# Falcon 9 First Stage Landing Predictor

Problem:

Can we predict Falcon 9 first stage landing success using payload, orbit, and launch site data?

Tools: Python, Pandas, Scikit-learn, Plotly, Dash

Data Pipeline & Modeling

➔   Collected launch data from SpaceX API and scraped metadata from Wikipedia

➔   Cleaned and merged datasets using Pandas

➔   Engineered features like payload mass, orbit type, and launch site

➔   Trained Logistic Regression, SVM, Decision Tree, and KNN

➔   Best model: Logistic Regression (F1: 89%, Precision: 92%, Recall: 87%)
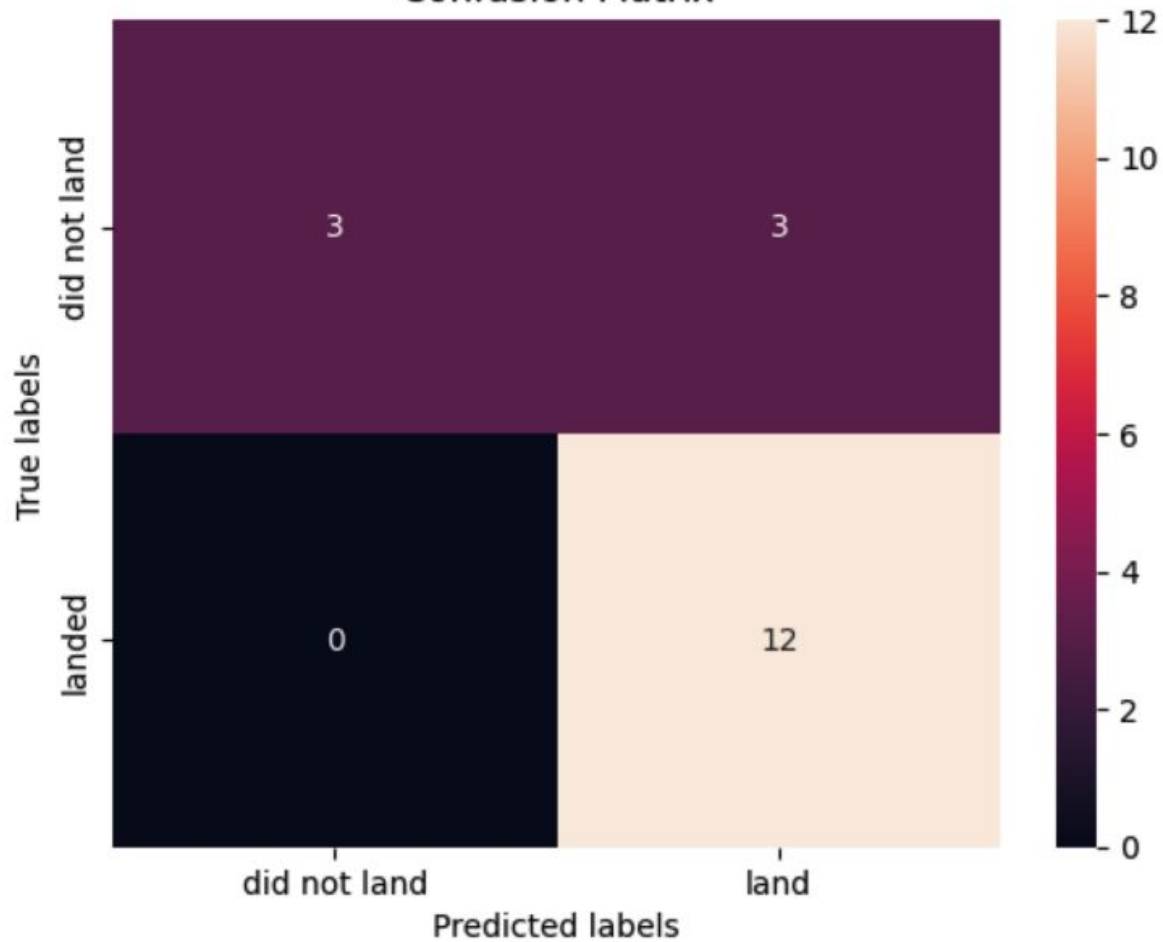
Model Performance Metrics
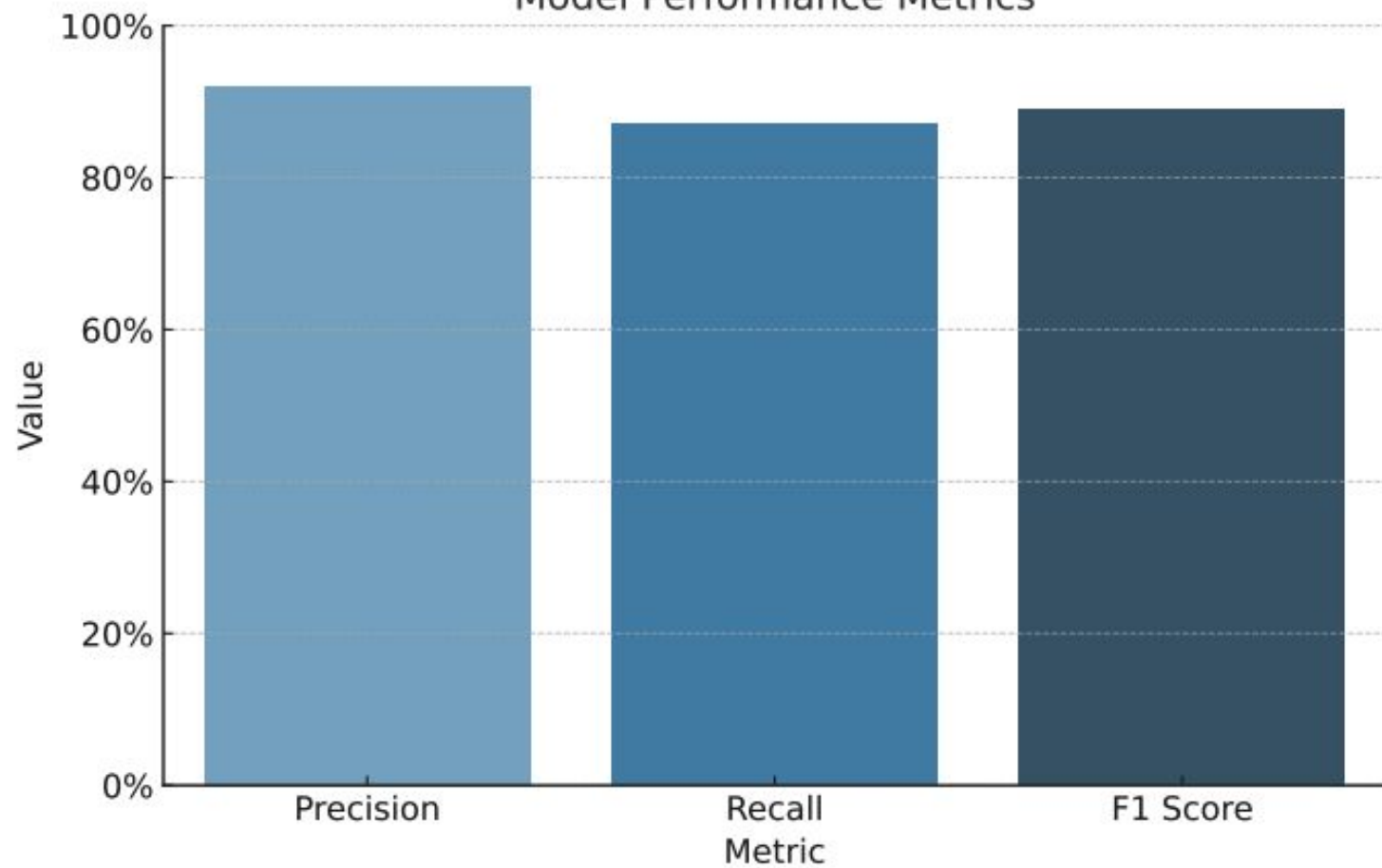
Logistic Regression Test Accuracy: 83.3%
