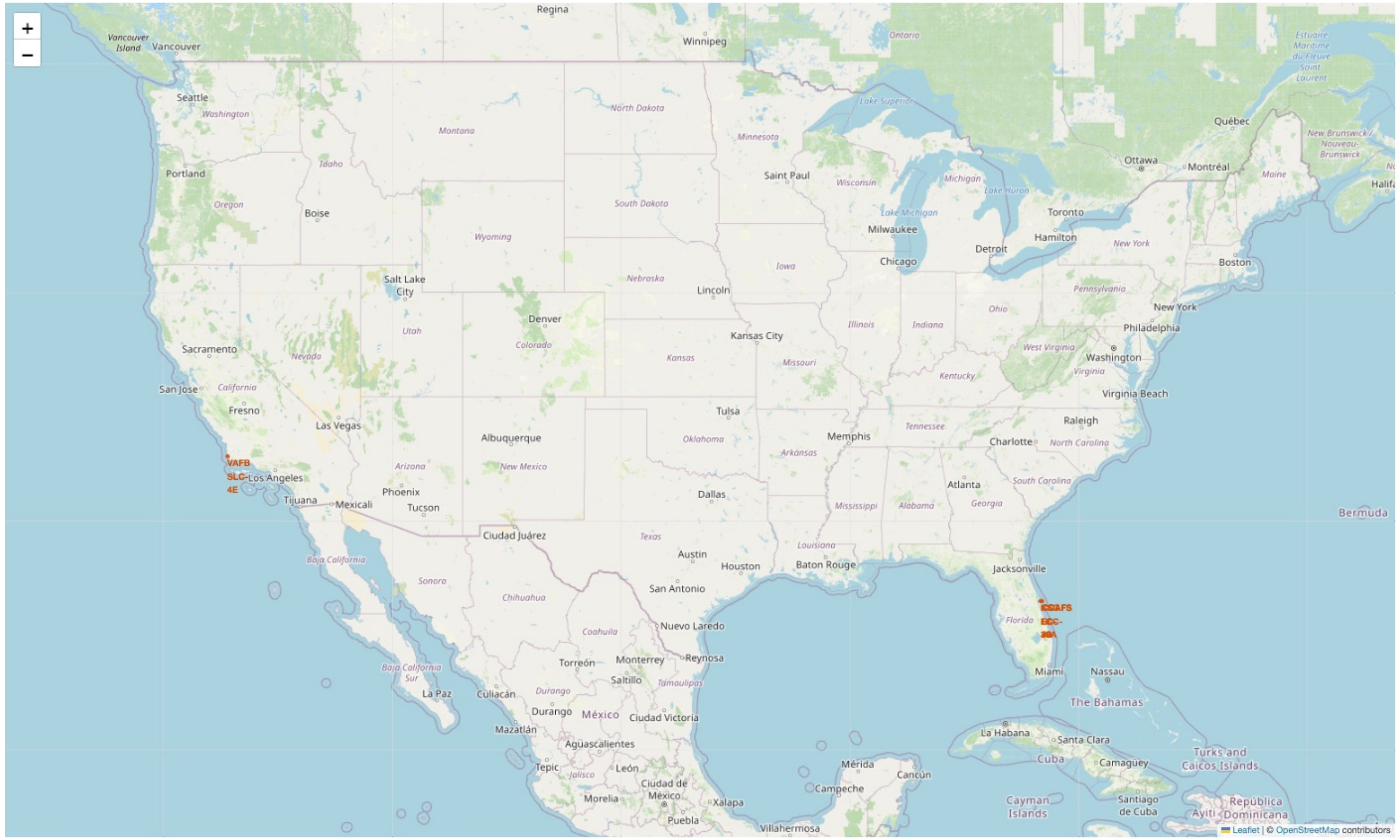
Section 3

Launch Sites Proximities Analysis

Launch Sites

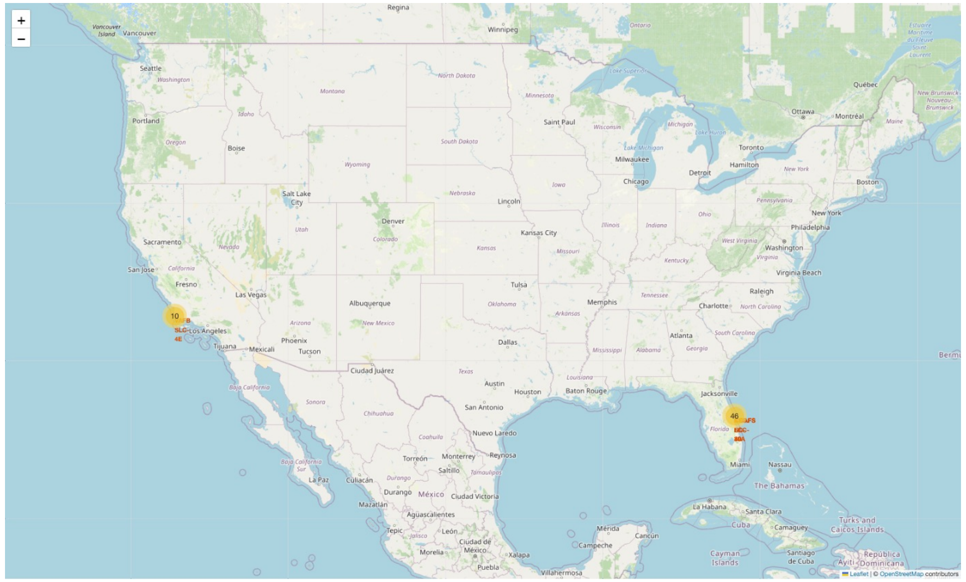
- East Coast Launch Sites
  - CCAFS LC-40
  - CCAFS SLC-40
  - KSC LC-39A
- West Coast Launch Site
  - VAFB SLC-40

