DATA SCIENCE CAPSTONE PROJECT

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OUTLINE

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EXECUTIVE SUMMARY

- Data collected from SpaceX REST API and Web scrape from wiki pages.
- The target is Falcon 9.
  - t has reached the farthest orbit for 27 times which is GTO orbit.
  - it can lift payloads of up to 8,300 kg (18,300 pounds) to geostationary orbit.
- In EDA visualization show that there is a success rate of launching Falcon 9 had increase since 2013 until 2020. .
- In EDA with SQl found that Falcon 9 was launched at 3 different launch site, which is CCAFS SLC-40 , KSC LC-39A , VAFB SLC-4E. The total number mission outcomes are 100 success mission and 1 fail mission (in flight). The first success landing is on 01 -05 - 2017
- Falcon 9 is a partially reusable two-stage-to-orbit medium-lift launch vehicle designed and manufactured by SpaceX.

INTRODUCTION

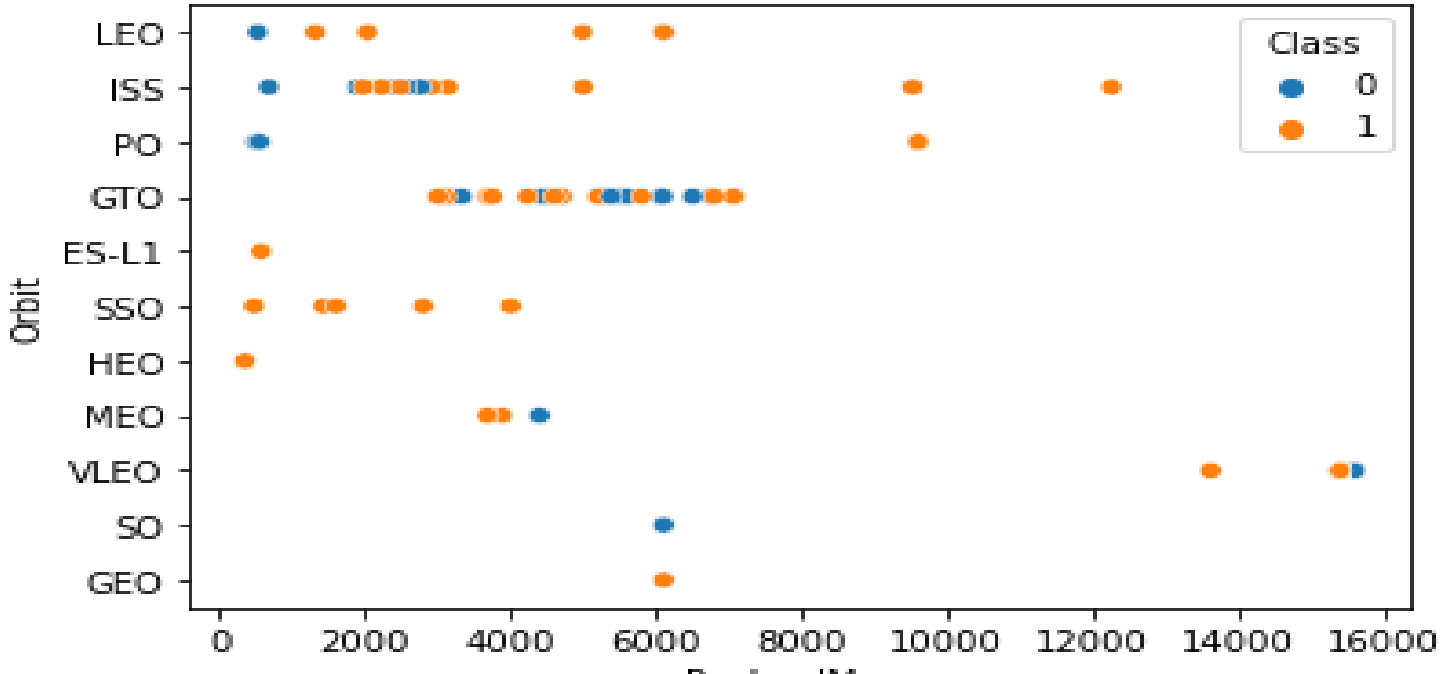
- The rocket launches for SpaceX are inexpensive.
- The commercial space age is here, companies are making space travel affordable for everyone.
- Companies like Virgin Galactic who providing suborbital space flights, Rocketlab who provides satellites. Perhaps the most successful is SpaceX.
- SpaceX 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.

