"SpaceX Launch Analysis & Prediction Platform"

🎯 Objective

Develop an advanced Python application that not only visualizes SpaceX launch data but also predicts the success of future launches using machine learning models. The platform should offer interactive dashboards, detailed analytics, and predictive insights based on historical data.

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🧠 Learning Outcomes

Participants will:

Deepen their understanding of RESTful APIs and data extraction.

Enhance skills in data cleaning, preprocessing, and feature engineering.

Apply machine learning algorithms for classification problems.

Create interactive dashboards using frameworks like Dash or Streamlit.

Implement geospatial visualizations using libraries like Folium.

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🛠️ Project Requirements

1. Data Acquisition & Preprocessing:

Fetch comprehensive launch data from the SpaceX-API.

Scrape additional data (e.g., weather conditions) from relevant sources to enrich the dataset.

Clean and preprocess the data, handling missing values and encoding categorical variables.

2. Exploratory Data Analysis (EDA):

Analyze factors influencing launch success, such as payload mass, launch site, rocket type, and weather conditions.

Visualize trends and correlations using libraries like Matplotlib and Seaborn.

3. Machine Learning Model:

Develop a classification model (e.g., Logistic Regression, Decision Trees, or Random Forest) to predict launch success.

Evaluate model performance using appropriate metrics (e.g., accuracy, precision, recall).

Implement cross-validation to ensure model robustness.

4. Interactive Dashboard:

Design a user-friendly interface displaying:

Historical launch data with filters (e.g., by year, launch site).

Geospatial map showing launch sites and outcomes using Folium.

Predictive tool allowing users to input parameters and receive launch success probabilities.

5. Deployment:

Deploy the application locally or on a cloud platform (e.g., Heroku, Render) for demonstration purposes.

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📚 Resources

APIs & Data Sources:

SpaceX-API Documentation

Weather data APIs (e.g., OpenWeatherMap)

Python Libraries:

Data Handling: pandas, numpy

Visualization: matplotlib, seaborn, folium

Machine Learning: scikit-learn

Dashboard: dash, streamlit


Deployment Platforms:

Heroku

Render