Aircraft Risk Assessment for strategic Aviation Expansion

Data driven Insights for Low-Risk Aircraft Selection
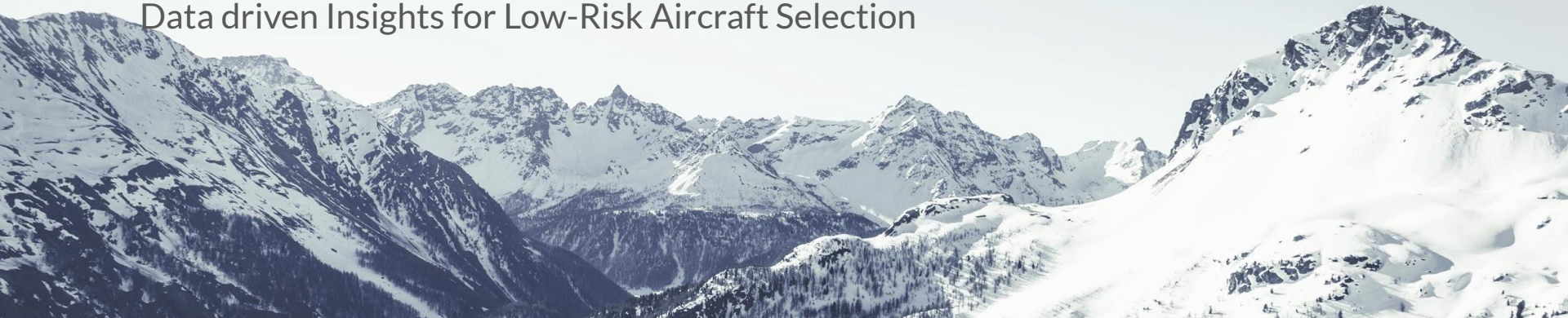
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Overview

❖ This project identifies low-risk aircraft to support safe and sustainable entry into the aviation market

❖ A data driven Approach has been used to leverage historical aviation data

Business Understanding

Objective : Minimize risks and liabilities while optimizing initial investment

➢ **Considerations:**

● **Safety and incident history of aircraft**

● **Maintenance costs and operational efficiency.**

● **Alignment with market needs (Commercial vs private use)**

Data Understanding

Data Sources: Historical aviation incident data, aircraft specifications and performance records

Key variables :

- Total Serious and Minor Injuries

- Number of Engines

- Aircraft Make and Model
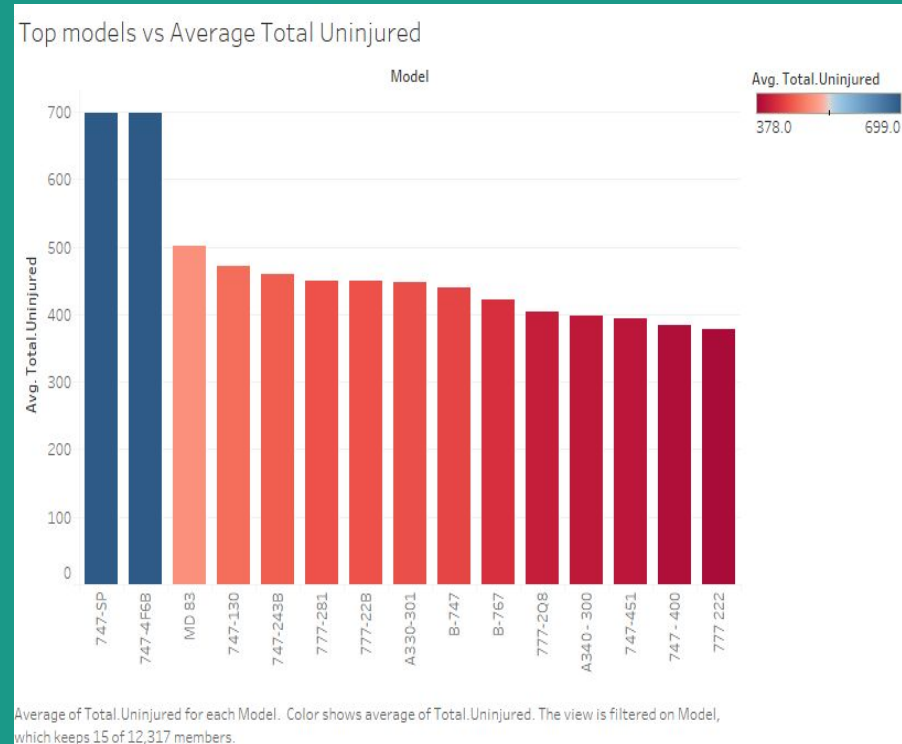
- Weather Conditions and Flight Phases

Missing Data Handled: Some fields imputed or excluded based on relevance.

