Flying Forward

Adding Aviation To The Business Portfolio

Goals

- To determine which planes the company should purchase
- Understanding risk of owning each Airplane Make and Model
- Analyze the Aviation Accident Database from the National Transportation Safety Board
    - Accident data from 1962-2023.

How Can We Determine Risk?

- # of Crashes
- # of Fatal Injuries and Uninjured from crashes
- Type and # of Engines
- Type of Plane

Event.Id	Investigat	Accident.I	Event.Dat	Location	Country	Latitude	Longitude	Airport.Cc	Airport.Na	Injury.Sev	Aircraft.d	Aircraft.C	Registrati	Make	Model	Amateur.E	Number.o	Engine.Ty	FAR.Descr	Schedule	Purpose.c	Air.carrie	Total.Fata	Total.Seri	Total.Min	Total.Uni	Weather.(	Broad.ph	Report.Sta	Publication.Date
20001218	Accident	SEA87LA0	########	MOOSE C	United States					Fatal(2)	Destroyed		NC6404	Stinson	108-3	No	1	Reciprocating			Personal		2	0	0	0	UNK	Cruise	Probable	Cause
20001218	Accident	LAX94LA3	########	BRIDGEPC	United States					Fatal(4)	Destroyed		N5069P	Piper	PA24-180	No	1	Reciprocating			Personal		4	0	0	0	UNK	Unknown	Probable	19-09-1996
20061025	Accident	NYC07LA0	########	Saltville,	United Sta	36.9222	-81.878			Fatal(3)	Destroyed		N5142R	Cessna	172M	No	1	Reciprocating			Personal		3				IMC	Cruise	Probable	26-02-2007
20001218	Accident	LAX96LA3	########	EUREKA, C	United States					Fatal(2)	Destroyed		N1168J	Rockwell	112	No	1	Reciprocating			Personal		2	0	0	0	IMC	Cruise	Probable	########
20041105	Accident	CHI79FA0	########	Canton, C	United States					Fatal(1)	Destroyed		N15NY	Cessna	501	No					Personal		1	2		0	VMC	Approach	Probable	16-04-1980
20170710	Accident	NYC79AA	########	BOSTON,	United Sta	42.4453	-70.758		N/A	Non-Fata	Substanti	Airplane	CF-TLU	Mcdonne	DC9	No	2	Turbo Fan	Part 129:	SCHD	1	Air Canada			1	44	VMC	Climb	Probable	19-09-2017
20001218	Accident	CHI81LA1	########	COTTON,	United States					Fatal(4)	Destroyed		N4988E	Cessna	180	No	1	Reciprocating			Personal		4	0	0	0	IMC	Unknown	Probable	########
20020905	Accident	SEA82DA0	########	PULLMAN	United States				BLACKBUF	Non-Fata	Substanti	Airplane	N2482N	Cessna	140	No	1	Reciproca	Part 91:	General Avi	Personal		0	0	0	2	VMC	Takeoff	Probable	########
20020905	Accident	NYC82DA0	########	EAST HAN	United States			N58	HANOVER	Non-Fata	Substanti	Airplane	N7967Q	Cessna	401B	No	2	Reciproca	Part 91:	General Avi	Business		0	0	0	2	IMC	Landing	Probable	########
20020905	Accident	MIA82DA0	########	JACKSON\	United States			JAX	JACKSON\	Non-Fata	Substantial		N3906K	North Am	NAVION L	No	1	Reciprocating			Personal		0	0	3	0	IMC	Cruise	Probable	########
20020905	Accident	FTW82DA	########	HOBBS, N	United States					Non-Fata	Substantial		N44832	Piper	PA-28-16	No	1	Reciprocating			Personal		0	0	0	1	VMC	Approach	Probable	########
20020905	Accident	ATL82DKJ	########	TUSKEGEE	United States				TUSKEGEE	Non-Fata	Substantial		N4275S	Beech	V35B	No	1	Reciprocating			Personal		0	0	0	1	VMC	Landing	Probable	########
20020911	Accident	FTW82FR	########	HOMER, L	United States					Non-Fata	Destroyed	Airplane	N14779	Bellanca	17-30A	No	1	Reciproca	Part 91:	General Avi	Personal		0	0	1	0	IMC	Cruise	Probable	########
20020911	Accident	FTW82FR	########	HEARNE, T	United States			T72	HEARNE M	Fatal(1)	Destroyed	Airplane	N758SK	Cessna	R172K	No	1	Reciproca	Part 91:	General Avi	Personal		1	0	0	0	IMC	Takeoff	Probable	########