- Launch sites are
  - Near the ocean
  - Near the equator
  - Away from cities



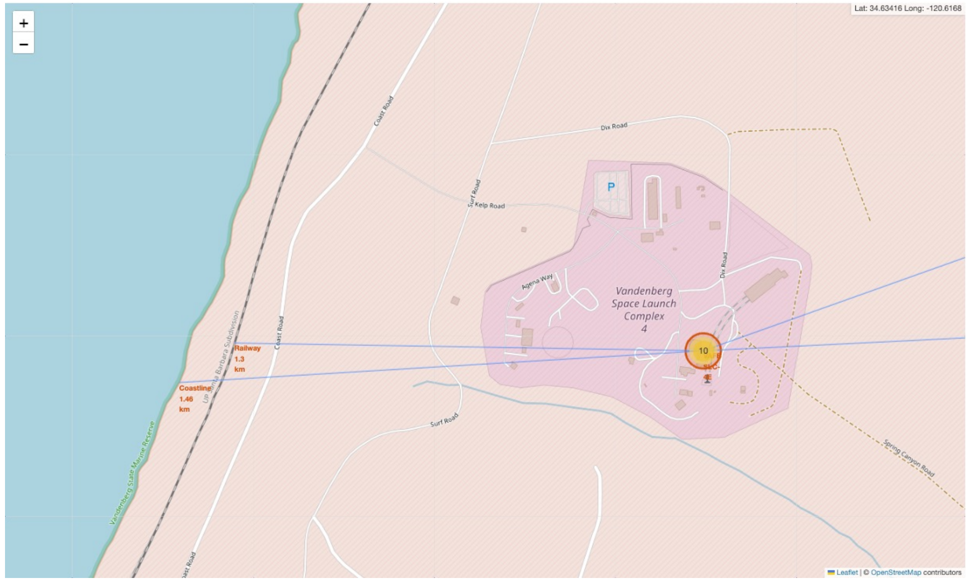
Launch Sites and Outcomes

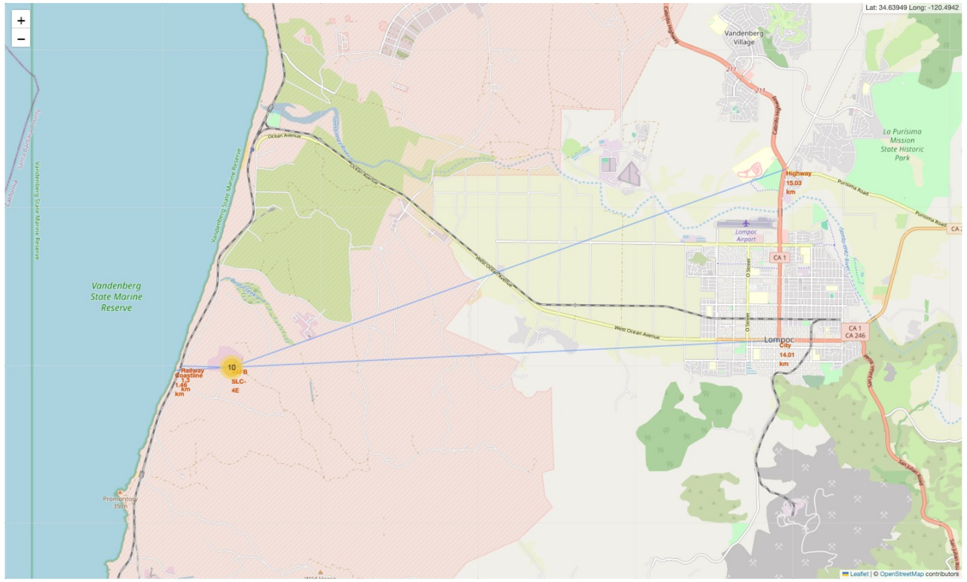
- The markers display the following information:
    - Total missions for launch site location
    - Mission outcomes (success/failure) for Falcon 9 first stage landings. Green for success and Red for Failure
- The markers provide a visual for launch site success/failure rate



Launch Site Proximity to Geo Locations

- Launch site location VAFB SLC-4E
- Proximity to the following geo points:
    - 1.46 km from Coastline
    - 1.3 km from Railway
    - 15.03 km from Highway
    - 14.01 km from City
- Isolated area with access to coastline/railway/highway
- Close proximity to coastline for access to spent stages
- Close proximity to railway/highways for access and supply line
- Further proximity from City to avoid any civilian based damage from failed launches