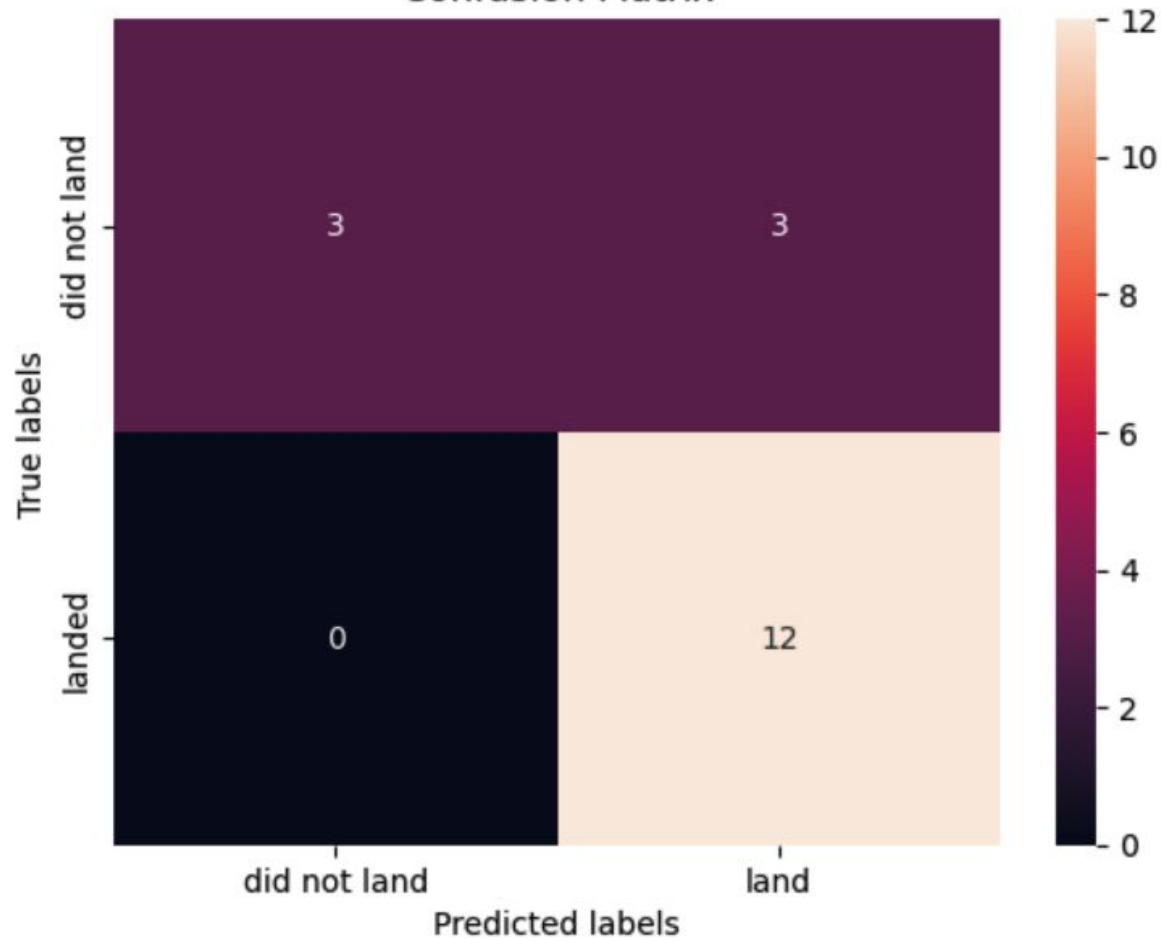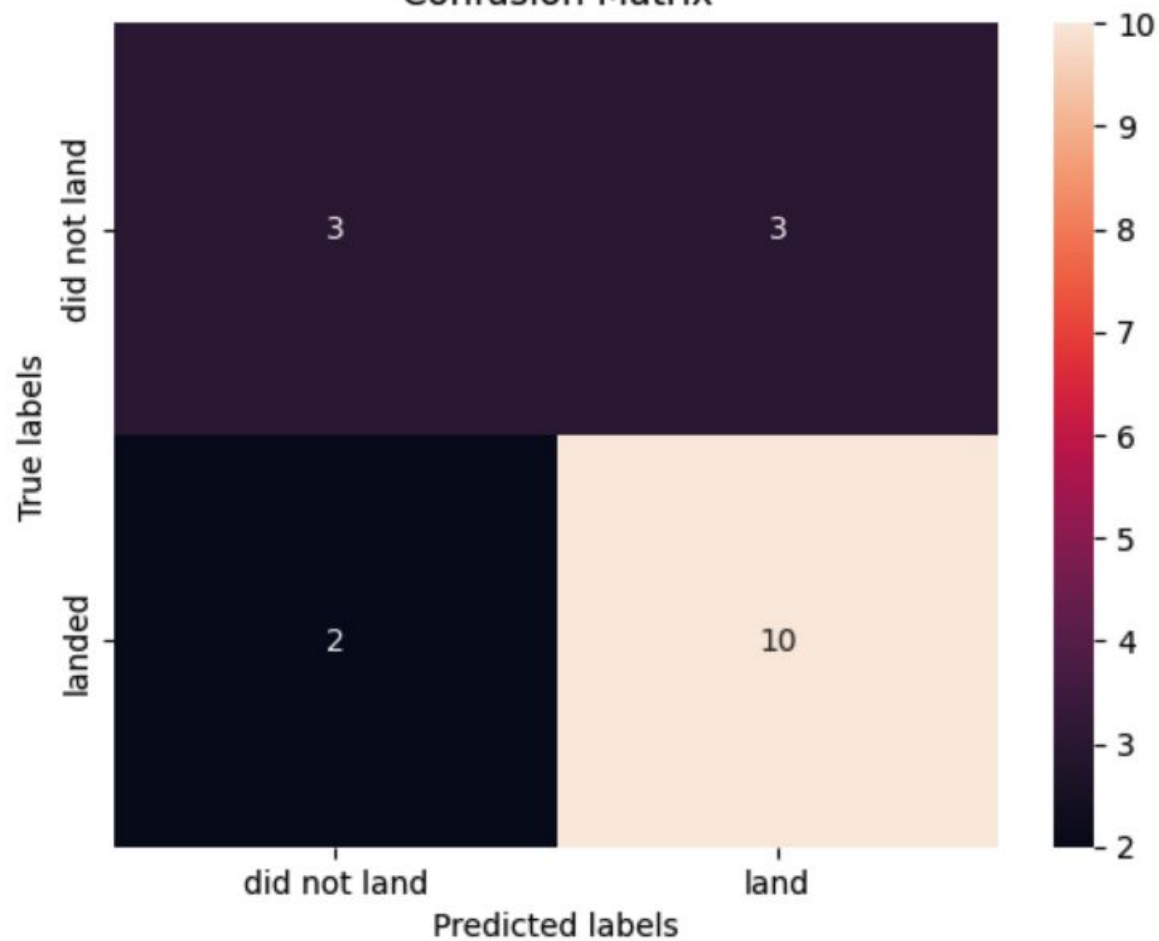
Confusion Matrix
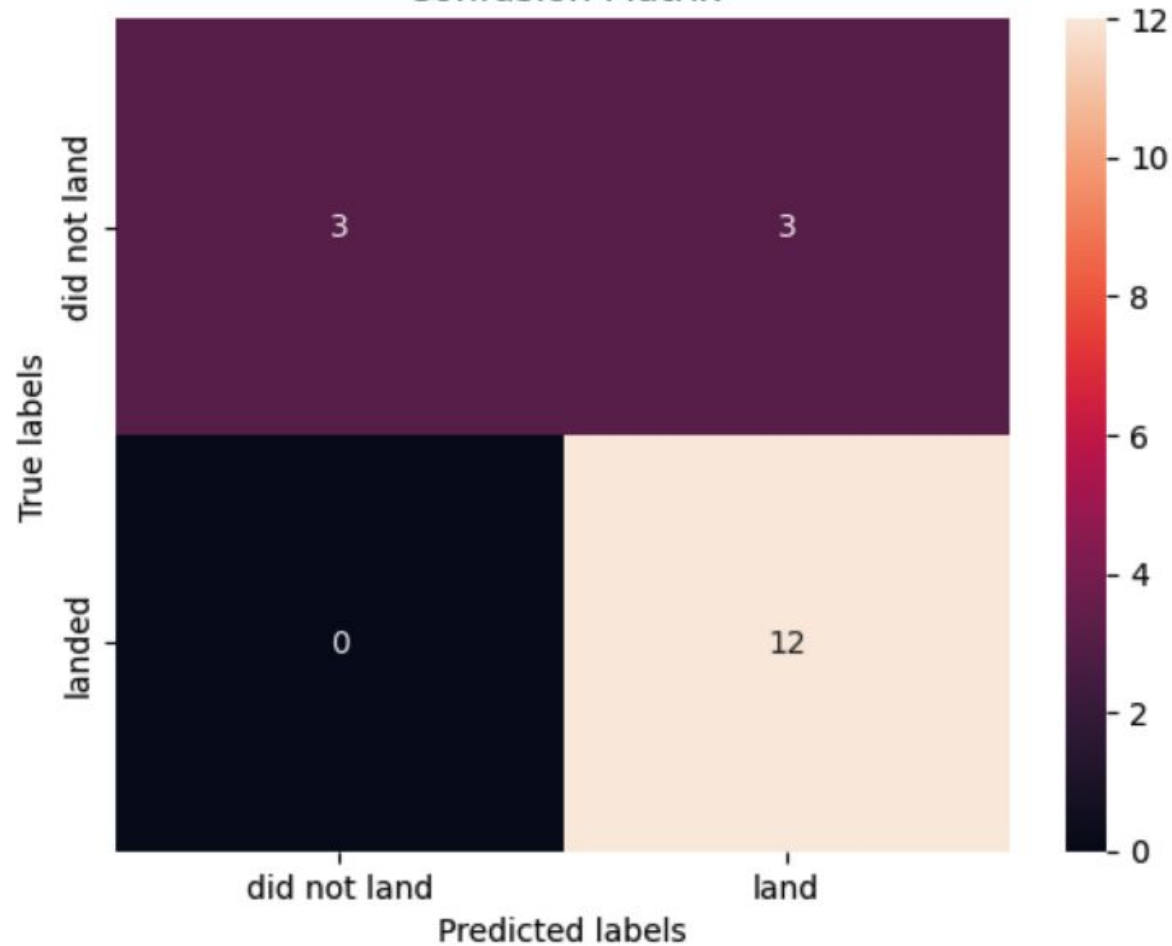
SVM Test Accuracy: 83.3%

