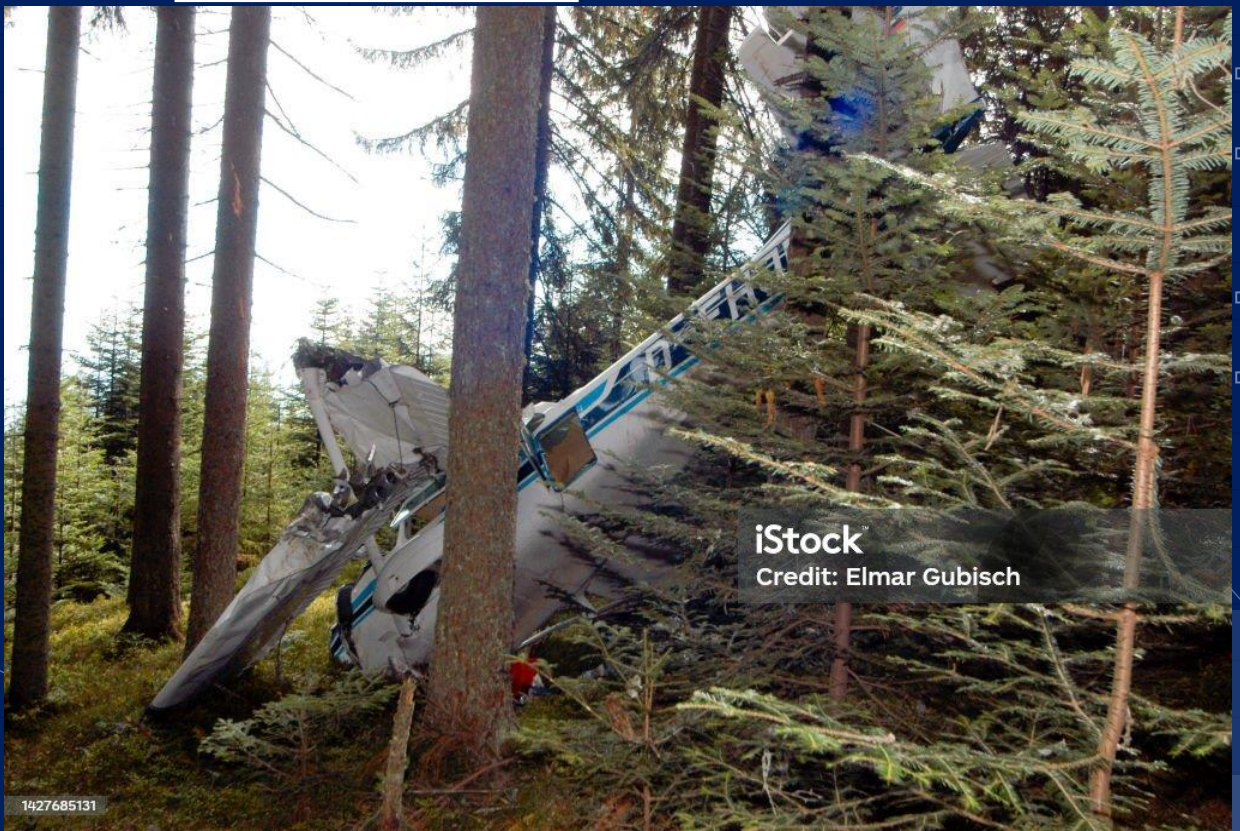
AVIATION RISK ANALYSIS FOR BUSINESS DECISIONS



PRESENTED BY:

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DATA SCIENTIST

DATE:

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OVERVIEW & BUSINESS UNDERSTANDING.

In this presentation I will cover the research goal, the data I analyzed, key findings & actionable safety recommendations for various stakeholders in the Aviation industry i.e:

1.Loss making Aviation business- Analysis on what might be hailing them.

2.Expansion of same business- To get insight of the best models to go for.

3.New ventures- To help businesses that want to venture into the aviation industry but lack enough insights.

4.Passive investors- To get a good look on which companies will make profit that will trickle down to their shareholding.

Regulatory bodies- To come up with informed decision to curb aviation accidents.

DATA UNDERSTANDING

- I analyzed Aviation accidents since 1962 which had information about aircraft types, purpose of flights, injury severity, Make, Model, Engine type and weather conditions (from https://www.kaggle.com/datasets/khsamaha/aviation-accident-database-synopses
- Due to the acknowledgement provided by the said publishers, missing data was addressed to ensure a higher rate of accuracy

SUMMARY OF DATA FIELDS

EVENT DATE

AIRCRAFT CATEGORY

MAKE & MODEL

ENGINE TYPE.