METHODOLOGY

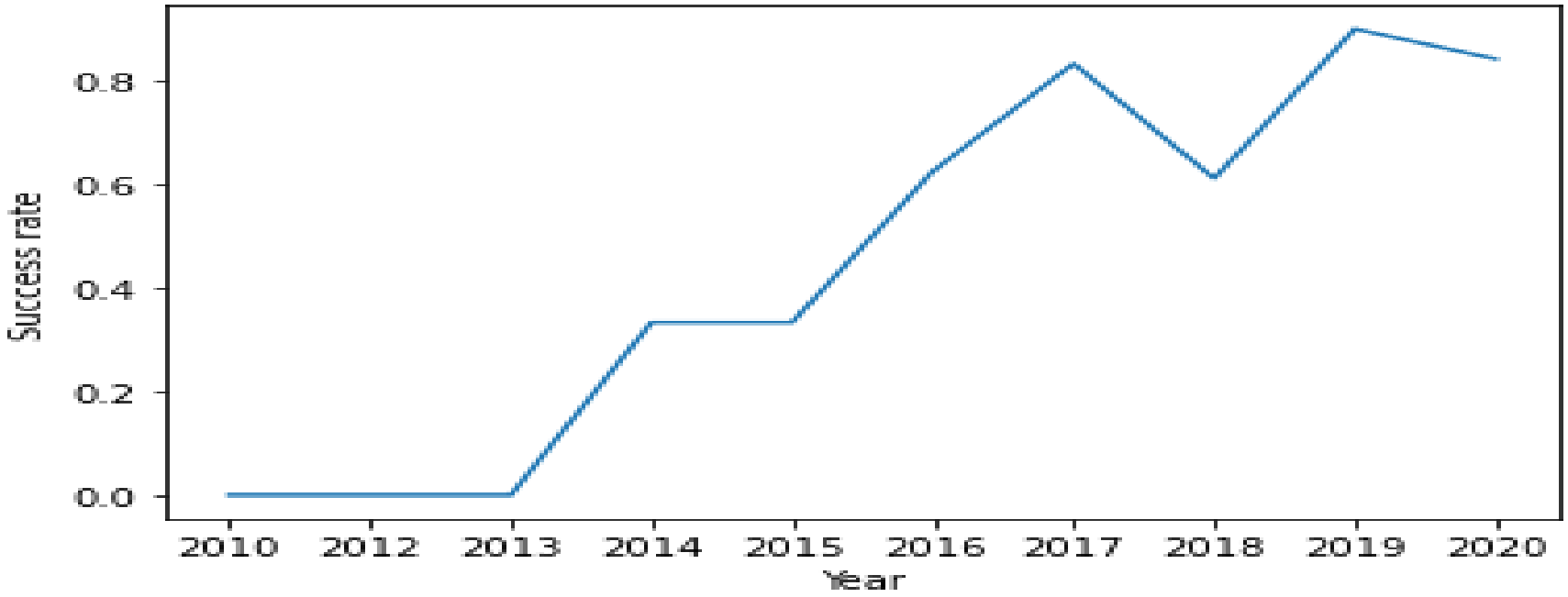
- Web Scrapping Falcon 9 launch records
- Working with SpaceX launched Data gathered from an API
- Data Wrangling using an API
- From Data preparation to Modeling and Evaluation.
  - Built a predicting Model
  - Deployment of the model
- Interactive Visual Analysis using Folium and Plotly.

RESULTS

- Visualizing the relationship between Payload and Orbit type, You should observe that Heavy payloads have a negative influence on GTO orbits and positive on GTO and Polar LEO (ISS) orbits.



