Aircraft Safety Analysis

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Introduction

Analyst: Justin Lee

Stakeholder: Embraer

Background: Brazilian airline company that produces private jets in addition to commercial aircrafts

Motive: Looking to enter the U.S. market by purchasing an aircraft of the lowest potential risk
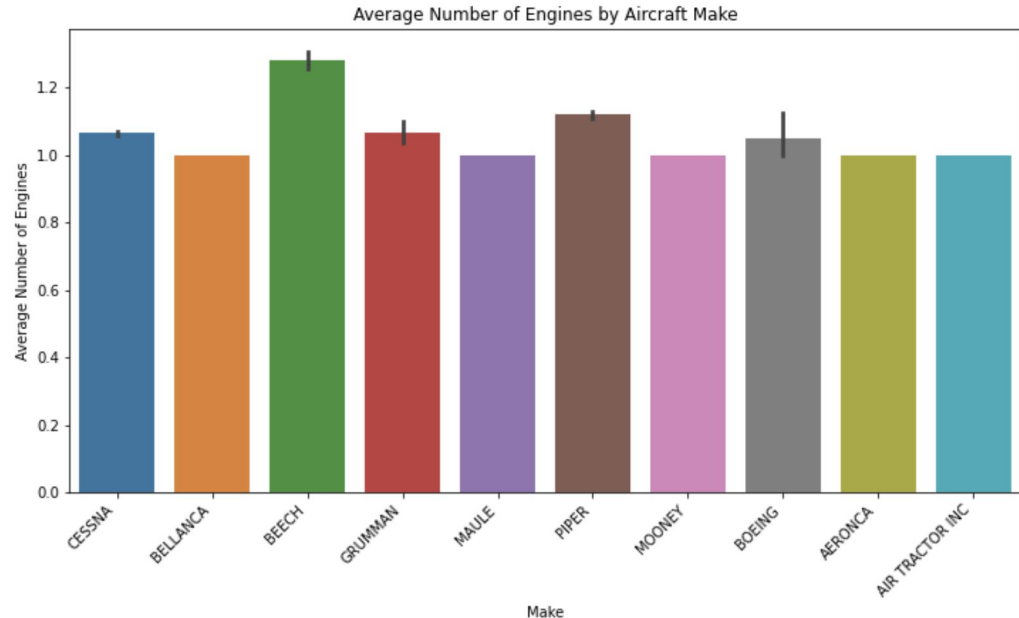
Business Context

Low Risk Measurements:
1) More Engines
2) Lower Average Injury Count
   a) Fatal (weighted the most)
   b) Serious
   c) Minor (weighted the least)
3) Higher Average Uninjured Count

Higher Number of Engines Correlates to Lower Risk

Makes averaging more than 1 engine:
- Cessna
- Beech
- Grumman
- Piper
- Boeing (commercial)

Average Number of Engines by Aircraft Make
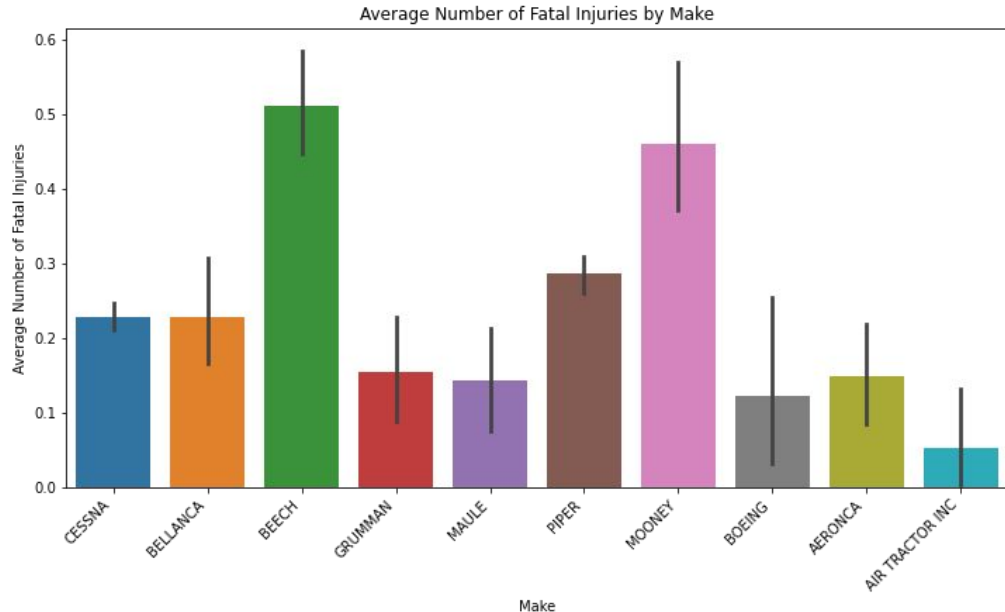
Average Fatal Injuries by Make