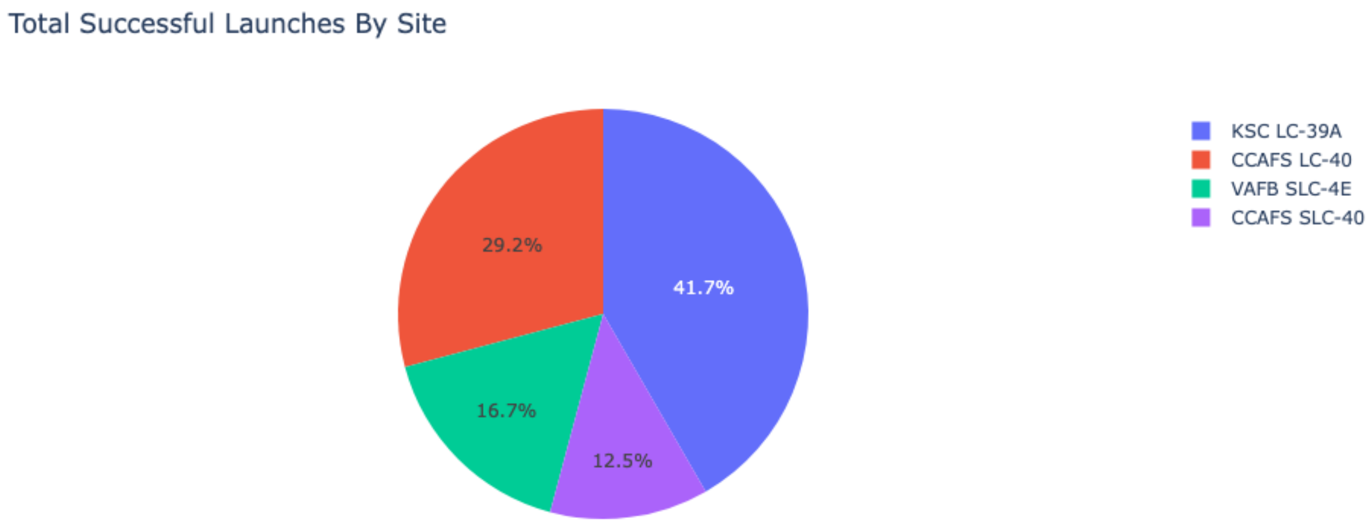


Section 4

Build a Dashboard with Plotly Dash

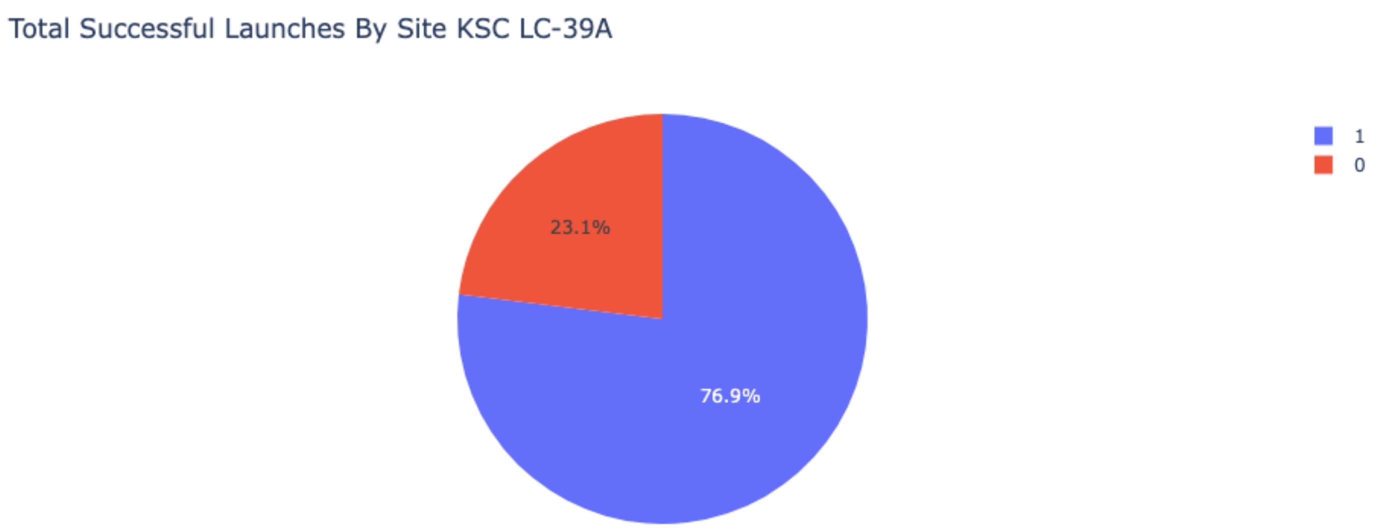
Total Successful Launches by Site

- Pie Chart displays total successful launch percentage by site
- KSC LC-39A had the greatest success with Falcon 9 first stage outcomes at 41.7%
- CCAFS SLC-40 had the lowest success with Falcon 9 first stage outcomes at 12.5%



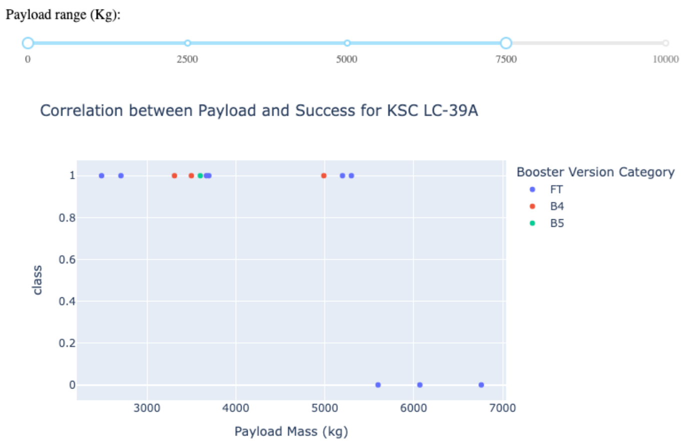
Total Successful Launches by Site KSC LC-39A