Data Prep

- Modernize Dataset of 88,889 crashes to include crashes within the last 40 years
- Consolidating all duplicates in ‘Make’ and ‘Model’ columns
- Removing Null values and rows with irrelevant/incomplete data
- Imputing Values
- Resulting Dataset includes 20,399 crashes

Data Analysis

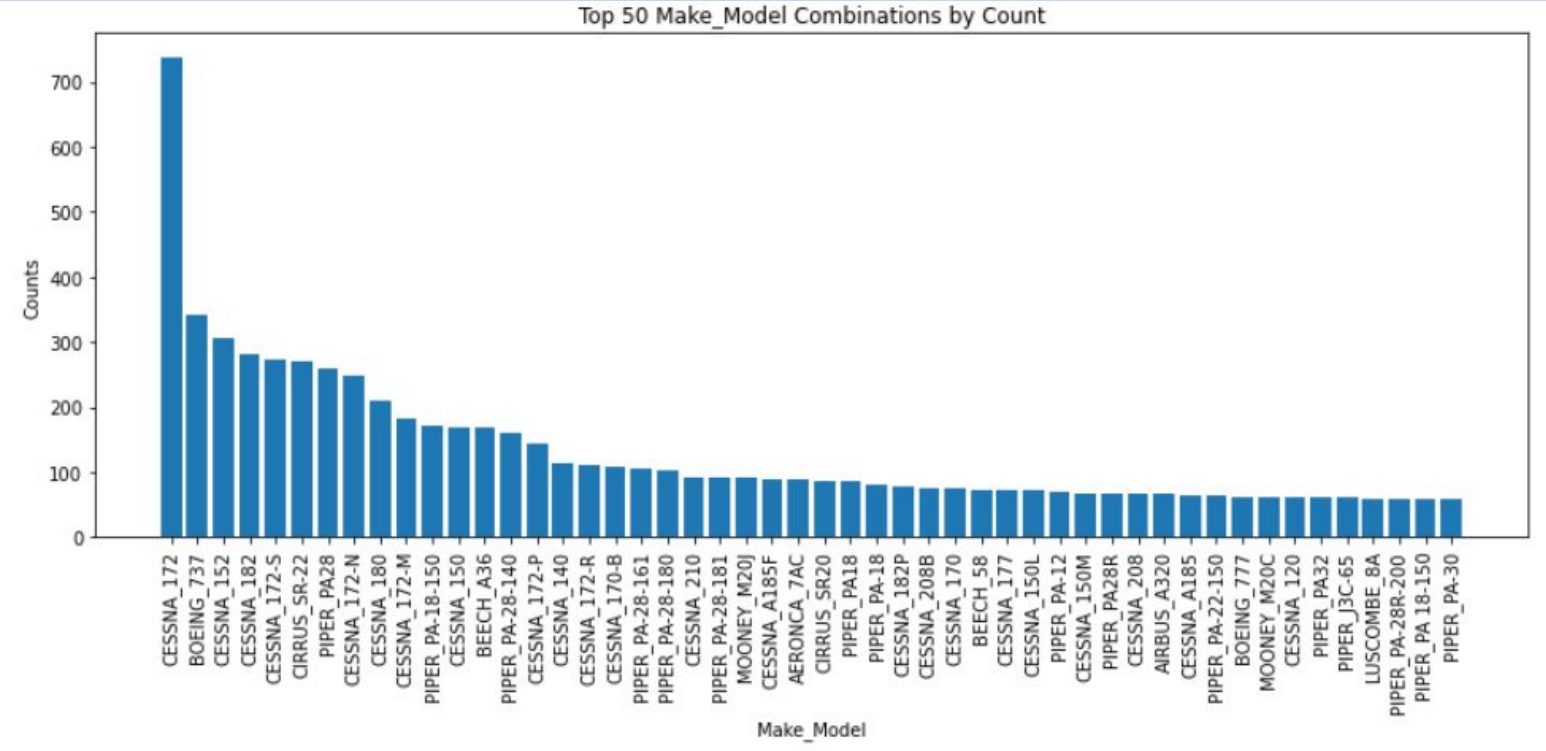
- Most popular Models
  - Cessna 172-private
  - Boeing 737-commercial
- Total.Fatal.Injuries
- Total.Uninjured
- Safest Engine Types
  - Turbo > Reciprocating
- Safest Engine #
  - Multiple engines resulted in safer crash metrics