Highest average:
1) Beech
2) Mooney
3) Piper

Lowest average:
1) Air Tractor Inc
2) Boeing
3) Maule

Highest average >1 engine: Beech

Lowest average >1 engine: Grumman

Average Number of Fatal Injuries by Make

Average Serious Injuries by Make

Highest average:
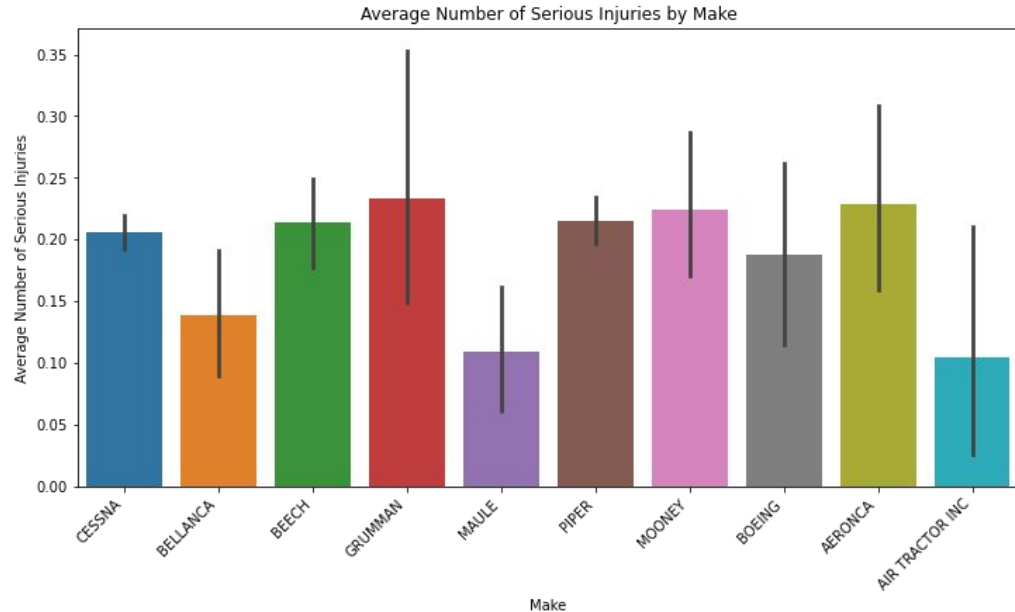1) Grumman
2) Aeronca
3) Mooney

Lowest average:
1) Air Tractor Inc
2) Maule
3) Bellanca

Highest average >1 engine:
Grumman

Lowest average >1 engine:
Cessna

Average Number of Serious Injuries by Make

Average Minor Injuries by Make

Highest average:
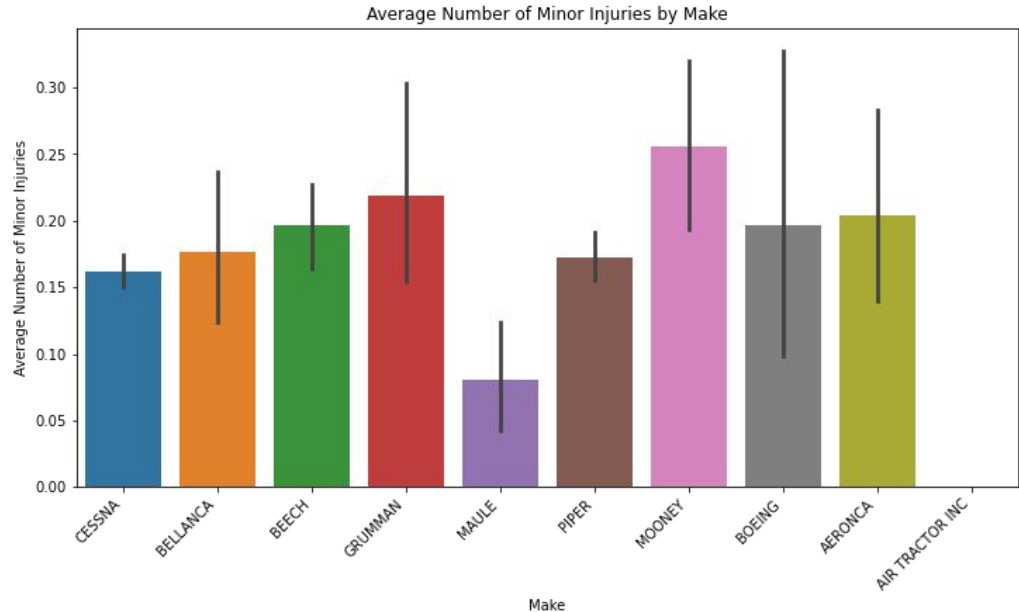1) Mooney
2) Grumman
3) Aeronca