Data Analysis - Safety Metrics by Aircraft Model

Key Points:

- **Evaluated safety metrics (incidents, injuries) across aircraft models.**

- **Identified models with consistently low incident rates.**

Visual: Bar chart comparing safety metrics for top models.

Top models vs Average Total Uninjured

Model

Avg. Total.Uninjured
378.0 — 699.0

Average of Total.Uninjured for each Model. Color shows average of Total.Uninjured. The view is filtered on Model, which keeps 15 of 12,317 members.

Data Analysis - Engine and Flight Risk

Key Points:

- Single-engine aircraft show slightly higher risk in adverse weather conditions.

- Multi-engine aircraft provide redundancy and lower fatality rates.

- Private-use aircraft have fewer incidents overall compared to high-volume commercial aircraft.

Average of Number.of.Engines for each Weather.Condition. Color shows details about Weather.Condition.
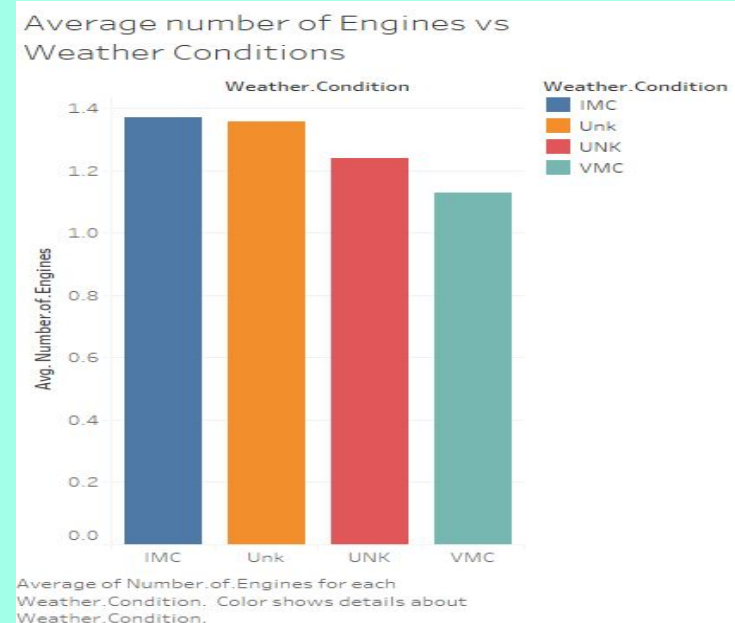
Data Analysis - Risk by Flight Phase

Key Points:

- **Most incidents occur during takeoff, landing, or cruise phases.**

- **Low-risk aircraft demonstrate better performance in these critical phases.**
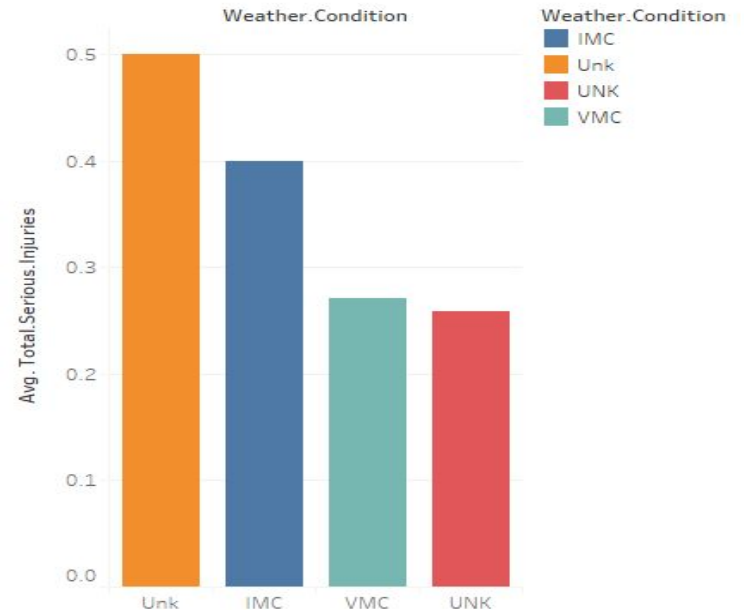
Data Analysis - Weather Impact

Key Points:

Aircraft with advanced navigation systems handle poor weather better.

