# SPACEX LAUNCH ANALYSIS & PREDICTION REPORT

High-level deck for executive team and stakeholders.

# EXECUTIVE SUMMARY

Project explores SpaceX launch data to identify key drivers of successful rocket landings using EDA, SQL, visualization, mapping, and predictive modeling.

# INTRODUCTION

Objective: Analyze SpaceX launch data. Why: Reduce costs by improving booster recovery rates. Data: SpaceX API, mission records.

# DATA COLLECTION & WRANGLING

Collected from SpaceX API, cleaned missing values, corrected data types, engineered features like binary landing outcome.

# EDA & INTERACTIVE VISUAL ANALYTICS

Used Matplotlib, Seaborn, Plotly for scatterplots, booster success, launch trends. Built Plotly Dash dashboard for real-time filtering.

# PREDICTIVE ANALYSIS METHODOLOGY

Binary classification using Logistic Regression. Features: Payload, orbit, booster. Target: Landing success. Evaluated accuracy & recall.

# EDA WITH VISUALIZATION RESULTS

Key findings: Heavier payloads decrease success; FT boosters perform better; CCAFS site has higher success. Visualized with charts, scatterplots.

# EDA WITH SQL RESULTS

Used SQLite: counted missions/site, avg payload/orbit, booster success rates. SQL JOINs, GROUP BY, aggregates revealed hidden trends.

# INTERACTIVE MAP WITH FOLIUM

Folium maps: marked launch sites, visualized distances, highlighted geographic factors affecting landings.

# PLOTLY DASH DASHBOARD

Interactive dashboard with filters for site, booster, outcome. Graphs update dynamically, trends explored without code.

# PREDICTIVE ANALYSIS RESULTS

Model accuracy ~80%. Key features: Payload, booster, site. Provided confusion matrix, classification report, feature importance.

# CONCLUSION

Summary: Combined wrangling, SQL, EDA, geospatial analysis, ML to predict SpaceX landings. Future: more features, ensemble models, API.