Plane	Crashes	Total.Fatal.Injuries	Average.Fatal.Injuries	Total.Uninjured
CESSNA 172	738	197	.266	815
BOEING 737	343	1279	3.728	18988

Frequency of Planes

CESSNA 172

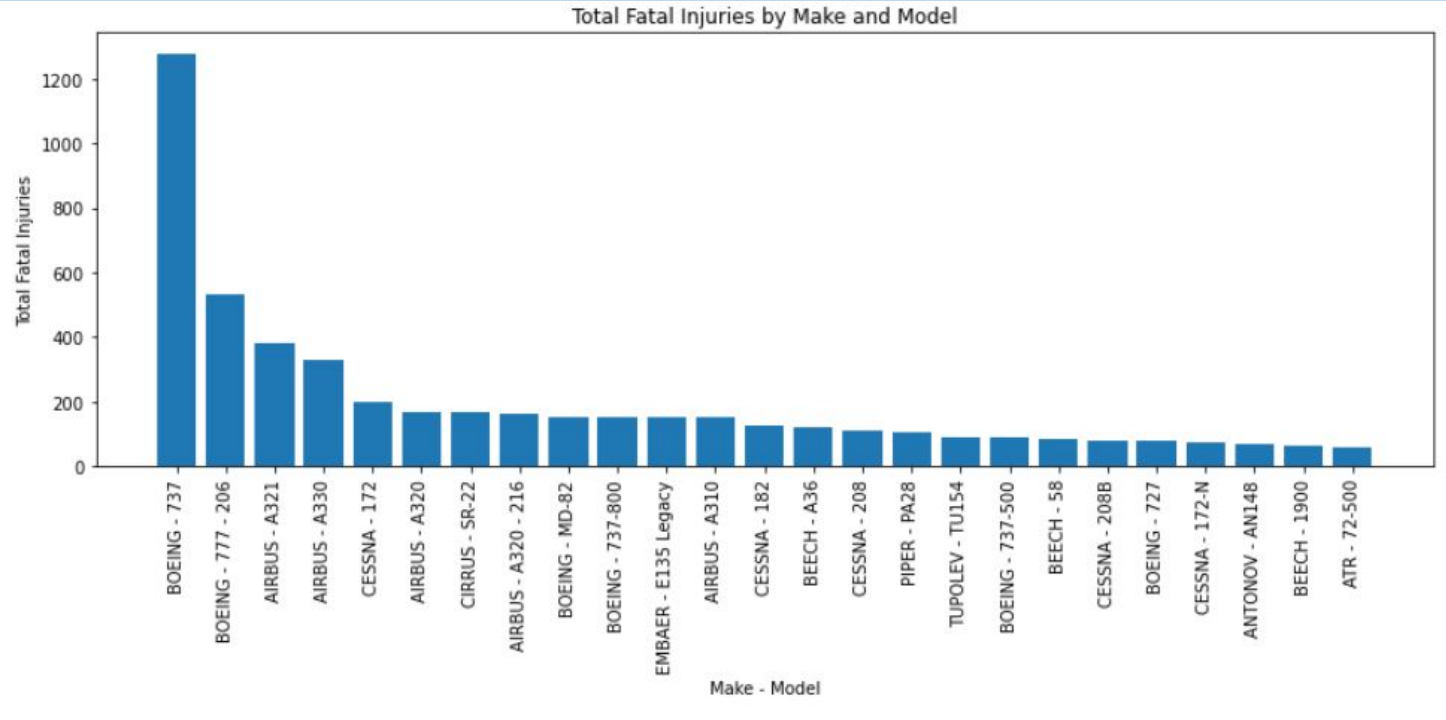
BOEING 737



Fatal Injuries by Model

CESSNA 172

BOEING 737



Top 25 Uninjured

CESSNA 172

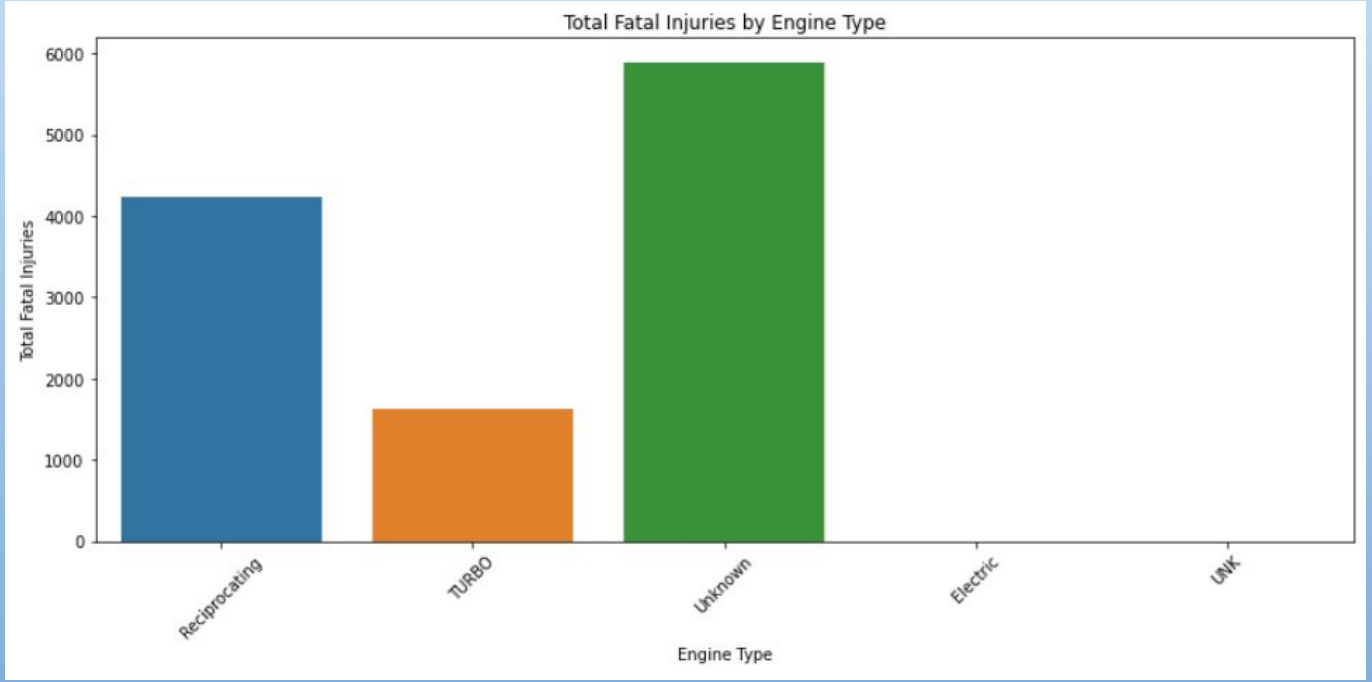
BOEING 737

Make_Model	
BOEING_737	18988.0
BOEING_777	7743.0
BOEING_767	4889.0
BOEING_757	3039.0
AIRBUS_A320	2788.0
AIRBUS_A330	2770.0
BOEING_747	2320.0
BOEING_787	2290.0
BOEING_747-400	1712.0
BOEING_737 7H4	1704.0
BOEING_737-7H4	1584.0
BOEING_777-222	1523.0
AIRBUS_A330-323	1395.0
AIRBUS_A321	1349.0
BOEING_737-800	1229.0
AIRBUS_A380	1097.0
EMBAER_EMB-145LR	955.0
BOEING_757-222	908.0
BOEING_767 332	898.0
MCDONNELL DOUGLAS_MD80	894.0
AIRBUS_A321 231	848.0
AIRBUS_A330 323	847.0
BOEING_737-300	846.0
BOEING_747-422	846.0
CESSNA_172	815.0