High-risk models often lack modern safety enhancements.

Weather impacts aircraft performance significantly.

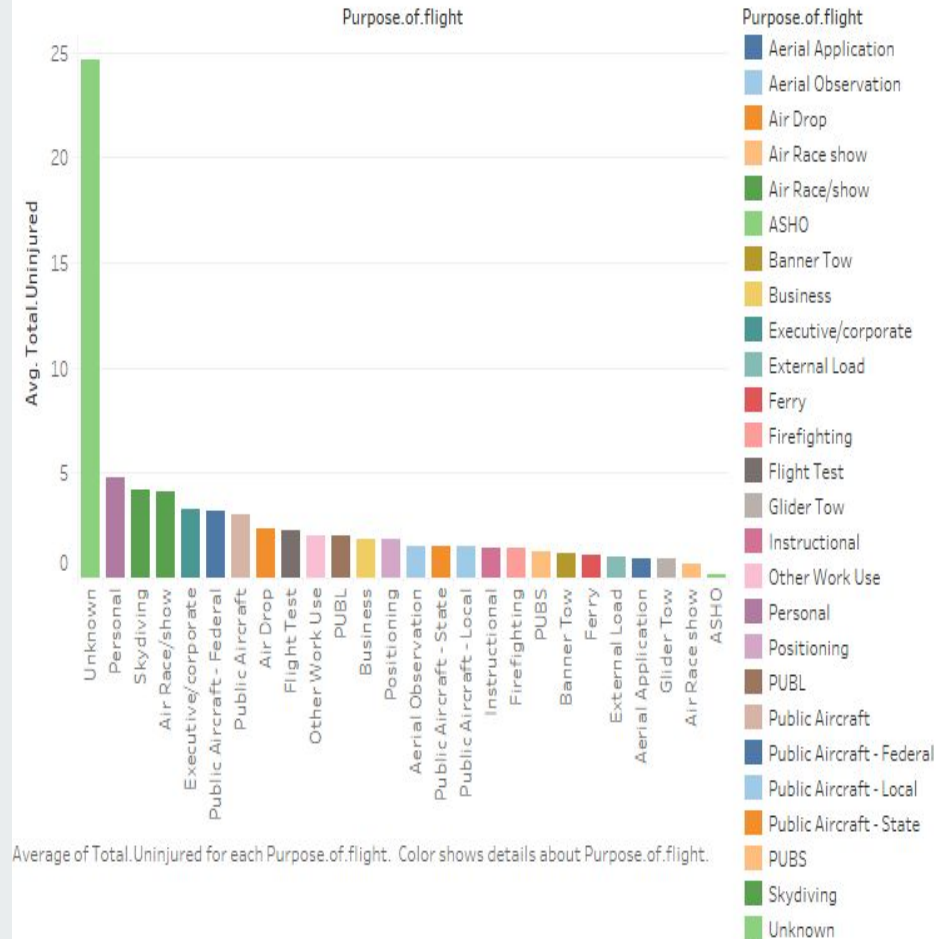Weather condition vs Average Total Serious Injuries

Average of Total.Serious.Injuries for each Weather.Condition. Color shows details about Weather.Condition.

Data Analysis - Purpose of Flight

Key points :

- **Most people travel for personal reasons using commercial planes hence more business in commercial sector.**
- Most uninjured people people had unknown travel purpose, personal, skydiving, airrace show

Purpose of the flight vs Average total uninjured

Average of Total.Uninjured for each Purpose.of.flight. Color shows details about Purpose.of.flight.

