Informe de Proyecto - Lanzamientos Falcon 9 de SpaceX

Executive Summary

This project analyzes SpaceX's Falcon 9 launches to predict the success of first-stage landings. Methodologies included data collection via API, web scraping, exploratory data analysis (EDA), and predictive analysis using classification models.

Introduction

The main goal of the project is to predict whether SpaceX's Falcon 9 first stage will land successfully. SpaceX stands out in the space industry due to its ability to reuse the rocket's first stage, lowering launch costs. This analysis focuses on understanding the factors that influence landing success.

Methodology

1. Data Collection: Launch data was obtained from the SpaceX API, and historical records were gathered from Wikipedia.
2. Data Cleaning and EDA: Data was cleaned and analyzed using SQL and statistical visualizations.
3. Interactive Maps: Folium was used to build maps for visualizing optimal locations for launch sites.
4. Dashboards: An interactive dashboard was created using Plotly Dash to observe correlations between mission success and payload type.

Predictive Analysis

Several classification models were implemented to predict landing success. The SVM, KNN, and Logistic Regression models achieved an accuracy of 83.3%. The SVM model performed the best in terms of Area Under the Curve (AUC), with a value of 0.958.

Results and Conclusions

1. Rockets with lighter payloads tend to have higher landing success rates.

2. Launch success rates have increased over time, stabilizing since 2019.

3. The KSC LC-39A launch site recorded the highest number of successful launches.

4. GEO, HEO, SSO, and ES L1 orbits showed the highest success rates.

In conclusion, this analysis suggests that SpaceX will continue to improve its success rates, with increased performance in the orbits and launch sites analyzed.