Engine Type Analysis

Turbo is safer

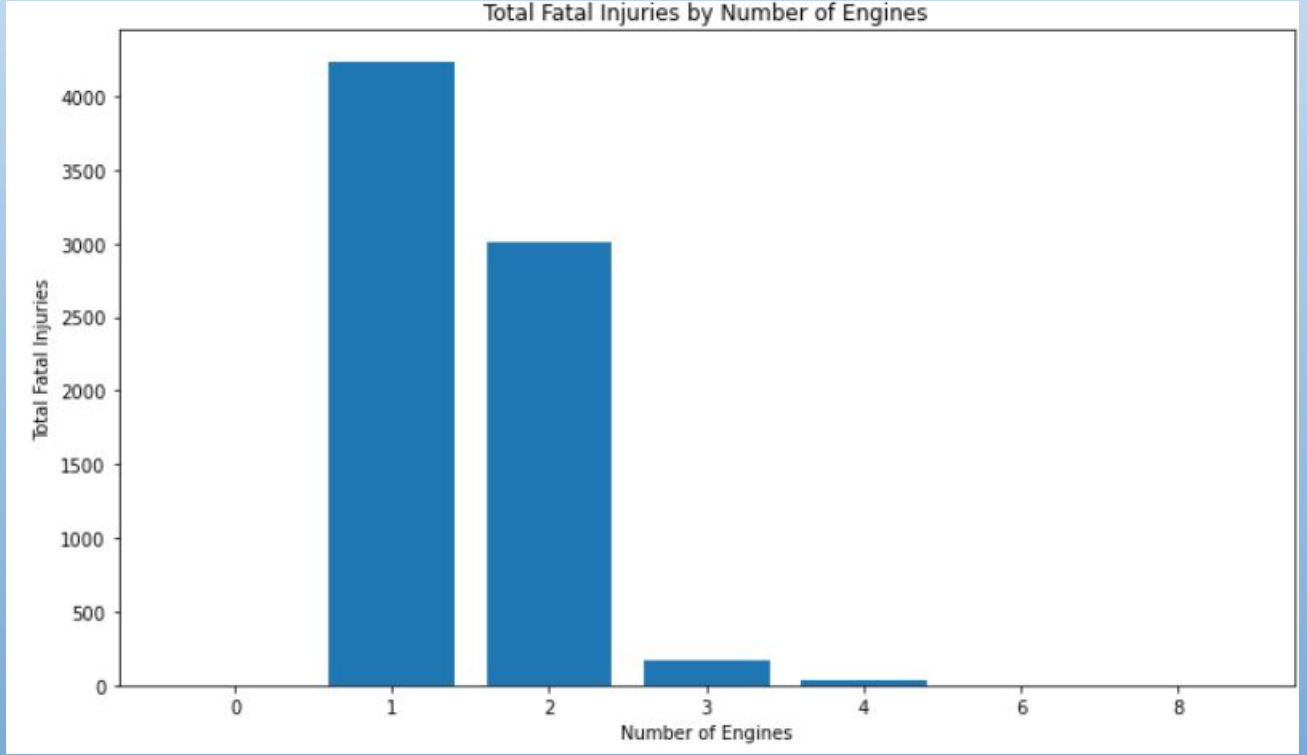
than Reciprocating



Number of Engines Analysis

More Engines results

in less Fatal Injuries



Limitations

- This is only crash data, so if a plane theoretically has never crashed before, it would not be in this dataset.
- The majority of the rows were not used in final calculations due to so many NaN/missing values.
- This data is US based which limits international analysis.

Conclusions

- BOEING 737 #1 recommendation
  - 1st in most injured and Uninjured
  - Multiple Turbo Engine Plane
  - Least risk per passenger
- CESSNA 172 #2 recommendation
  - 25th in most uninjured
  - Single Reciprocating Engine
  - Least overall Risk

Next Steps

- Make a deeper analysis of Boeing 737 and Cessna 172.
- Analyze cost of maintenance for these 2 planes

Thank you for your time

- Additional Questions?
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