Lowest average:
1) Maule
2) Cessna
3) Piper

Highest average >1 engine:
Grumman

Lowest average >1 engine:
Cessna

Average Number of Minor Injuries by Make

Average Uninjured by Make

Highest average:
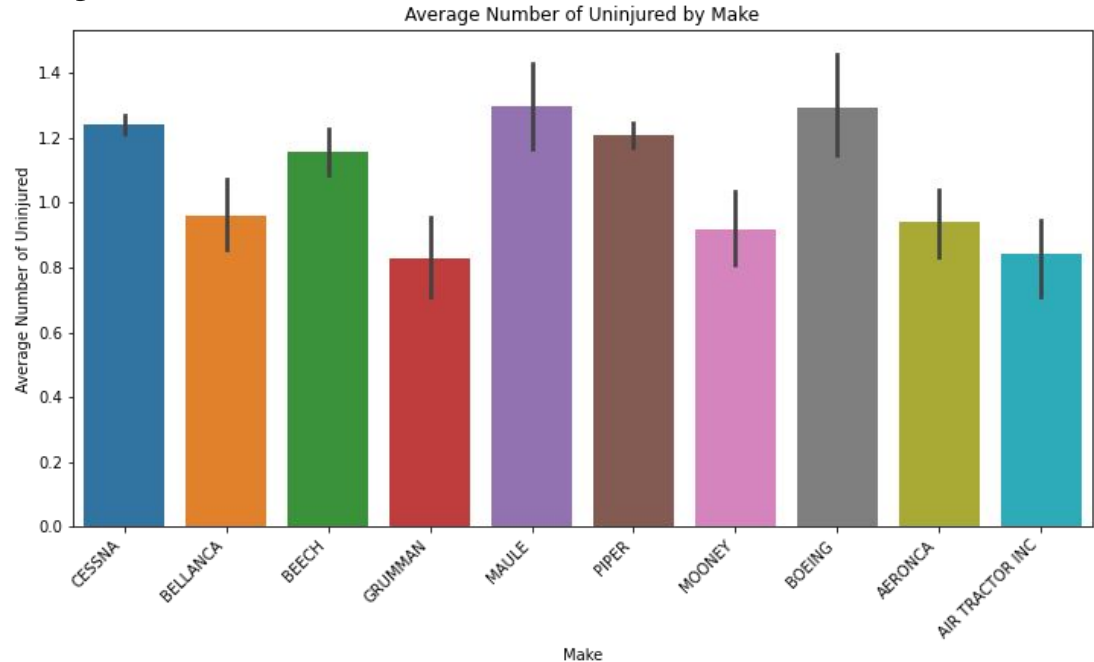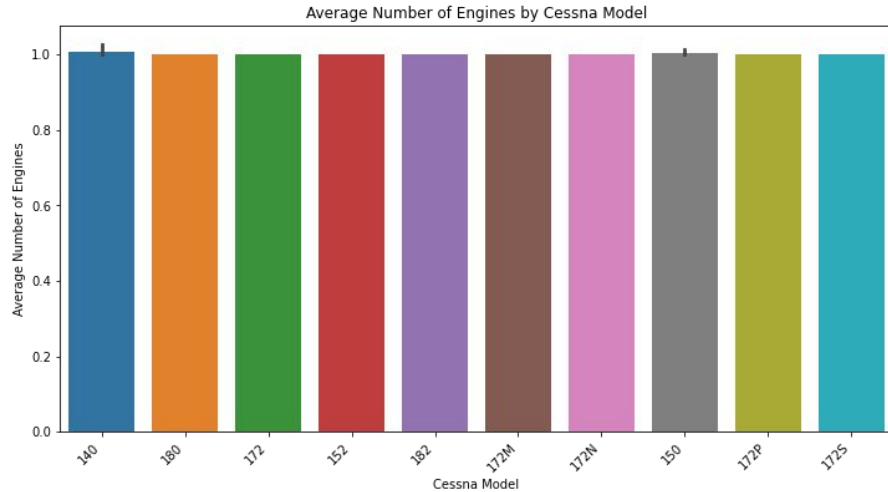1) Maule
2) Boeing
3) Cessna