Confusion Matrix

Decision Tree Test Accuracy: 72.2%

Confusion Matrix

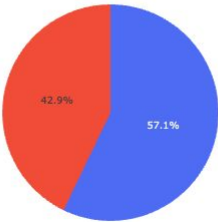KNN Test Accuracy: 83.3%

Confusion Matrix

SpaceX Launch Records Dashboard

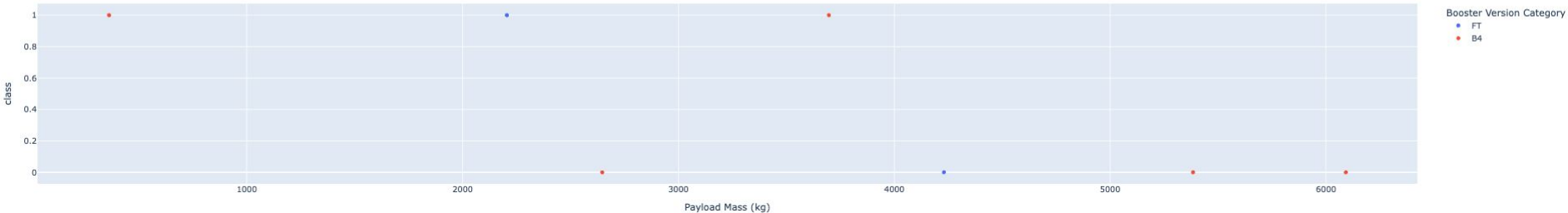CCAFS SLC-40

Total Success vs Failure for site CCAFS SLC-40

- 0
- 1

42.9%

57.1%

Payload range (Kg):

0   2500   5000   7500   10000

Correlation Between Payload and Success for site CCAFS SLC-40

class

Booster Version Category
- FT
- B4

Payload Mass (kg)

SpaceX Launch Records Dashboard

KSC LC-39A

Total Success vs Failure for site KSC LC-39A

- 1
- 0

23.1%

76.9%

Payload range (Kg):

0   2500   5000   7500   10000
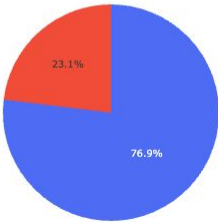
Correlation Between Payload and Success for site KSC LC-39A

class

Booster Version Category
- FT
- B4
- B5

Payload Mass (kg)
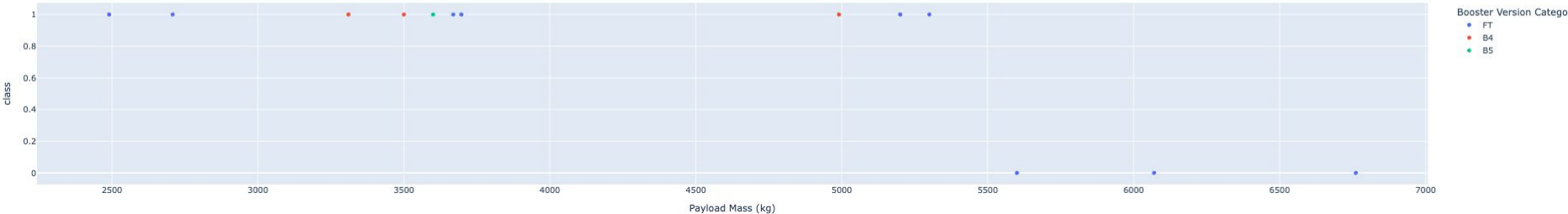
SpaceX Launch Records Dashboard

VAFB SLC-4E

Total Success vs Failure for site VAFB SLC-4E
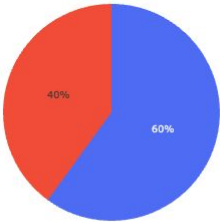
- 0
- 1

Payload range (Kg):

0 — 2500 — 5000 — 7500 — 10000

Correlation Between Payload and Success for site VAFB SLC-4E

Booster Version Category
- v1.1
- FT
- B4

Payload Mass (kg)
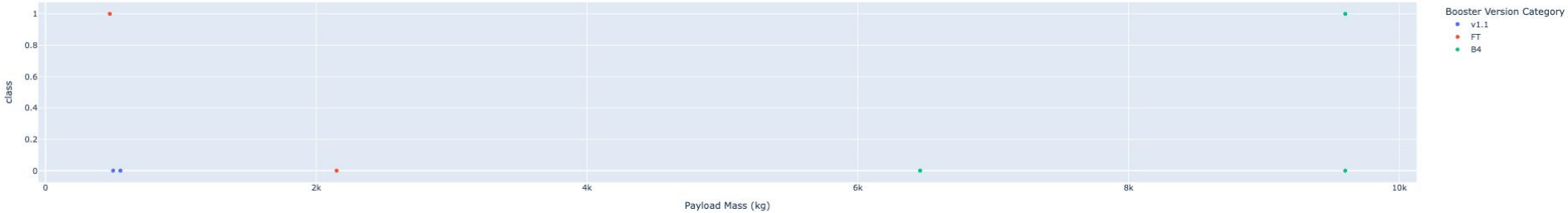
SpaceX Launch Records Dashboard

