AVIATION ANALYSIS IN CHOOSING A LOW-RISK AIRCRAFT FOR COMMERCIAL AND PRIVATE AVIATION.

CRITERIA

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BACKGROUND

AVIATION BACKGROUND

Air transport has become the most popular means of transport across the world.

It is the fastest means of transport and the most safest means of transport.

Although air transport can be deemed as the fastest means of transport, it is also one of the most expensive means of transport that generates a lot of money to many airlines.

Aviation has become very wide spread and quite popular as it connects distant regions promoting tourism, international trade, cultural exchange and promoting businesses globally.

Aviation globally has improved the infrastructure of many countries and also improved the economic stability of many countries by increasing employment in different aviation sectors.

BUSINESS PROBLEM

Although aviation is recommended as the fastest means of transport, safety of passengers and cargo remains a top priority.

Some of challenges or risks include:

- Over the years air transport has faced many challenges such as plane crashes that has led to fatal injuries and serious injuries inflicted on passengers and cargo destruction.
- Plane accidents have also occurred causing either minor or serious injuries to passengers. This accidents can be caused by bad weather conditions.
- Airplanes are also expensive to maintain since the parts are complex with specialized components that require precision engineering and experts.
- Human error that can be caused by pilots and maintenance technicians that can comprise safety of passengers.
- Terrorism.

IMPACT

Due to this challenges, airlines have endured financial losses due lose of planes that are very costly, reduction of passenger numbers due to fear of such occurrence happening again and compensating victims of crashes and accidents which is costly.

Airlines endure reputation damage due to this challenges as passengers lose trust and confidence in these airlines regarding their safety.

With decrease in financial income, due to challenges endured by the airline, investors may pull out their investment leading to bankruptcy of the airline.

BUSINESS SOLUTION

To avoid such challenges or risks when purchasing an airplane, first the buyers need to identify the make and model of the plane they want to buy. This can be done by conducting analysis on the impact the make and model has made on the passengers throughout the years. This can be the fatal injuries, serious injuries and minor injuries inflicted on the passengers by the make and model of the planes.

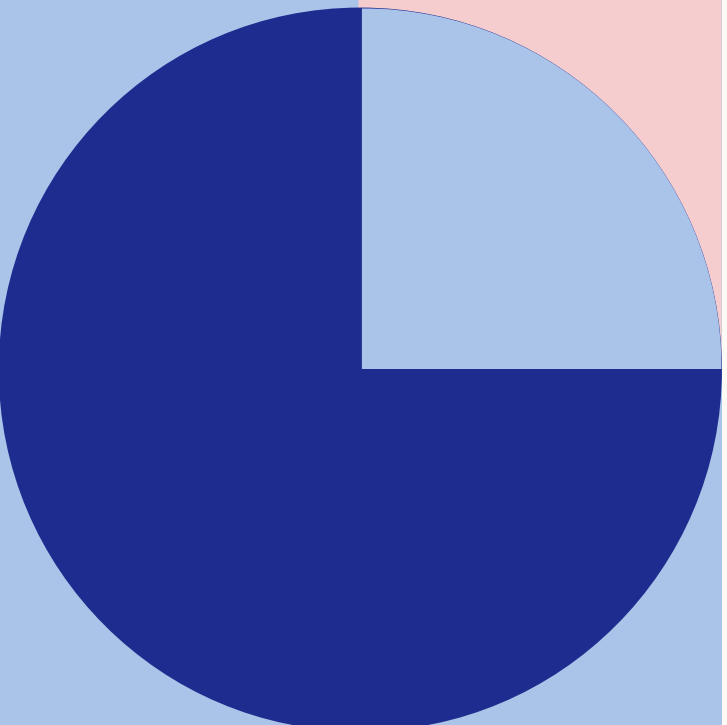
Another analysis to be conducted is the number of accidents incurred throughout the years by the make and model of the plane, analysis on the how the accidents occurred and last analysis on the weather conditions that are not favorable for flying and which weather conditions are prone to cause plane accidents.

The entire analysis can be done through data analysis by creating visualizations that can be used to understand and comprehend ways of identifying the low-risk aircraft that is safe to passengers and can generate money to the buyers intending on buying it.