Lowest average:
1) Grumman
2) Air Tractor Inc
3) Mooney

Highest average >1 engine:
Cessna

Lowest average >1 engine:
Grumman

Average Number of Uninjured by Make

Number of Engines per Cessna Model

Average Number of Engines by Cessna Model

Make	Model	Amateur.Built	Number.of.Engines	Engine.Type	Total.Fatal.Injuries	Total.Serious.Injuries	Total.Minor.Injuries	Total.Uninjured	
CESSNA	150	No	2.0	Reciprocating	0.0	0.0	0.0	2.0	
CESSNA	140	No	2.0	Reciprocating	0.0	0.0	0.0	1.0	

Average number of fatal injuries for models with more than 1 engine: 0.0
Average number of fatal injuries for models with 1 or fewer engines: 0.17535211267605633

Average Fatal Injuries by Cessna Model
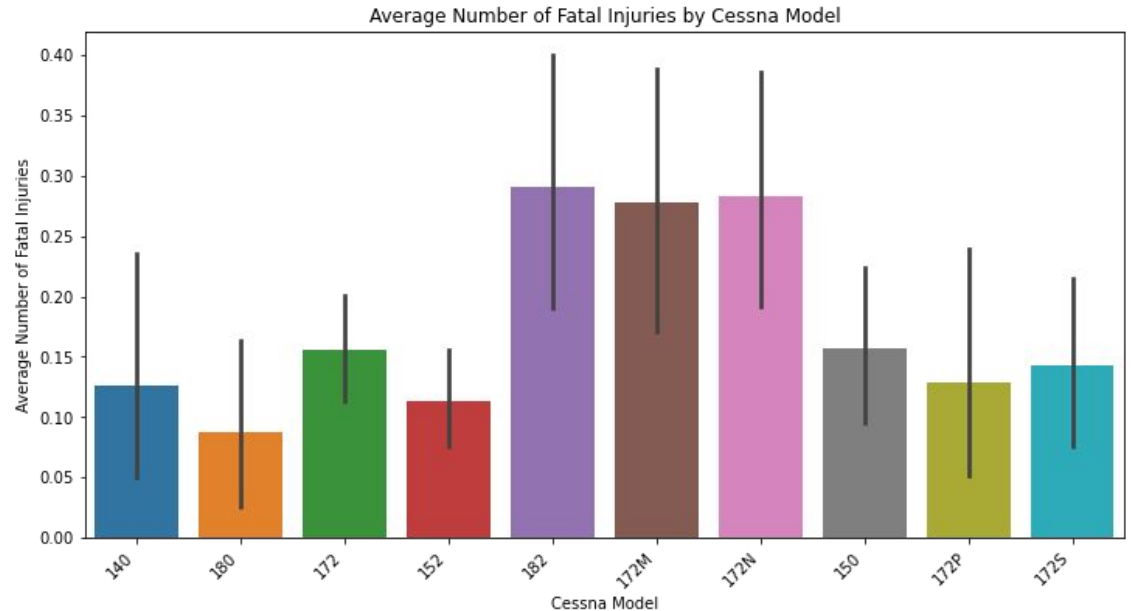
Highest average:
1) 182
2) 172N
3) 172M