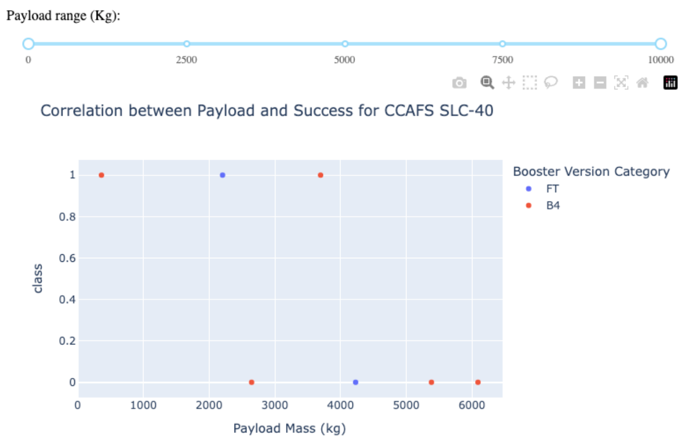
- Pie Chart displays the success = 1 (blue) and failure = 0 (red) percentages of the Falcon 9 first stage launches for the most successful launch site, KSC LC-39A
- KSC LC-39A had a launch success rate of 76.9%

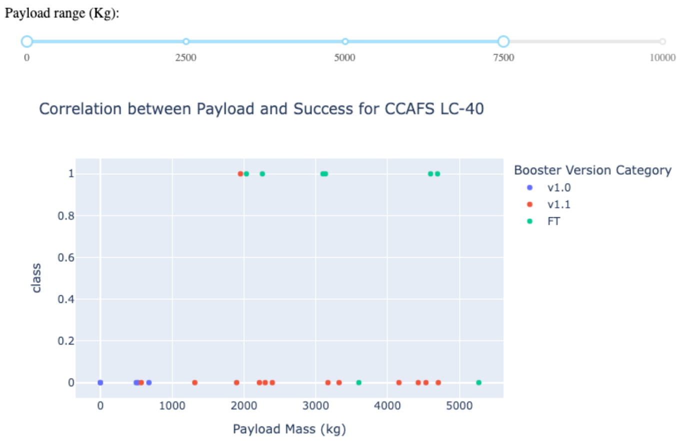


Correlation between Payload Mass and Success

- Screenshots display Payload vs. Launch Outcome scatterplots for all sites, with different payload selected in the range slider
- Payload Mass between 2000 kg to 5000 kg displays the highest success rate
- The FT booster displays the highest success rate
- The v1.1 booster displays the lowest success rate







