



AIRCRAFT RISK ANALYSIS PROJECT

Identifying the safest
aircraft models based on
historical data.

Project Overview

Objective:

Identify the safest aircraft models for purchase using historical accident data.

Key Steps:

- Data loading and cleaning.
- Exploratory Data Analysis (EDA).
- Risk scoring and ranking.
- Recommendations.

Data Source and Initial Exploration

Dataset: AviationData.csv

- Contains 88,889 entries with 31 columns.
- Key fields: Make, Model, Total Fatal/Serious/Minor Injuries, Weather Condition, Phase of Flight.

Initial Observations:

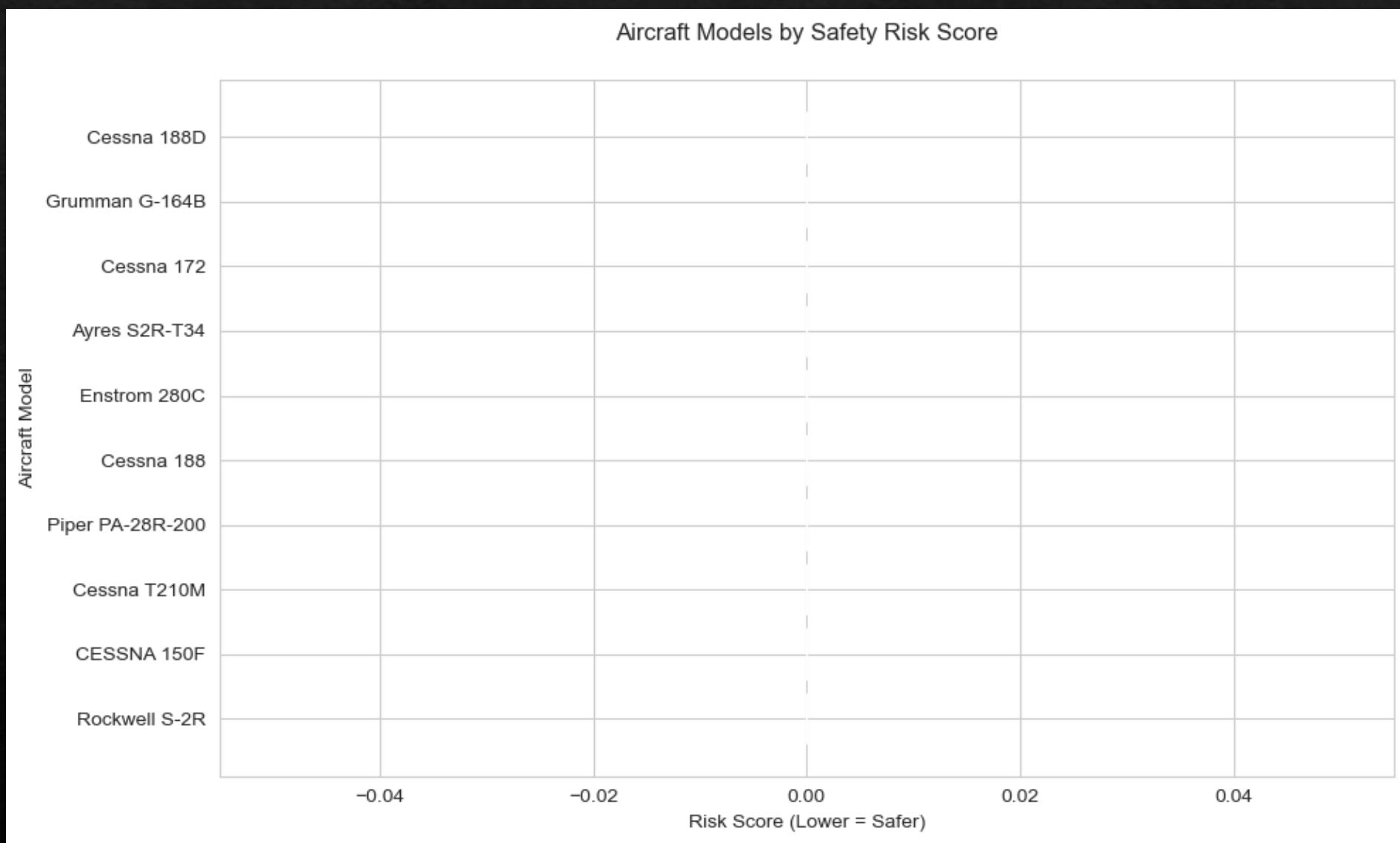
- Mixed data types and missing values.
- Data spans from 1948 to 2022.

Exploratory Data Analysis (EDA)