Lowest average:
1) 180
2) 152
3) 172P

Lower risk >1 Engine:
140

Average Number of Fatal Injuries by Cessna Model

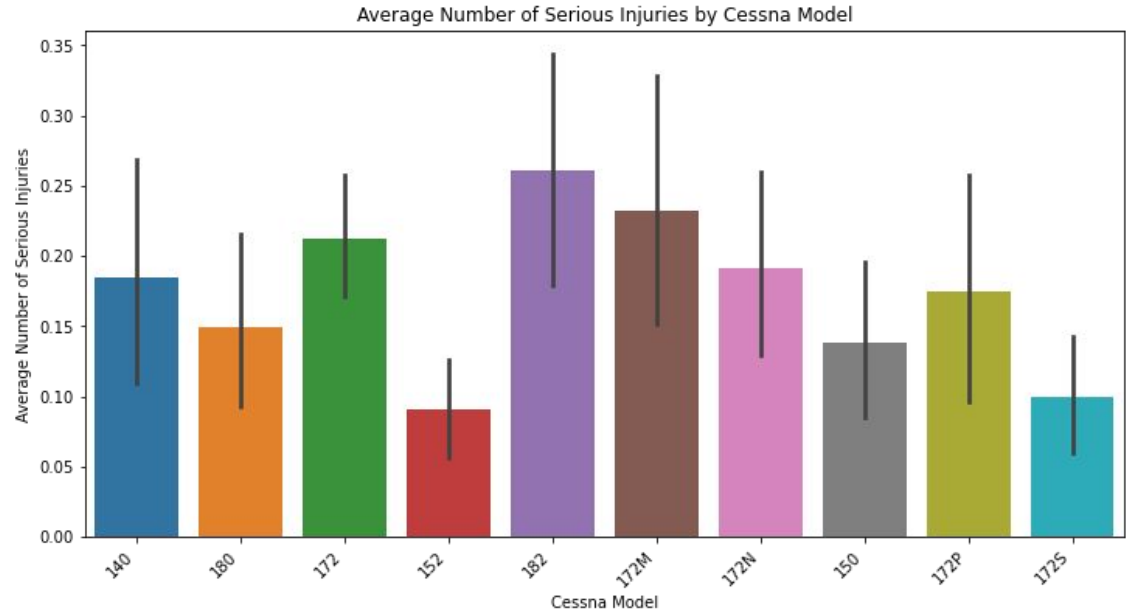# Average Serious Injuries by Cessna Model