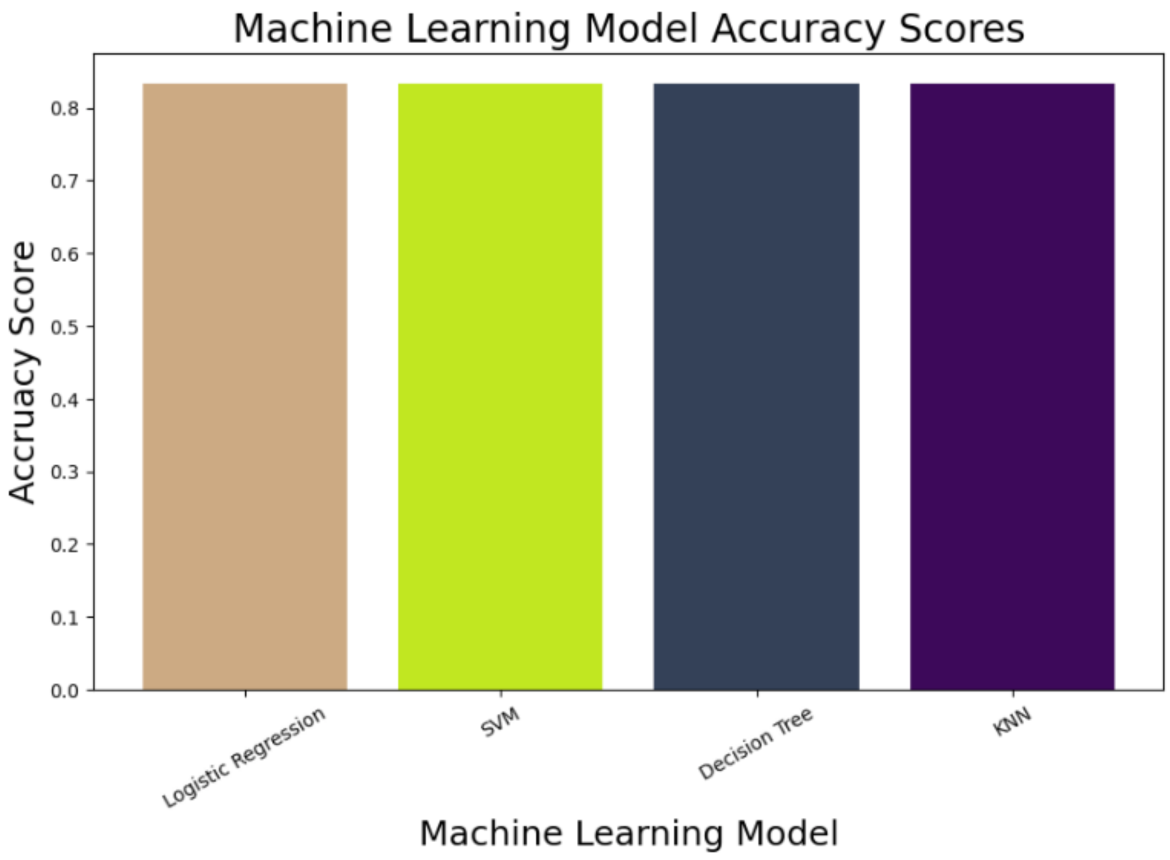
Section 5

Predictive Analysis (Classification)

Classification Accuracy