EDA and Visualization



you can observe that the sucess rate since 2013 kept increasing till 2020

DATA WRANGLING

TASK 3: Calculate the number and occurence of mission outcome per orbit type

Use the method `value_counts()` to determine the number and occurrence of each orbit in the column `Outcome` , then assign it to the variable `landing_outcomes`:

```
# landing_outcomes = values on Outcome column
landing_outcomes = df["Outcome"].value_counts()
landing_outcomes
```

```
True ASDS      41
None None      19
True RTLS      14
False ASDS      6
True Ocean      5
None ASDS       2
False Ocean     2
False RTLS      1
Name: Outcome, dtype: int64
```

DATABASE

List the names of the boosters which have success in drone ship and have payload mass greater than 4000 but less than 6000

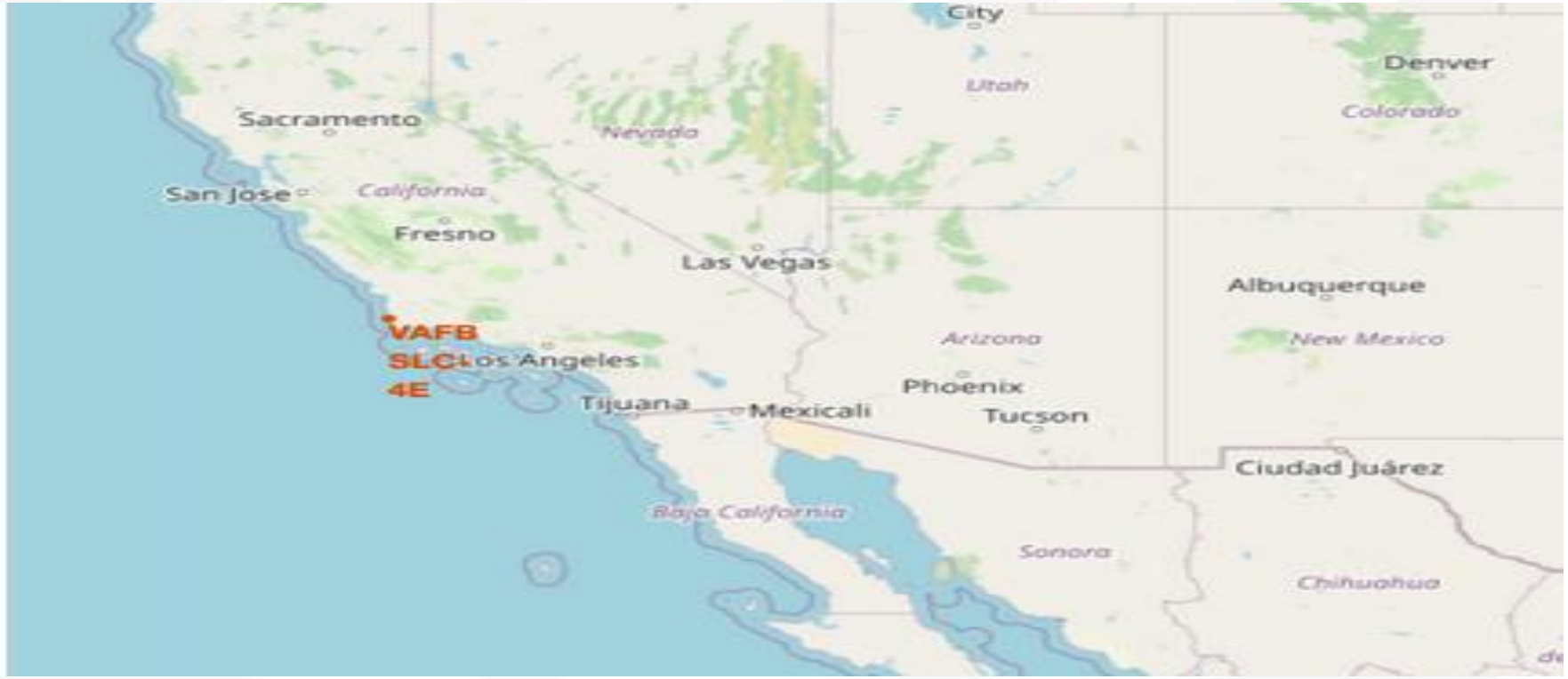
List the names of the boosters which have success in drone ship and have payload mass greater than 4000 but less than 6000

```
%sql SELECT BOOSTER_VERSION FROM SPACEXTBL WHERE LANDING__OUTCOME = 'Success (drone ship)' AND PAYLOAD_MASS__KG_ > 4000 AND
PAYLOAD_MASS__KG_ < 6000
```