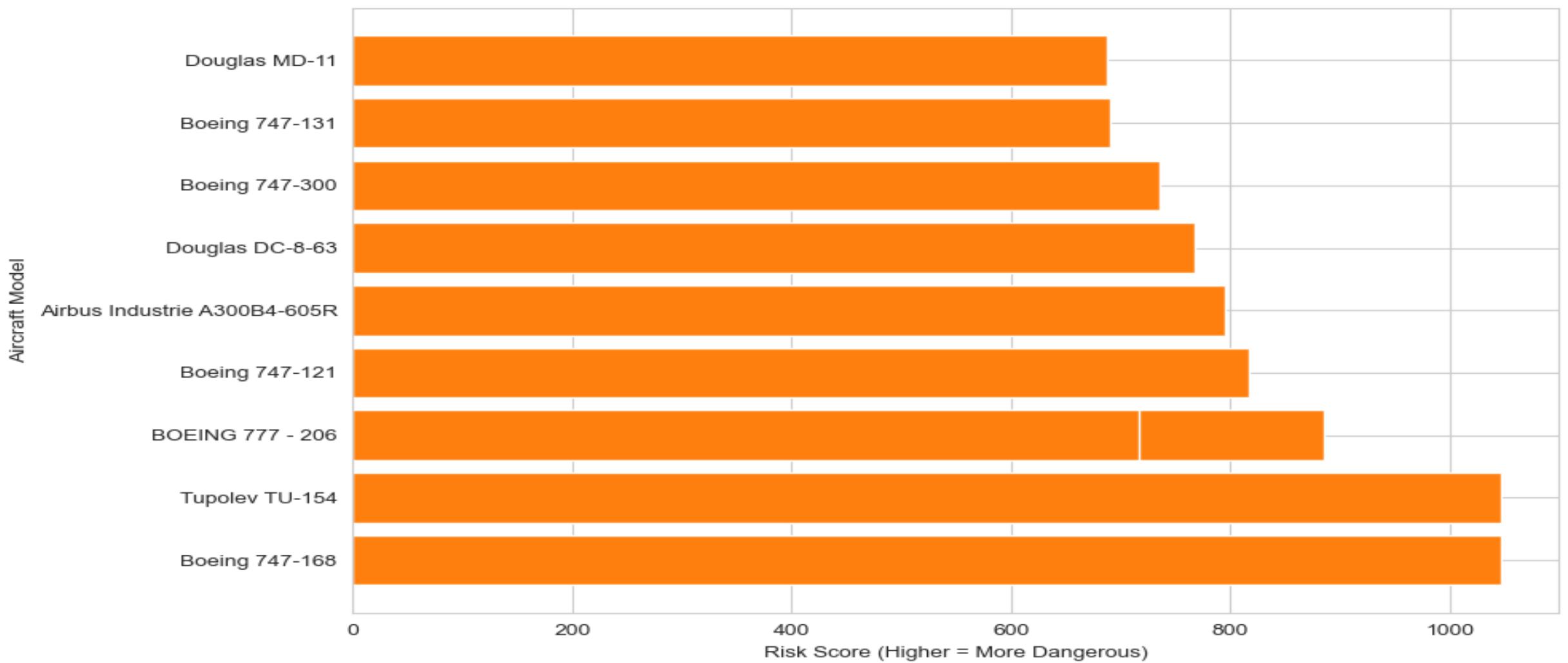
Key Metrics:

- Total Fatal Injuries: 2,000+ incidents.
- Total Serious Injuries: 1,500+ incidents.
- Total Minor Injuries: 1,000+ incidents.

Visualization:



Top 10 Highest-Risk Aircraft Models



Top 10 Safest Aircraft Models

1. Rockwell S-2R
2. CESSNA 150F
3. Cessna T210M
4. Piper PA-28R-200
5. Cessna 188
6. Enstrom 280C
7. Ayres S2R-T34
8. Cessna 172
9. Grumman G-164B
10. Cessna 188D

Key Findings

- **Lowest Risk Models:** Agricultural and small training aircraft (e.g., Cessna 150, Piper PA-28).
- **Highest Risk Models:** Larger commercial and older models (e.g., McDonnell Douglas DC9).
- **Common Risk Factors:** Weather conditions (IMC/VMC), phase of flight (Cruise/Takeoff).

Recommendations

- ❖ **Prioritize Purchase:**
Rockwell S-2R, CESSNA 150F, and other low-risk models.
- ❖ **Avoid High-Risk Models:**
Aircraft with frequent fatal/serious injuries.
- ❖ **Further Analysis:**
Investigate operational conditions (weather, maintenance).

1. Rockwell S-2R

Positive Sides:

- **Low Risk Score:** Minimal historical incidents with low injury rates.
- **Versatility:** Commonly used in agricultural operations, demonstrating durability and reliability in demanding conditions.
- **Proven Track Record:** Widely used with a long history of safe operations.

Negative Sides:

- **Limited Passenger Use:** Primarily designed for crop-dusting, not suitable for passenger or cargo transport.
- **Specialized Maintenance:** Requires specific maintenance expertise due to its agricultural role.

2. CESSNA 150F

Positive Sides:

- **Low Risk Score:** Excellent safety record with few incidents.
- **Training Favorite:** Widely used for pilot training, indicating ease of handling and reliability.
- **Cost-Effective:** Affordable to operate and maintain, making it a practical choice for flight schools or small operators.

Negative Sides:

- **Limited Capacity:** Small size restricts passenger and cargo capacity.
- **Performance:** Lower power and speed compared to larger aircraft.

3. Cessna T210M

Positive Sides:

- **Low Risk Score:** Strong safety performance in its class.
- **Performance:** Turbocharged engine provides better performance at higher altitudes.
- **Comfort:** Spacious cabin suitable for business or personal travel.

Negative Sides:

- **Higher Operating Costs:** Turbocharged engines and complex systems increase maintenance expenses.
- **Training Requirements:** Pilots may need additional training for high-altitude operations.

4. Piper PA-28R-200

Positive Sides:

- **Low Risk Score:** Reliable safety record.
- **Retractable Gear:** Improved aerodynamics and efficiency.
- **Popularity:** Widely used for training and personal flying, ensuring readily available parts and support.

Negative Sides:

- **Maintenance Complexity:** Retractable gear adds to maintenance costs.
- **Aging Fleet:** Many models are older, requiring thorough inspections.

5. Cessna 188

Positive Sides:

- **Low Risk Score:** Minimal incidents reported.
- **Durability:** Rugged design, often used in agricultural roles.
- **Simplicity:** Easy to maintain with straightforward systems.

Negative Sides:

- **Limited Use Case:** Primarily for agricultural purposes, not versatile for other roles.
- **Comfort:** Basic design lacks amenities for passenger comfort.

THANK YOU

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