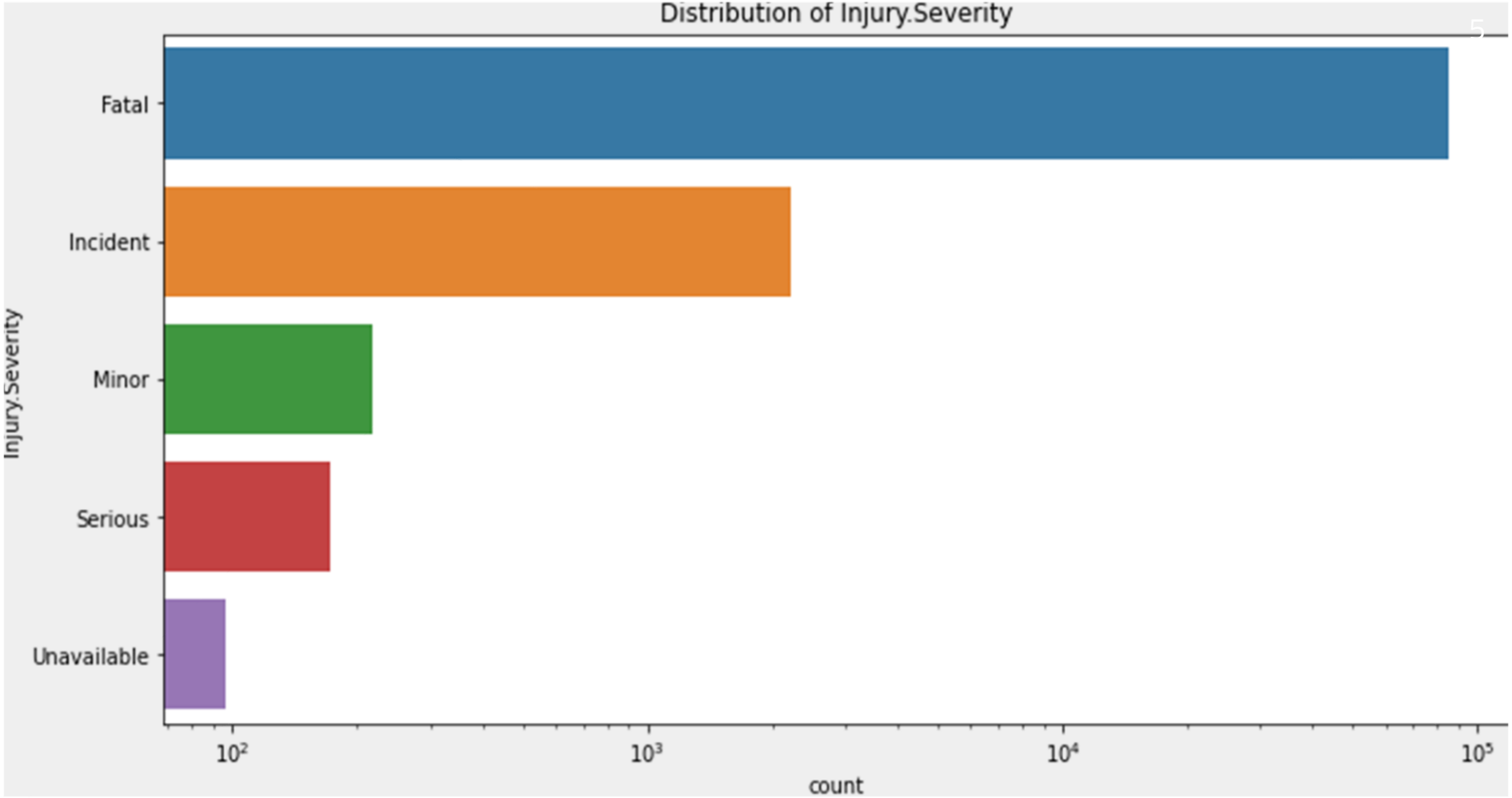
PURPOSE OF FLIGHT

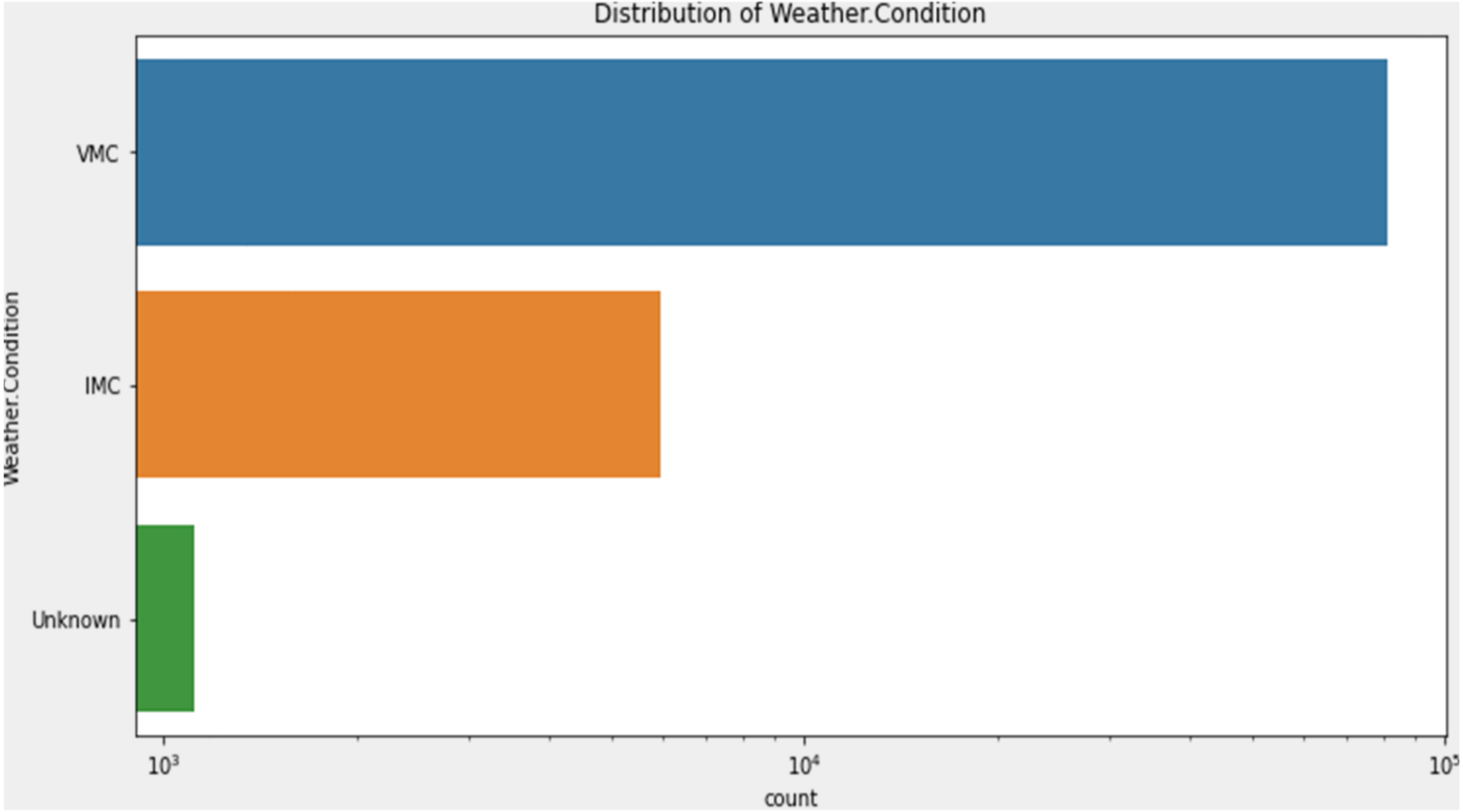
INJURY SEVERITY