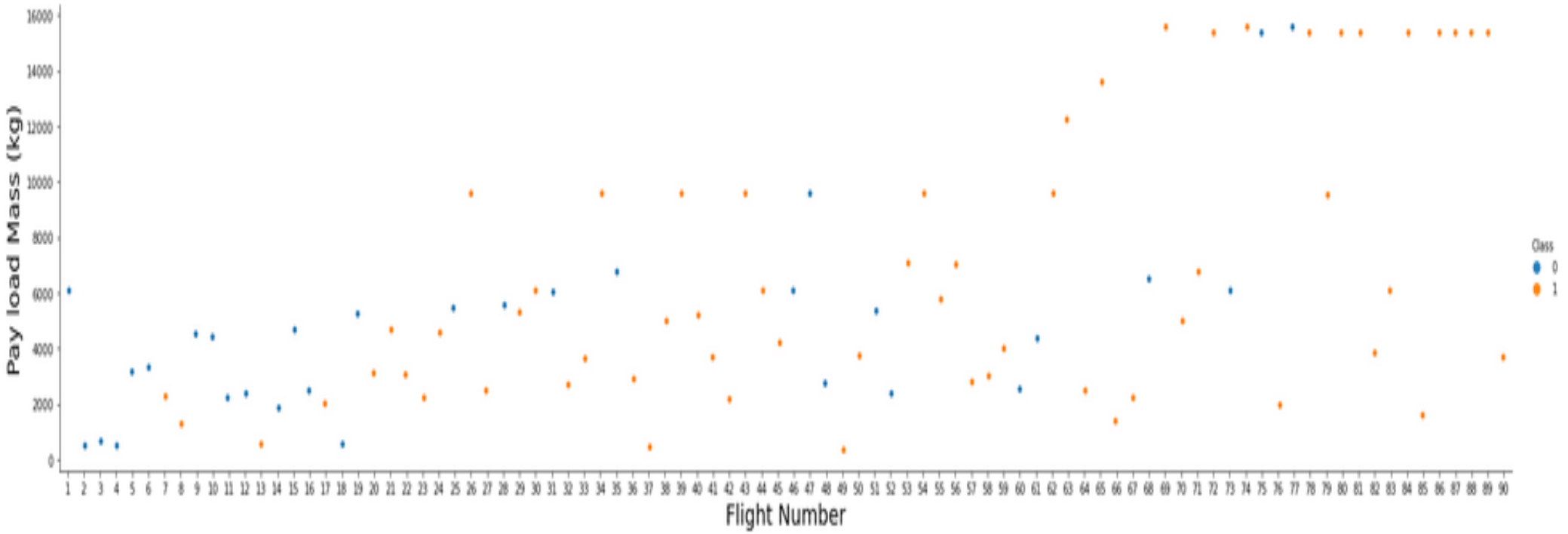
```
 * ibm_db_sa://rbn61462:***@0c77d6f2-5da9-48a9-81f8-86b520b87518.bs2io90l08kqb1od8lcg.databases.appdomain.cloud:31198/bludb
Done.
```

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

Interation Visual Analysis wiyh Folium



DASHBOARD



We see that different launch sites have different success rates. CCAFS LC-40, has a success rate of 60 %, while KSC LC-39A and VAFB SLC 4E has a success rate of 77%.

DISCUSSION

- CLASSIFICATION ACCURACY

- CLASSIFICATION MODELCLASSIFICATION ACCURACY Right side is showing the different type of classification model will be testing the data Logistic regression has the accuracy of 84.72 % and 0.8333 score Support Vector Machine has the accuracy of 84.72 and 0.8333 score

- Decision Tree Classifier has the accuracy of 89% and 0.9444scoreK nearest neighbors has the accuracy of 84.72% and 0.8333 score

OVERALL FINDINGS & IMPLICATIONS

There are total of 100 success of landing , 99 success landing with stated payload mass and 1 success landing without payload status unclear There is only 1 failure for landing

EDA WITH SQLSUCCESSFUL DRONE SHIP LANDING WITH PAYLOAD BETWEEN 4000 AND 6000There are 3 type of different version booster that successful landed on drone ship with payload mass between 4000 KG and 6000 KG

- The generated map with marked launch sites should look similar
- On the left side we have VAFB SLC - 4E launch where located near Lompoc airport

CONCLUSION

- The collection of data were collected from SpaceX REST API and Web scrape from wiki pages.
- The target object is Falcon 9, it has reached the farthest orbit for 27 times which is GTO orbit. The range of GTO orbit is 35,768 KM above Earth's equator and the overall success rate of landing the booster of Falcon 9 is a 66.66%
- In EDA visualization show that there is a success rate of launching Falcon 9 had increase since 2013 until 2020.