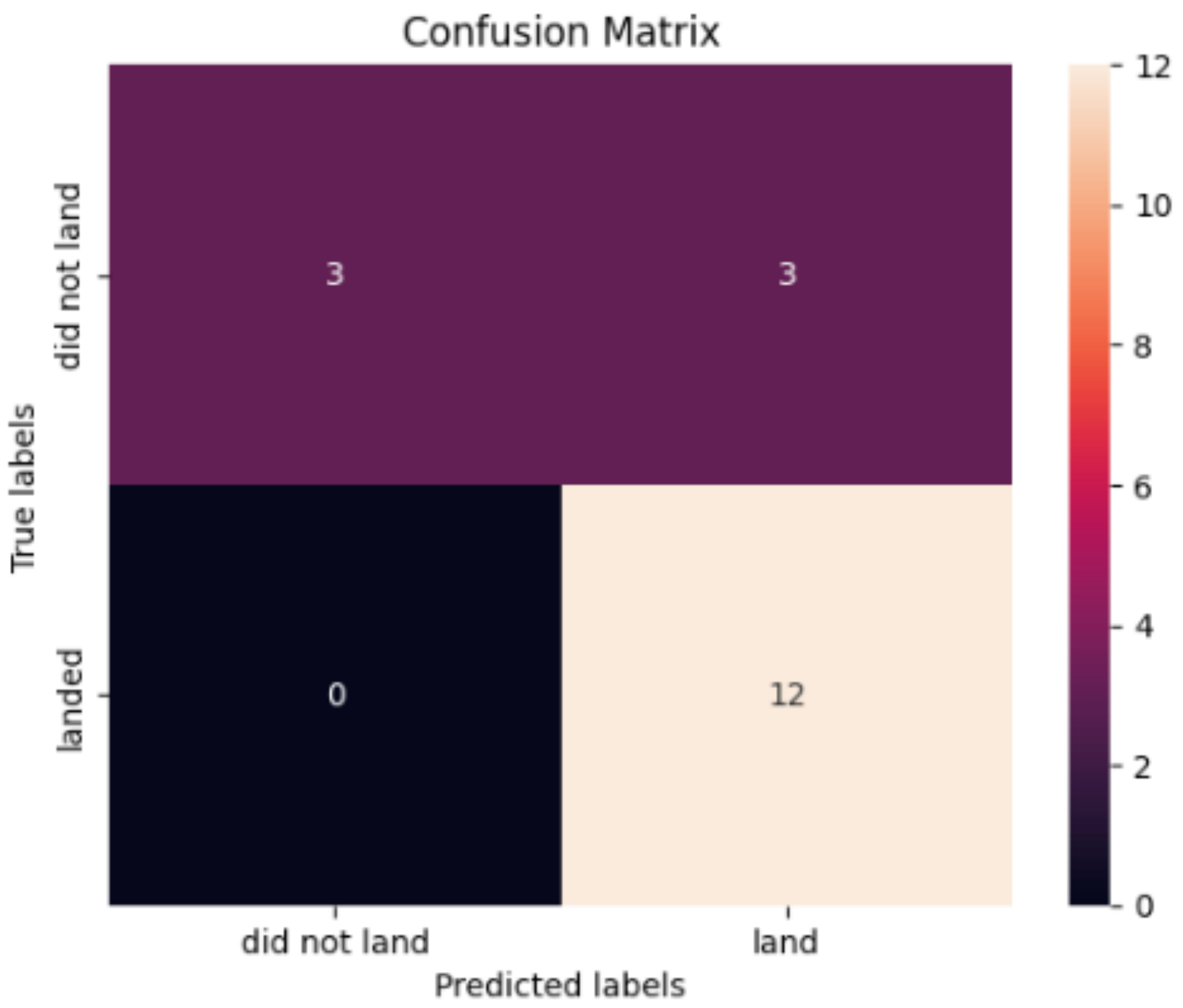
- All models performed similarly with the same accuracy