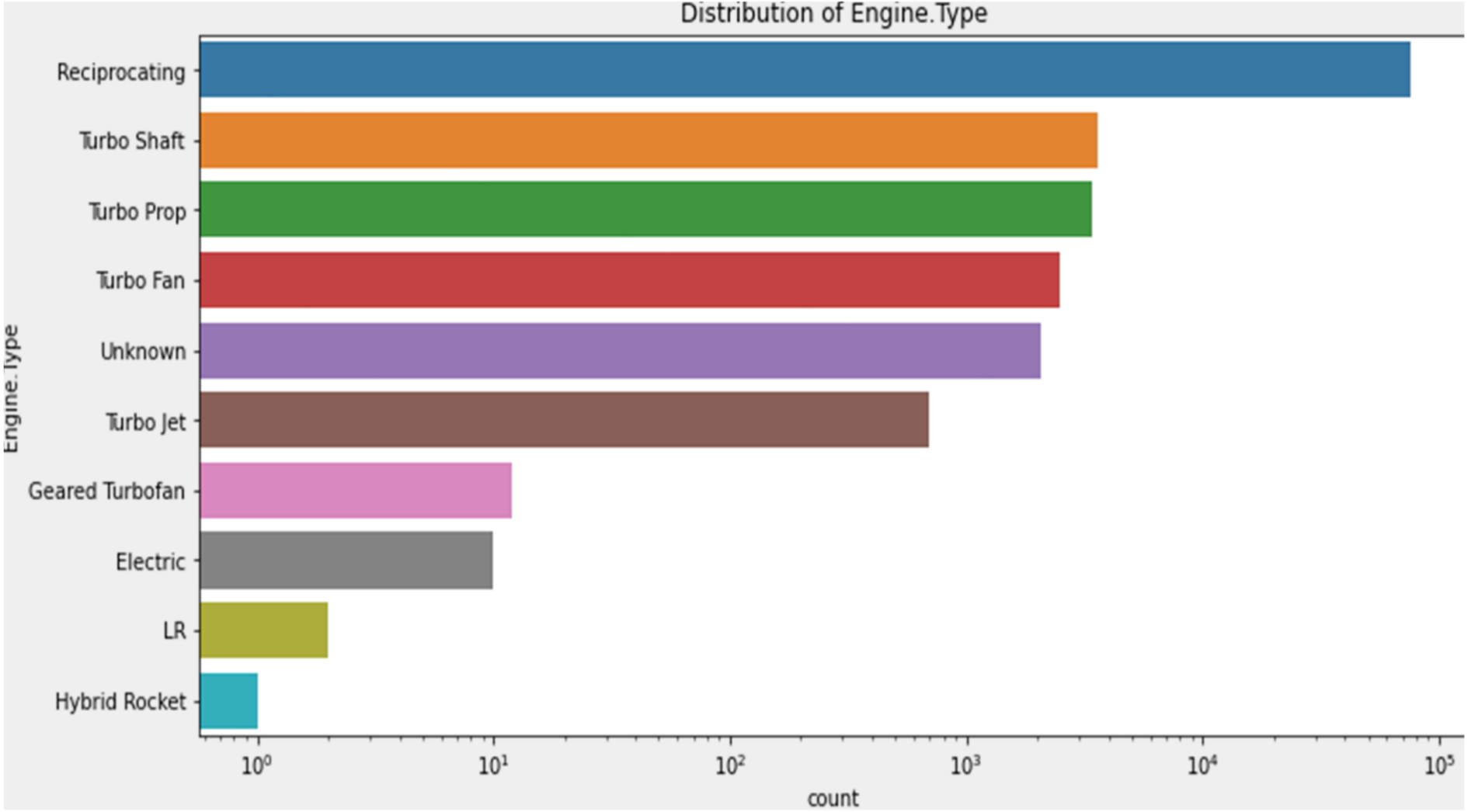
TOTAL FATAL INJURIES

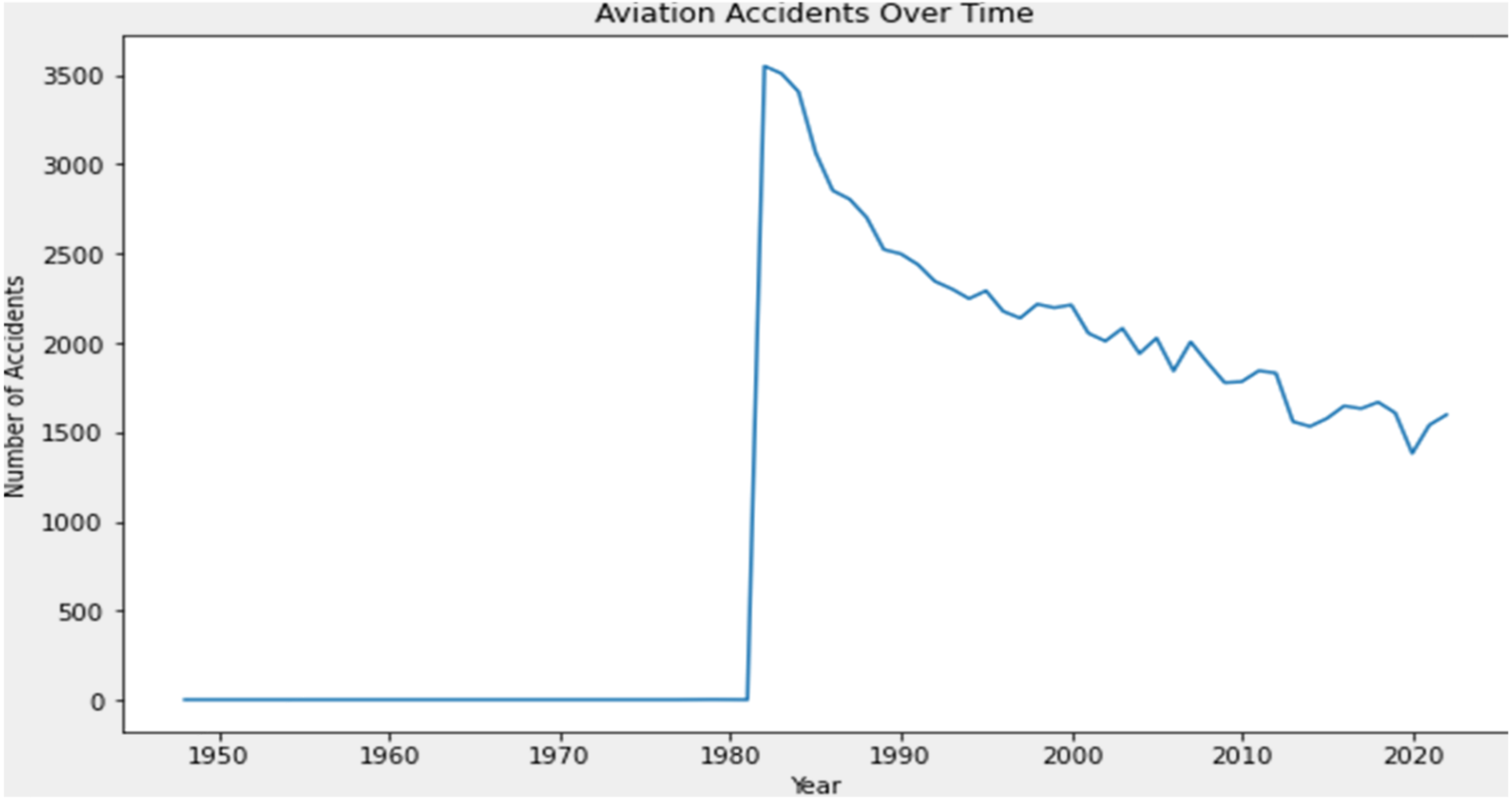
WEATHER CONDITIONS.