Purpose.of.flight
- Aerial Application
- Aerial Observation
- Air Drop
- Air Race show
- Air Race/show
- ASHO
- Banner Tow
- Business
- Executive/corporate
- External Load
- Ferry
- Firefighting
- Flight Test
- Glider Tow
- Instructional
- Other Work Use
- Personal
- Positioning
- PUBL
- Public Aircraft
- Public Aircraft - Federal
- Public Aircraft - Local
- Public Aircraft - State
- PUBS
- Skydiving
- Unknown

Recommendations

Key Points:

- **Purchase aircraft with proven safety records and operational efficiency.**

- **Focus on multi-engine aircraft for redundancy and safety.**

- **Align aircraft selection with target market (private or commercial).**

Recommended Aircraft

Key Points:

- Identify specific low-risk aircraft models from the analysis.

- Emphasize safety, cost-efficiency, and market demand alignment.

Risk Mitigation Strategies

Key Points:

- *Regular risk audits and safety checks.*

- *Invest in modern navigation and monitoring systems.*

- *Build a robust maintenance program.*

Investment Strategy

Key Points:

- **Allocate budget to modern aircraft with high ROI potential.**

- **Plan for long-term cost savings through predictive maintenance.**

Next Steps

Key Actions:

❖ Conduct detailed market analysis to align aircraft purchase with customer demand.

❖ Perform risk audits on shortlisted aircraft before purchase.

❖ Engage with aviation safety experts for ongoing operational strategy development.

❖ Build a maintenance and safety team to ensure long-term reliability.

Conclusion

Key Points:

- **Data-driven insights reduce risk and optimize initial investments.**

- **Strategic aircraft selection ensures safe and sustainable market entry.**

- **Following Aviation laws and regulation is key to safety and good business environment.**
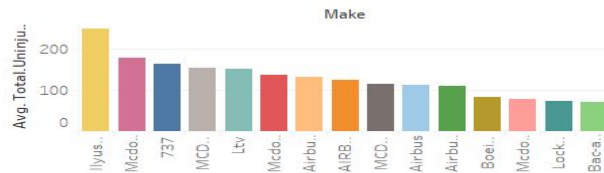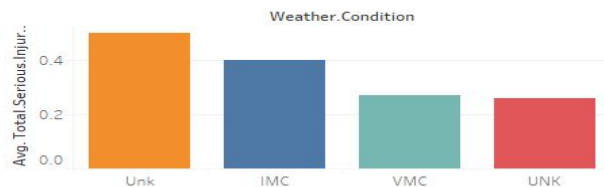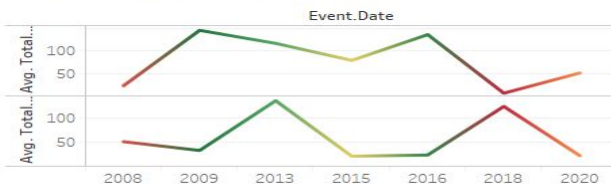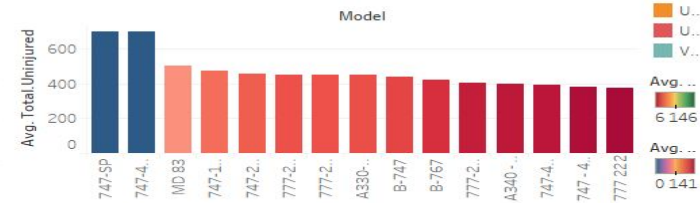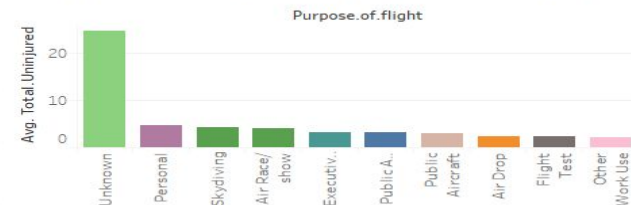
Summary of graphs
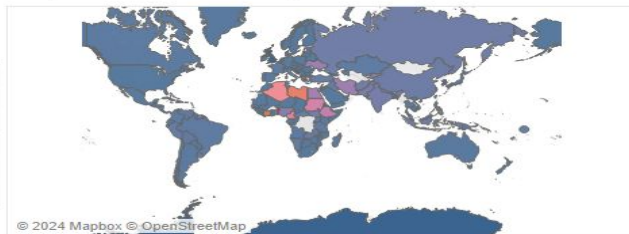
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2) https://www.thecmhs.com/biles10/plane-type.html
3) https://www.vecteezy.com/free-vector/plane-landing

Thank You

Questions ?

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Let's catch Flights not feelings