	Model	Best Training Score	Test Score
0	Logistic Regression	0.846429	0.833333
1	SVM	0.848214	0.833333
2	Decision Tree	0.873214	0.833333
3	KNN	0.848214	0.833333



Confusion Matrix

- All confusion matrices were identical
- Confusion matrix displayed is for the Logistic Regression model
- Confusion Matrix Output:
  - 12 True Positives
  - 3 True Negatives
  - 3 False Positives
  - 0 False Negatives



Conclusions

- Launch success showed improvement over time, with 2015 through 2017 showing the largest improvement
- ES-L1, GEO, HEO, and SSO Orbits have 100% first stage landing success
- KSC LC-39A has the highest success rate of all sites
- All Models performed similarly on test set displaying accuracy of 0.83%
- Utilizing our model can predict future Falcon 9 first stage landing outcomes, thereby determining the cost of a launch

Appendix

Jupyter Notebooks & Dash Python Code (GitHub URLs)

- Data Collection: https://github.com/Chikaradameshi/Data_Science_Capstone_SpaceX/blob/main/01_spacex_data_collection_api.ipynb
- Web Scraping: https://github.com/Chikaradameshi/Data_Science_Capstone_SpaceX/blob/main/01_spacex_data_collection_api.ipynb
- Data Wrangling: https://github.com/Chikaradameshi/Data_Science_Capstone_SpaceX/blob/main/03_spacex_data_wrangling.ipynb
- EDA with SQL: https://github.com/Chikaradameshi/Data_Science_Capstone_SpaceX/blob/main/04_spacex_eda_sql.ipynb
- EDA with Data Visualization: https://github.com/Chikaradameshi/Data_Science_Capstone_SpaceX/blob/main/05_spacex_eda_with_visualization.ipynb
- Folium Maps: https://github.com/Chikaradameshi/Data_Science_Capstone_SpaceX/blob/main/06_spacex_launch_site_location.ipynb
- Dashboard File: https://github.com/Chikaradameshi/Data_Science_Capstone_SpaceX/blob/main/spacex_dash_app.py
- Machine Learning: https://github.com/Chikaradameshi/Data_Science_Capstone_SpaceX/blob/main/07_spacex_ml_prediction.ipynb

Data Sets:

- SpaceX REST API (JSON): https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-DS0321EN-SkillsNetwork/datasets/API_call_spacex_api.json
- Wikipedia (Webpage): https://en.wikipedia.org/w/index.php?title=List_of_Falcon_9_and_Falcon_Heavy_launches&oldid=1027686922
- SpaceX (CSV): https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-DS0321EN-SkillsNetwork/labs/module_2/data/Spacex.csv
- Launch Geo (CSV): https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-DS0321EN-SkillsNetwork/datasets/spacex_launch_geo.csv
- Launch Dash (CSV): https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-DS0321EN-SkillsNetwork/datasets/spacex_launch_dash.csv
- Dataset Part 1 (CSV): https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-DS0321EN-SkillsNetwork/datasets/dataset_part_1.csv
- Dataset Part 2 (CSV): https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-DS0321EN-SkillsNetwork/datasets/dataset_part_2.csv
- Dataset Part 3 (CSV): https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-DS0321EN-SkillsNetwork/datasets/dataset_part_3.csv

Thank you!