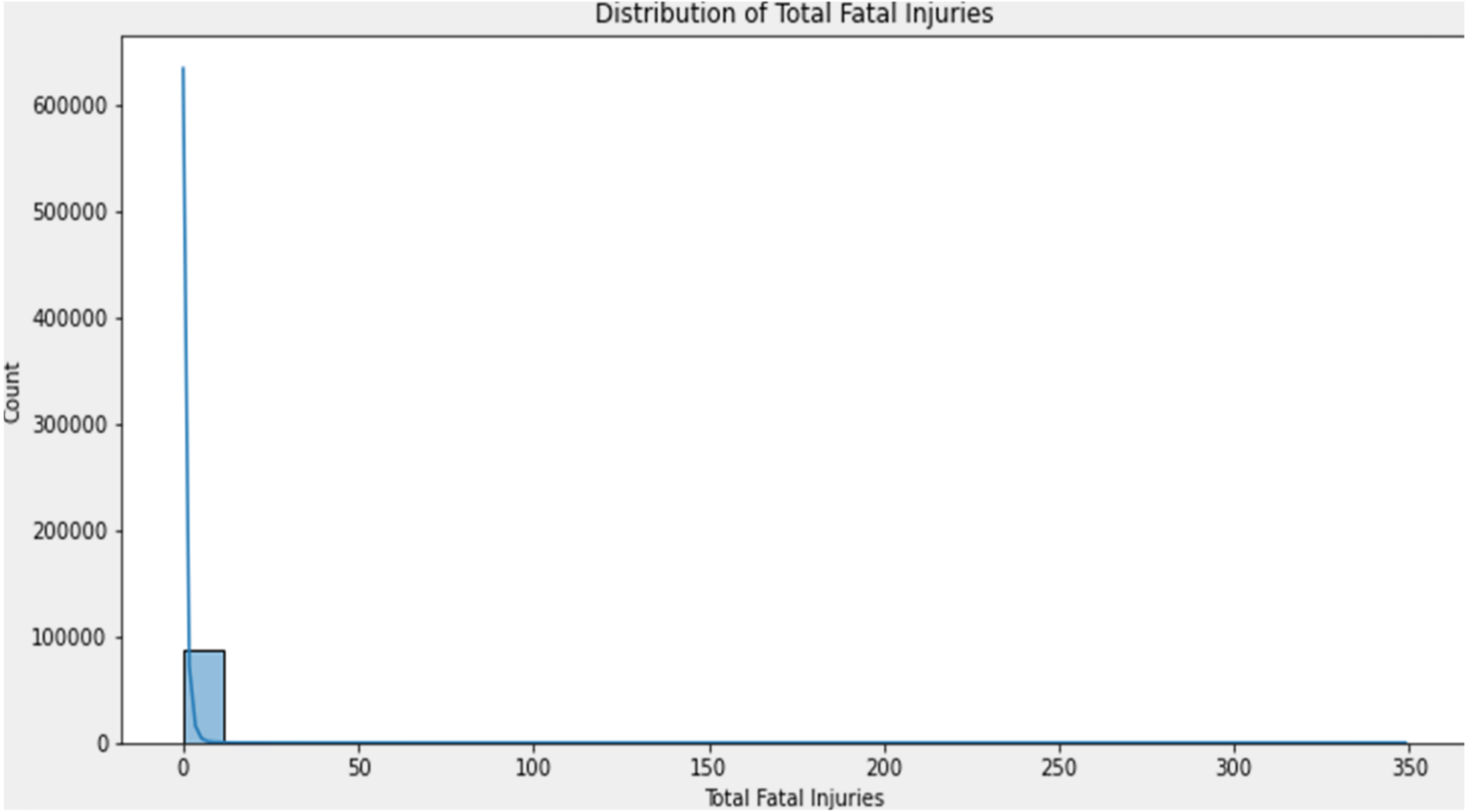
SOME OF THE GRAPHICAL VISUALIZATION IS AS FOLLOWS:

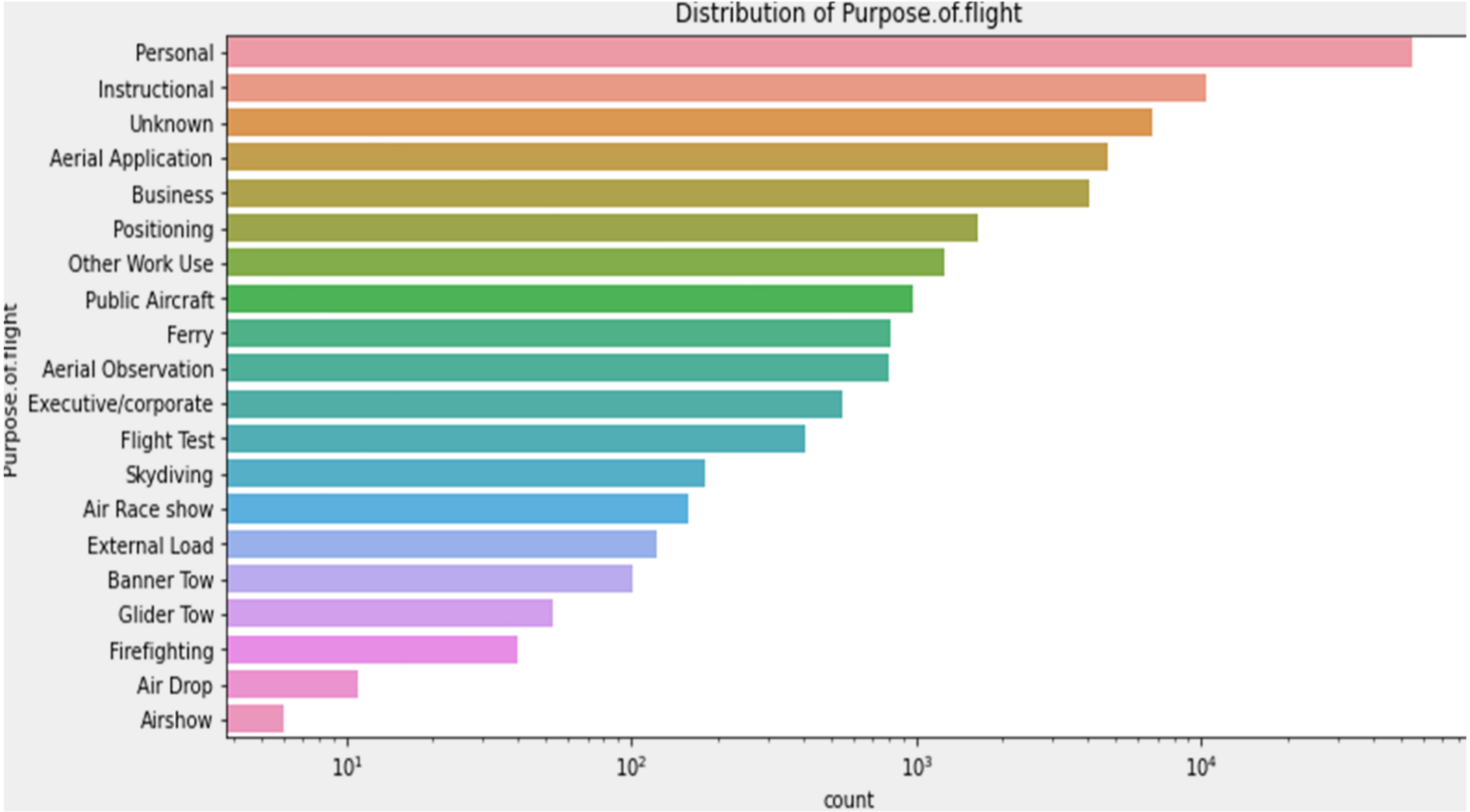

Distribution of Injury.Severity
Fatal
Incident
Minor
Serious
Unavailable
Injury.Severity
10^2
10^3
10^4
10^5
count


Distribution of Weather.Condition
VMC
IMC
Unknown
Weather.Condition
10^3
10^4
10^5
count


Distribution of Engine.Type
Reciprocating
Turbo Shaft
Turbo Prop
Turbo Fan
Unknown
Turbo Jet
Geared Turbofan
Electric
LR
Hybrid Rocket
Engine.Type
10^0
10^1
10^2
10^3
10^4
10^5
count


Aviation Accidents Over Time
Number of Accidents
3500
3000
2500
2000
1500
1000
500
0
1950
1960
1970
1980
1990
2000
2010
2020
Year


Distribution of Total Fatal Injuries
Count
600000
500000
400000
300000
200000
100000
0
0
50
100
150
200
250
300
350
Total Fatal Injuries

