Executive Summary

- This project focuses on leveraging data science methodologies to win the space race. The analysis includes data collection, wrangling, EDA, interactive analytics with Folium and Plotly Dash, and predictive modeling using classification techniques.

Introduction

- This project, 'Winning the Space Race with Data Science', aims to uncover insights into space mission data using data science techniques. The key objectives are to explore launch data, develop predictive models, and create interactive visualizations.

Data Collection & Wrangling

- • SpaceX API: Collected launch data using REST API calls.
- • Web Scraping: Extracted additional mission data from relevant websites.
- • Data Wrangling: Cleaned and processed the data, handling missing values, normalizing formats, and preparing it for analysis.

EDA with Visualization Results

- • Scatter Plots: Showed relationships between payloads and mission success.
- • Bar Charts: Visualized the frequency of launches by rocket type.
- • Line Charts: Illustrated trends in launches over time.

EDA with SQL Results

- • Queries performed:
- • Count of launches by site
- • Success rate of each rocket type
- • Payload statistics (e.g., average payload per mission)

Interactive Maps (Folium)

- • Map Markers: Showed locations of launches.
- • Polylines: Displayed flight paths.
- • Circle Markers: Represented launch success/failure visually.

Plotly Dash Dashboard Results

- • Interactive Pie Charts: Visualized launch success rates by site.
- • Range Slider: Allowed users to filter data by payload weight and booster version.
- • Scatter Plots: Analyzed relationships between payload and mission outcome.

Predictive Analysis (Classification)

- • Classification Models: Logistic Regression, Decision Trees, Random Forest.
- • Evaluation Metrics: Accuracy, Precision, Recall.
- • Hyperparameter tuning performed to improve model performance.

Conclusion

- This analysis demonstrated the power of data science in optimizing space missions. The use of interactive dashboards and predictive modeling can enhance mission planning and execution in the space race.