Highest average:
1) 182
2) 172M
3) 172

Lowest average:
1) 152
2) 172S
3) 150

Lower risk >1 Engine:
150

Average Number of Serious Injuries by Cessna Model

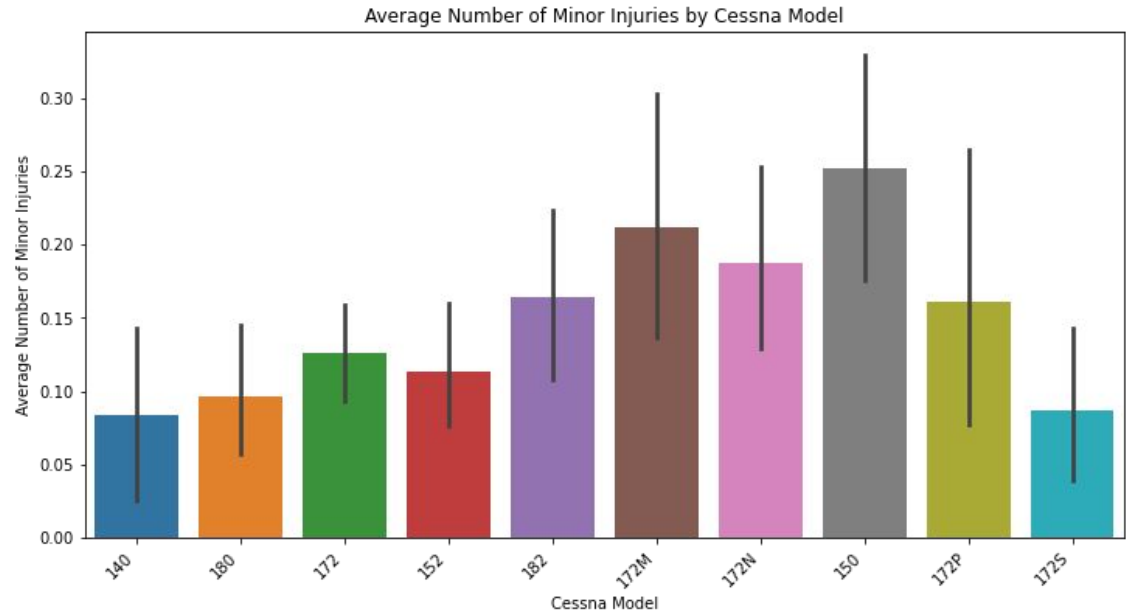# Average Minor Injuries by Cessna Model

Highest average:
1) 150
2) 172M
3) 172N

Lowest average:
1) 140
2) 172S
3) 180

Lower risk >1 Engine:
140

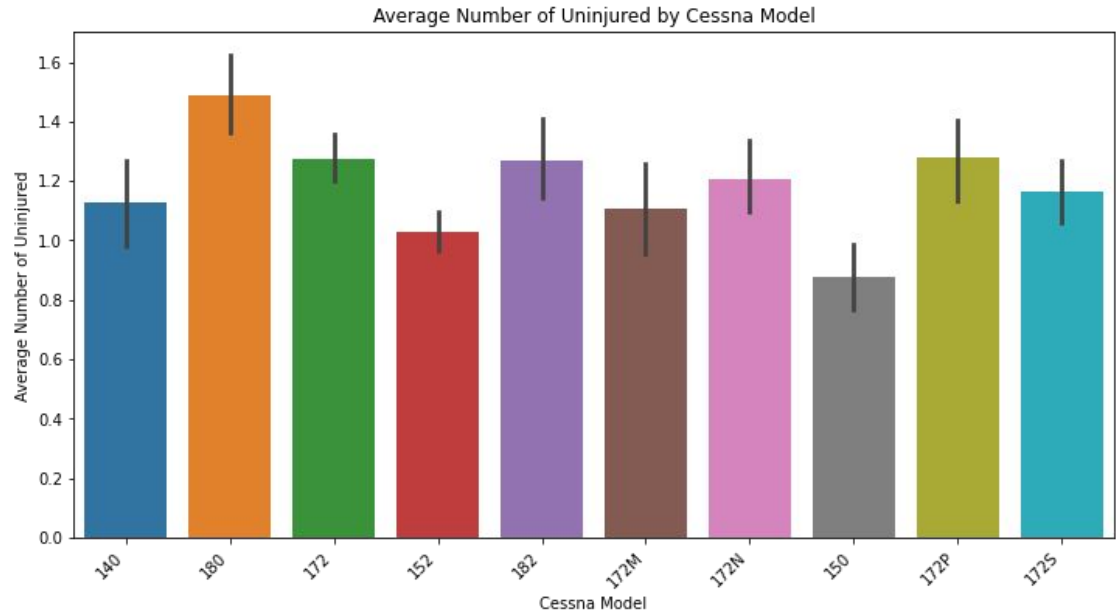Average Number of Minor Injuries by Cessna Model

Average Uninjured by Cessna Model

Highest average:
1) 180
2) 172
3) 182/172P

Lowest average:
1) 150
2) 152
3) 172M

Lower risk >1 Engine:
140

Average Number of Uninjured by Cessna Model

Process Steps

Stakeholder Criteria
- U.S. airplane accidents
- Top ten sample size counts of data
- Reciprocating engine type
- Not amateur built
- Private enterprise, not commercial

Filtered dataset
- 14 columns
- 13448 rows of data

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 13448 entries, 7 to 90120
Data columns (total 14 columns):
 #   Column                 Non-Null Count  Dtype
---  ------                 --------------  -----
 0   Investigation.Type     13448 non-null  object
 1   Country                13448 non-null  object
 2   Injury.Severity        13438 non-null  object
 3   Aircraft.Category      13448 non-null  object
 4   Make                   13448 non-null  object
 5   Model                  13448 non-null  object
 6   Amateur.Built          13448 non-null  object
 7   Number.of.Engines      13320 non-null  float64
 8   Engine.Type            13448 non-null  object
 9   Total.Fatal.Injuries   13448 non-null  float64
 10  Total.Serious.Injuries 13448 non-null  float64
 11  Total.Minor.Injuries   13448 non-null  float64
 12  Total.Uninjured        13448 non-null  float64
 13  Broad.phase.of.flight  4514 non-null   object
dtypes: float64(5), object(9)
memory usage: 1.5+ MB
```

Results and Business Applications

1) Lowest Risk Make: Cessna
2) Select Higher Number of Engines
3) Lowest Risk Cessna Model: 140

Evaluation and Future Improvement Ideas

1) More even distribution of data
2) More numerical variables
3) Less missing NaN values in the data set

Contact Information

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