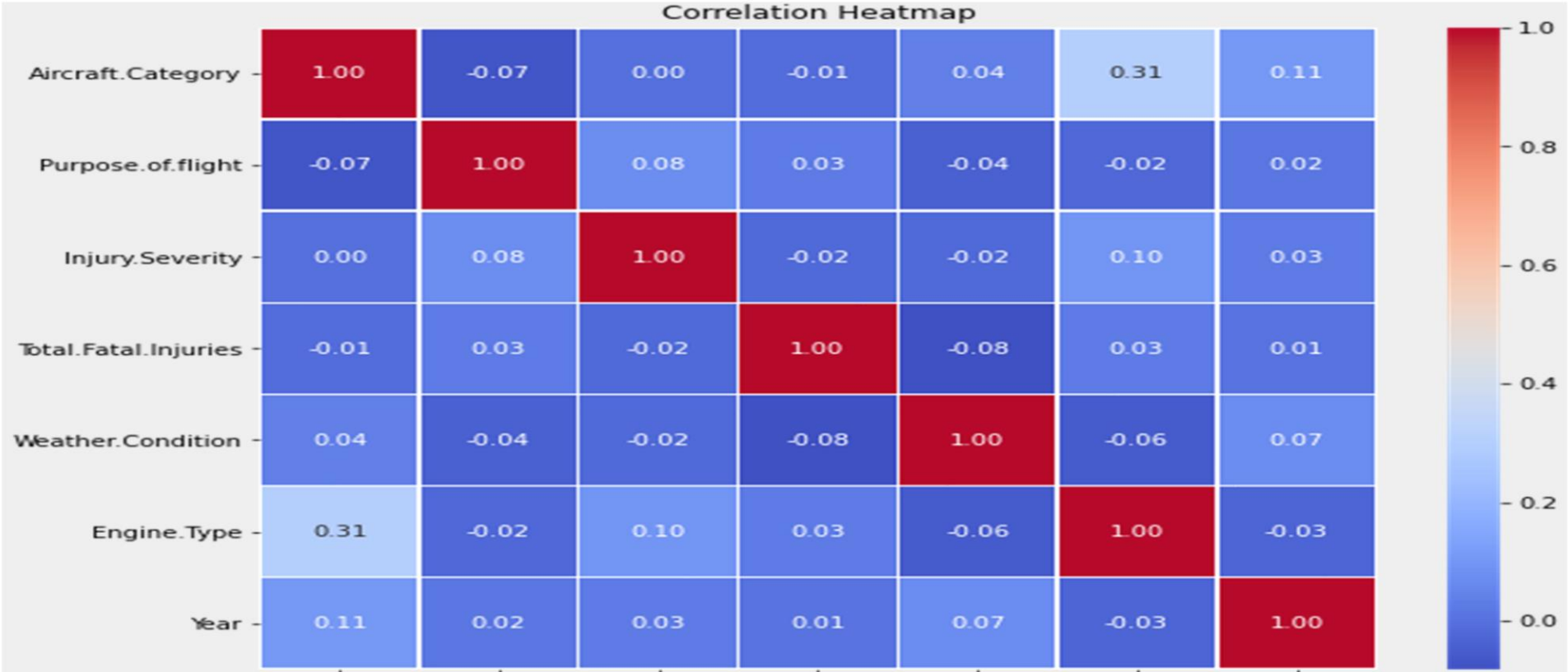

Distribution of Purpose.of.flight
Personal
Instructional
Unknown
Aerial Application
Business
Positioning
Other Work Use
Public Aircraft
Ferry
Aerial Observation
Executive/corporate
Flight Test
Skydiving
Air Race show
External Load
Banner Tow
Glider Tow
Firefighting
Air Drop
Airshow
Purpose.of.flight
10^1
10^2
10^3
10^4
count

DATA ANALYSIS.

- I employed python for data cleaning and visualization. For interactive dashboards, I made use of Tableau.

- Key highlights being finding the correlation between various variables to assist in coming up with recommendations as follows:

HEAT MAP CORRELATION VISUALIZATION



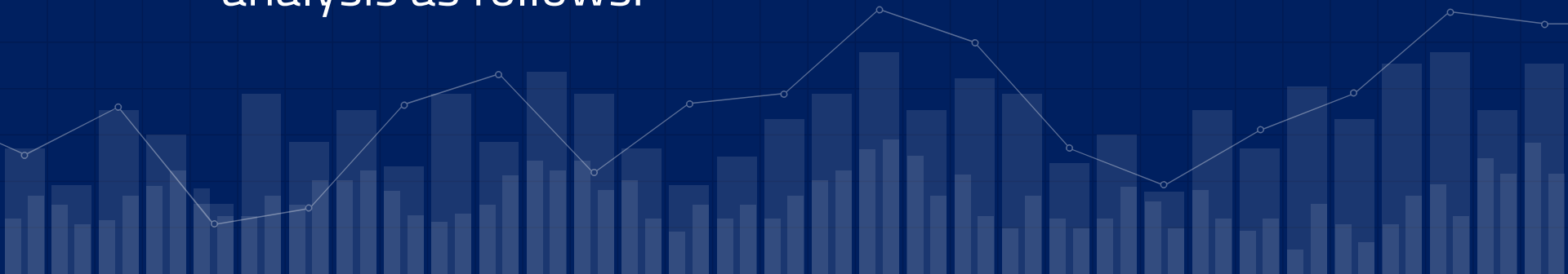
SUMMARY HEAT MAP FINDINGS

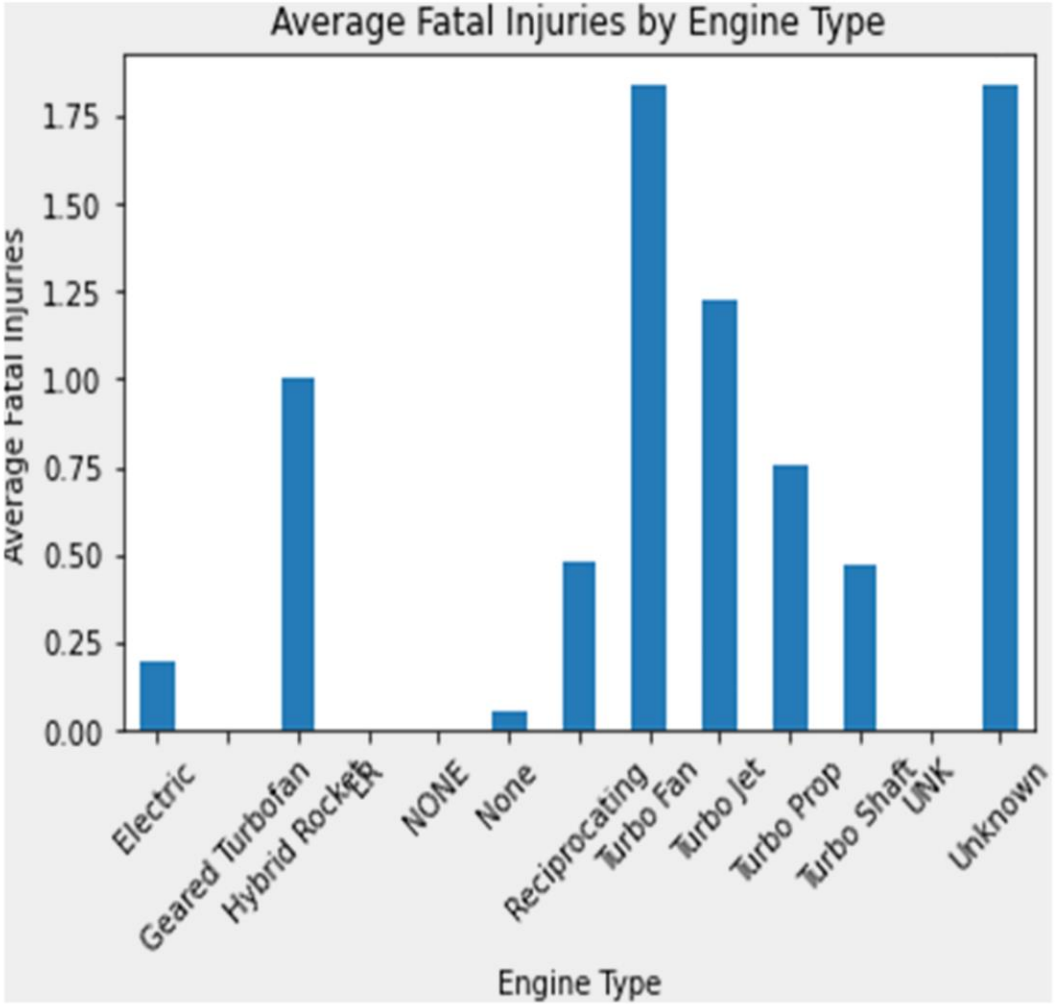
The summary denotes the strength of correlation

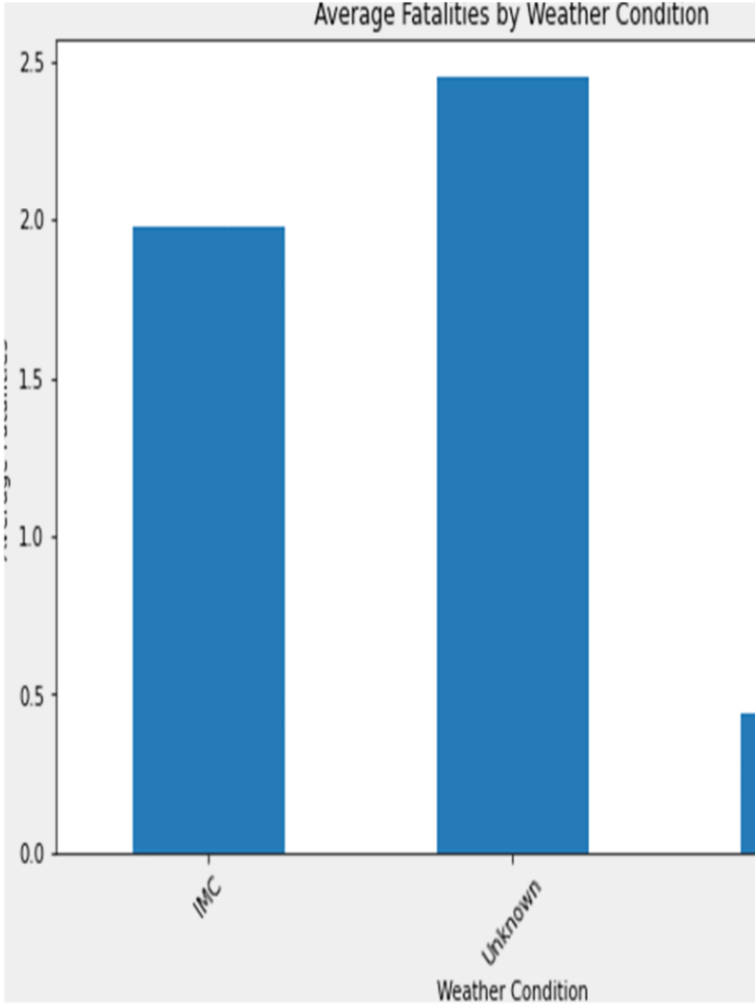
- Aircraft Category and Engine Type (0.31):
- Aircraft Category and Year (0.11):
- Purpose of Flight and Injury Severity (0.08):
- Total Fatal Injuries and Weather Condition (-0.08):
- Purpose of Flight and Weather Condition (-0.04):
- Injury Severity and Total Fatal Injuries (-0.02):