CCAFS LC-40   × ▾

Total Success vs Failure for site CCAFS LC-40

■ 0
■ 1

26.9%

73.1%
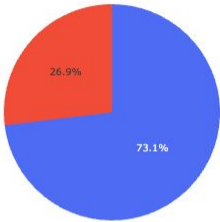
Payload range (Kg):

0   10000
0   2500   5000   7500

Correlation Between Payload and Success for site CCAFS LC-40

Booster Version Category
● v1.0
● v1.1
● FT
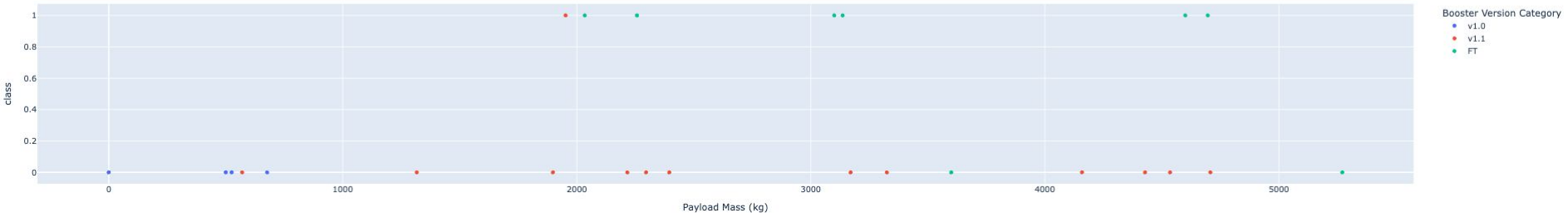
SpaceX Launch Records Dashboard

Total Successful Launches by Site
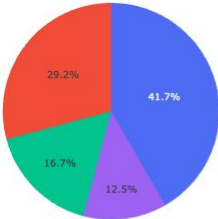
- KSC LC-39A
- CCAFS LC-40
- VAFB SLC-4E
- CCAFS SLC-40

41.7%

29.2%

16.7%

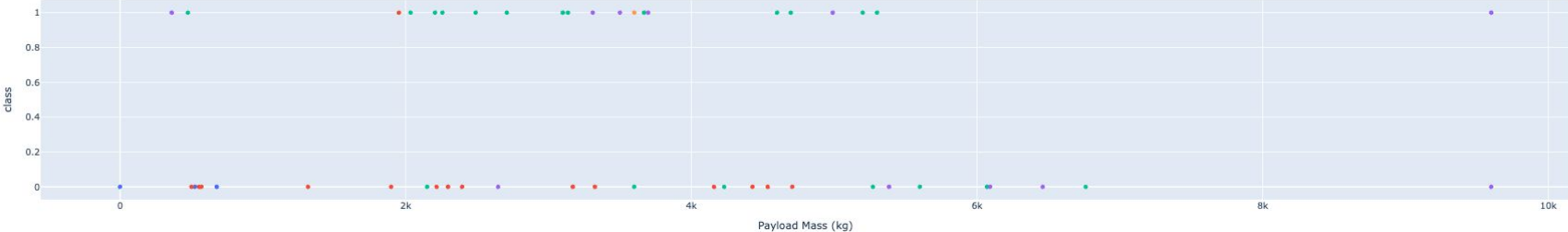12.5%

Payload range (Kg):

0   2500   5000   7500   10000

Correlation Between Payload and Success for All Sites

Booster Version Category
- v1.0
- v1.1
- FT
- B4
- B5

class

Payload Mass (kg)