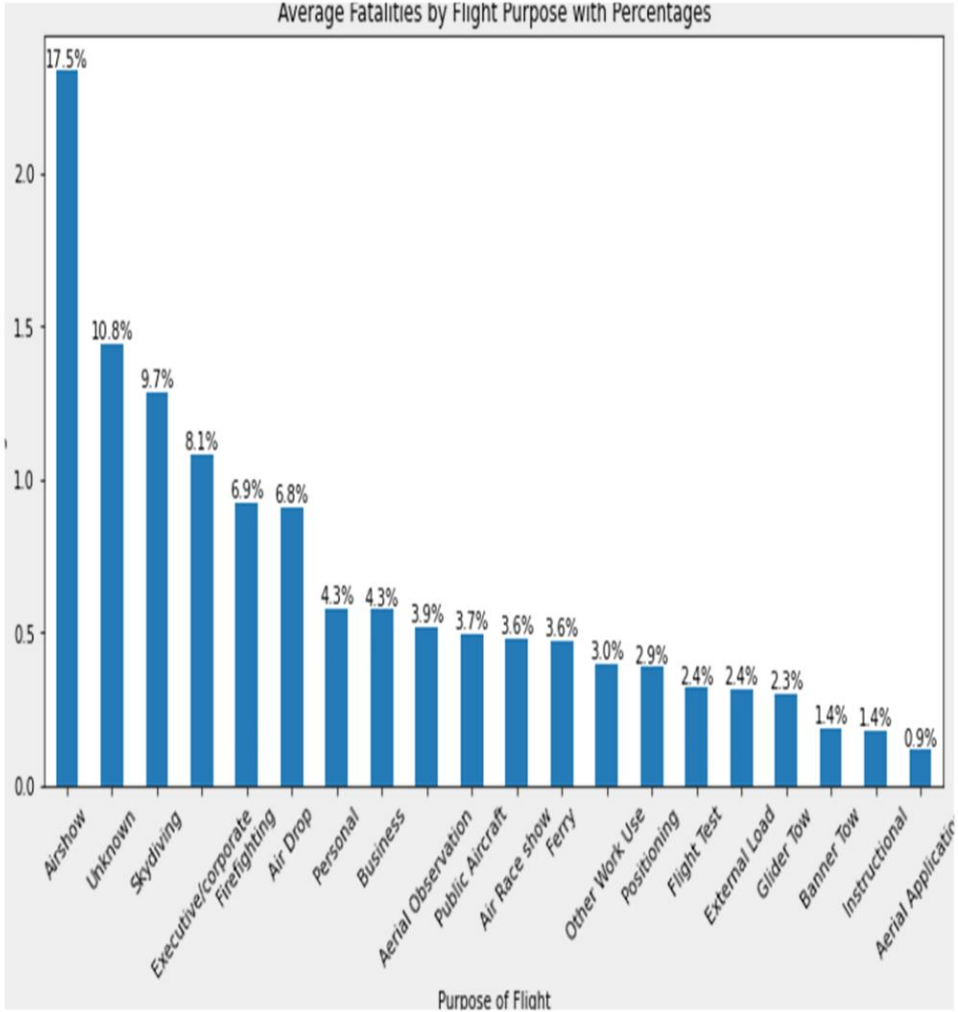
AVERAGE DATA ANALYSIS

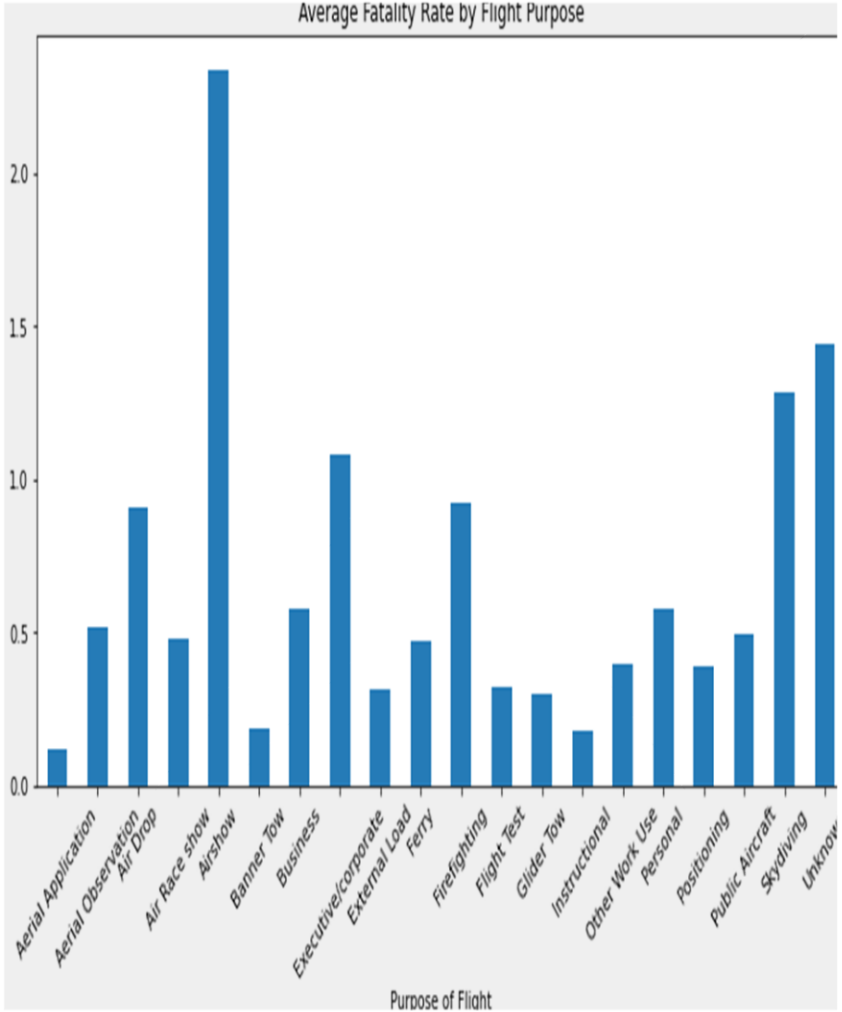
- The data by virtue of absolute counts tends to be skewed. Therefore, to get a better view of accurate results I used average fatal injury to further the analysis as follows:

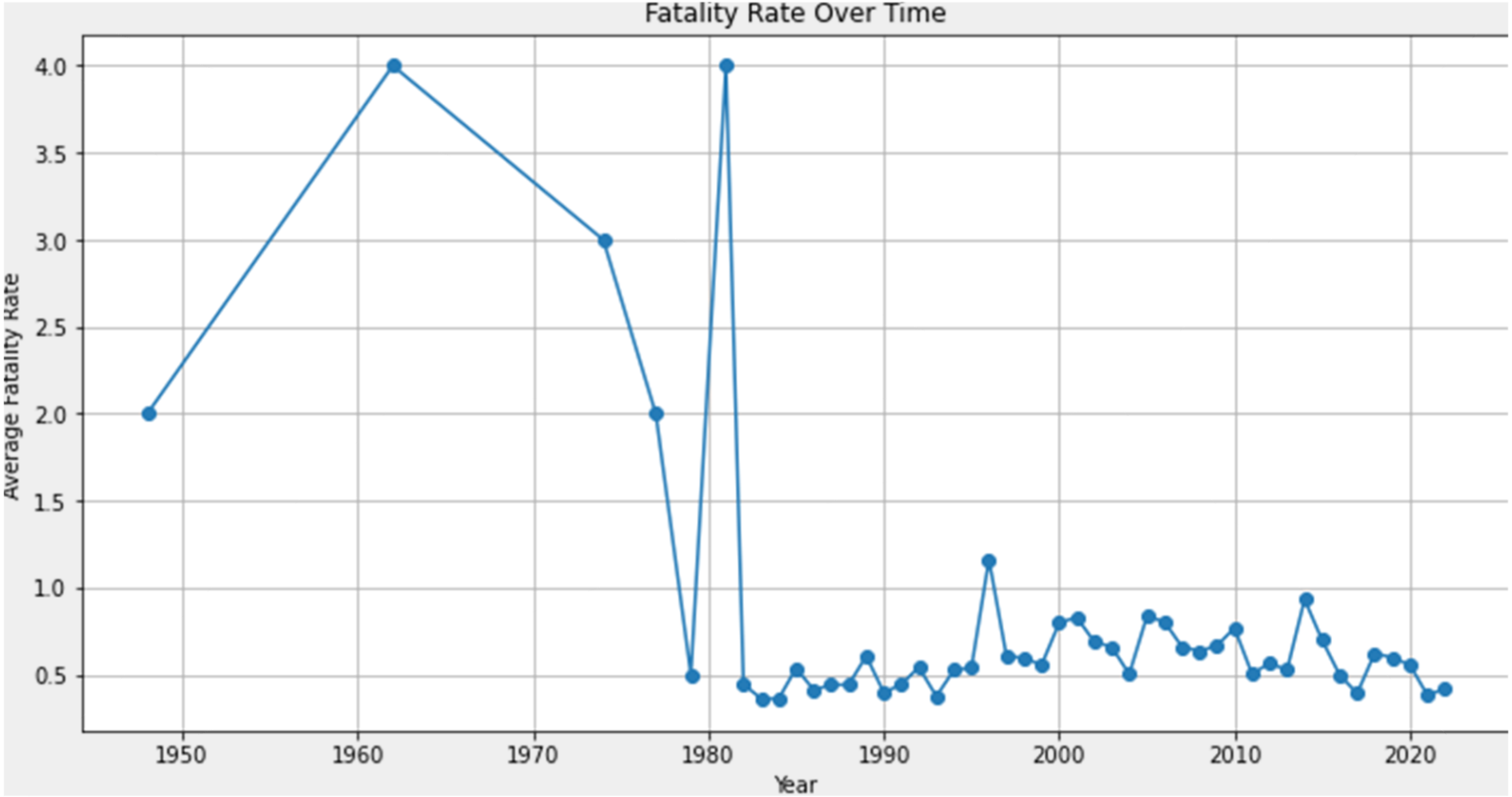


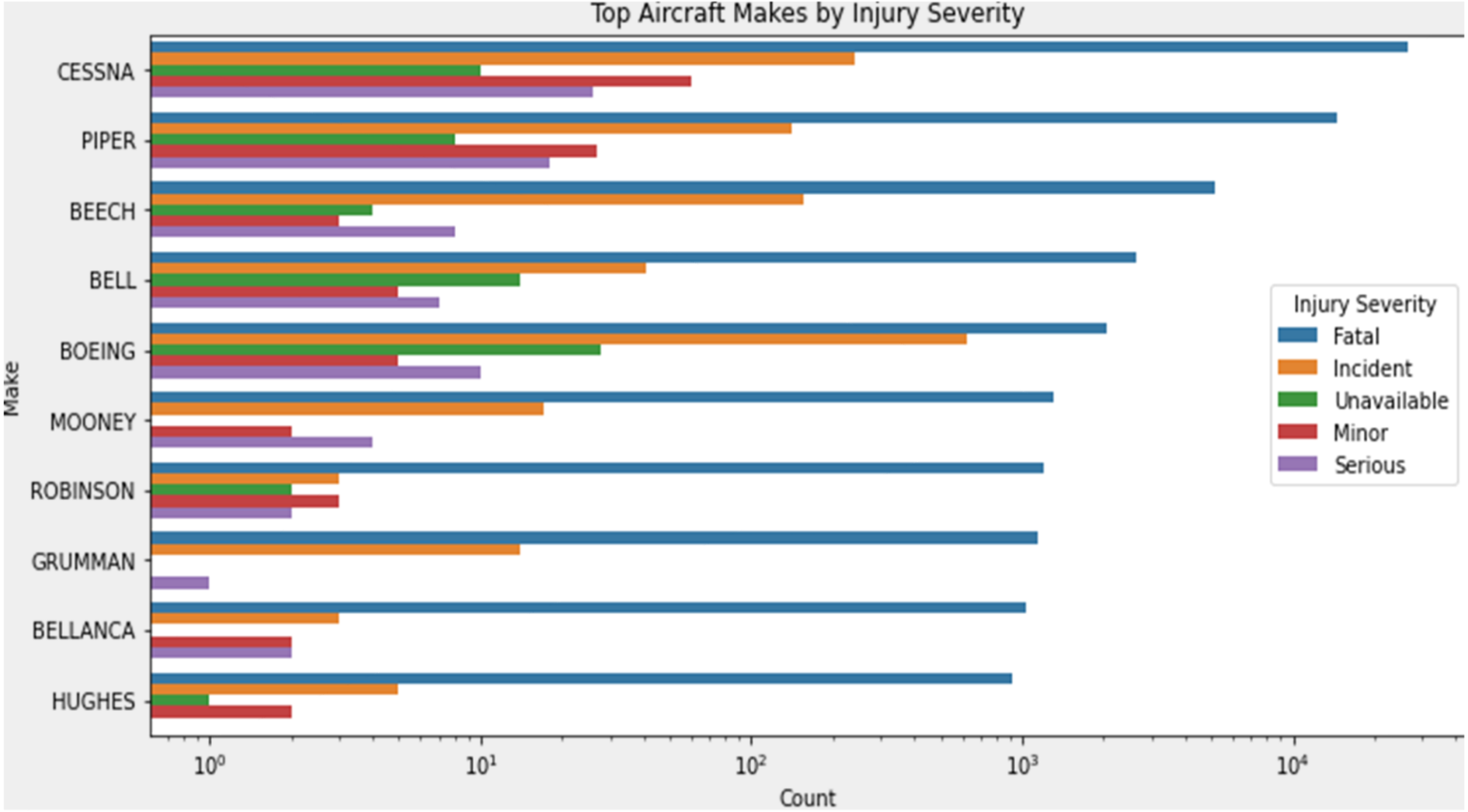

Average Fatal Injuries by Engine Type
Average Fatal Injuries
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Electric
Geared Turbofan
Hybrid Rocket
LR
NONE
None
Reciprocating
Turbo Fan
Turbo Jet
Turbo Prop
Turbo Shaft
UNK
Unknown
Engine Type


Average Fatalities by Weather Condition
0.0
0.5
1.0
1.5
2.0
2.5
IMC
Unknown
Weather Condition


Average Fatalities by Flight Purpose with Percentages
17.5%
10.8%
9.7%
8.1%
6.9%
6.8%
4.3%
4.3%
3.9%
3.7%
3.6%
3.6%
3.0%
2.9%
2.4%
2.4%
2.3%
1.4%
1.4%
0.9%
0.0
0.5
1.0
1.5
2.0
Airshow
Unknown
Skydiving
Executive/corporate
Firefighting
Air Drop
Personal
Business
Aerial Observation
Public Aircraft
Air Race show
Ferry
Other Work Use
Positioning
Flight Test
External Load
Glider Tow
Banner Tow
Instructional
Aerial Applicatio
Purpose of Flight


Average Fatality Rate by Flight Purpose
0.0
0.5
1.0
1.5
2.0
Aerial Application
Aerial Observation
Air Drop
Air Race show
Airshow
Banner Tow
Business
Executive/corporate
External Load
Ferry
Firefighting
Flight Test
Glider Tow
Instructional
Other Work Use
Personal
Positioning
Public Aircraft
Skydiving
Unknow
Purpose of Flight


Fatality Rate Over Time
Average Fatality Rate
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
1950
1960
1970
1980
1990
2000
2010
2020
Year


Top Aircraft Makes by Injury Severity
CESSNA
PIPER
BEECH
BELL
BOEING
MOONEY
ROBINSON
GRUMMAN
BELLANCA
HUGHES
Make
10^0
10^1
10^2
10^3
10^4
Count
Injury Severity
Fatal
Incident
Unavailable
Minor
Serious

RECOMMENDATIONS

Based on the analysis, I summarize actionable insights:

1. **Low-Risk Aircraft Models**: Aircraft categories with lower fatality rates should be prioritized for investment- this strongly correlates with engine type
2. **Safer Flight Purposes**: Those with lower average fatality rates, such as Aerial, instructional, Banner & Glider flights, External load, flight test & positioning are safer.
3. **Weather Conditions**: Avoid flights during adverse weather conditions to minimize risks, also there is need for staff training and other factor-considerations to reduce IMC risks.
4. **Engine Types**: Electric and geared turbofan engines show lower fatality rates and should be considered for safer operations.
5. **Policy Recommendations**: Regulatory bodies should focus on improving safety standards for high-risk aircraft categories and flight purposes.

WHAT NEXT?

- Collaborate with manufacturers to evaluate safer aircrafts models
- The regulatory bodies and businesses to conduct workshops on safety improvements for flight purposes
- Since IMC weather Implies clear skies, further staff training should be done regularly.

THANK YOU

- ANY QUESTIONS OR CLARIFICATION

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