DATA ANALYSIS

For this project, to conduct data analysis some steps have to be taken:

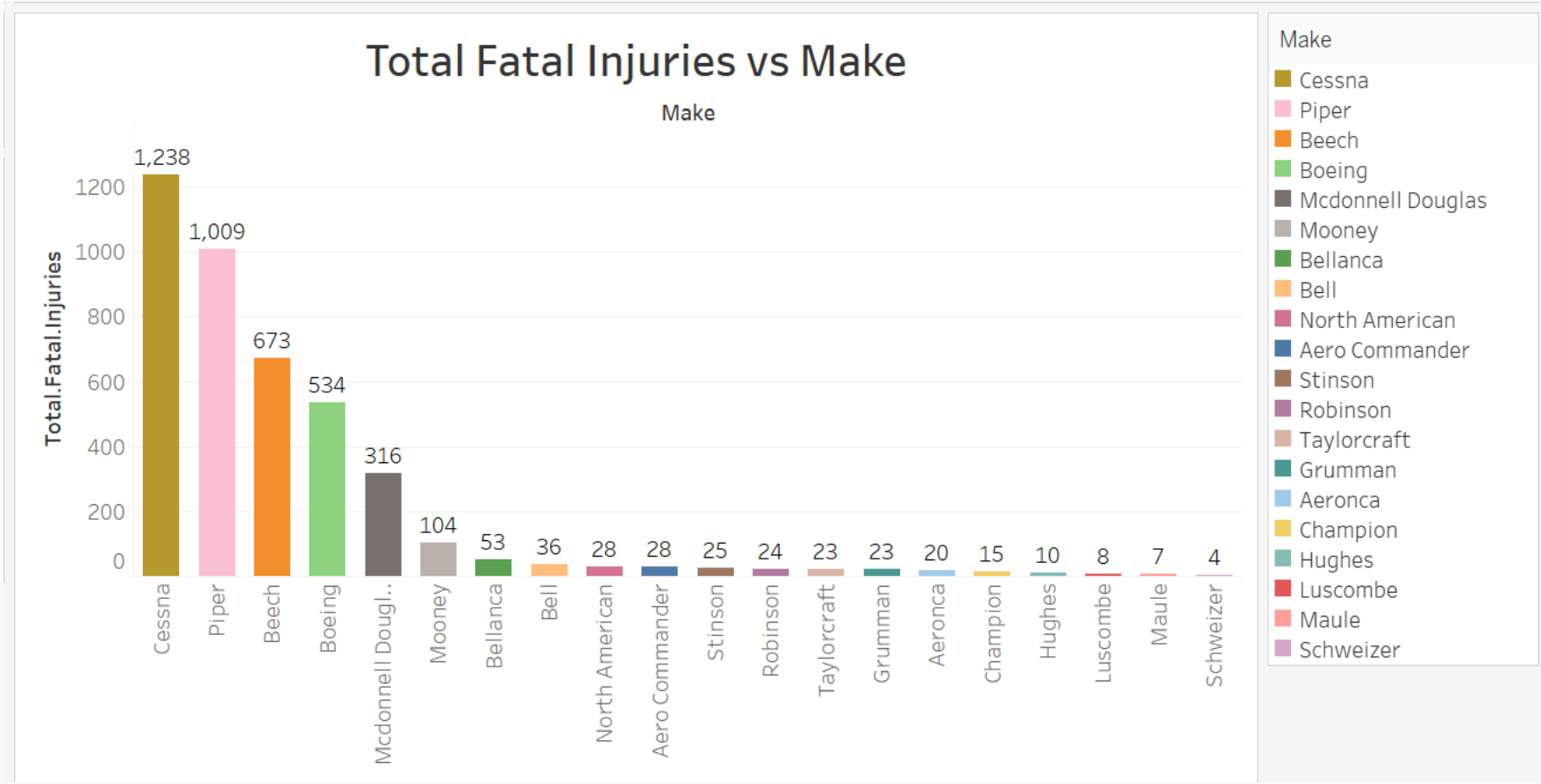
1. Collect data needed for this project by identifying a dataset that is relevant to the project been conducted. For this project the dataset identified was the aviation dataset from Kaggle which contained 25 columns and 10,000 plus rows.
2. Conduct data analysis by first cleaning the dataset. Cleaning of the dataset is crucial in order to identify missing values that can affect the data quality and the model performance by using pandas library for cleaning.
3. First identify which columns have the highest number of missing values. After that drop the columns with the highest number of missing values.
4. Columns with the lowest missing values, the values can be imputed using statistical methods using either mean, median if the values in the columns are continuous and mode if the values in the columns are categorical.
5. Columns with the missing values can have their rows dropped as dropping rows may not affect the data quality of the dataset.
6. Another way of cleaning the dataset is by replacing columns names that feel like the need to be replaced.
7. After cleaning the dataset, data visualizations can be formed from the clean dataset using an application called tableau. This can allow one to understand and comprehend the relationship between different columns and identify which aspects are required from the data analysis.



DATA VISUALIZATION

Total Fatal injuries vs Make

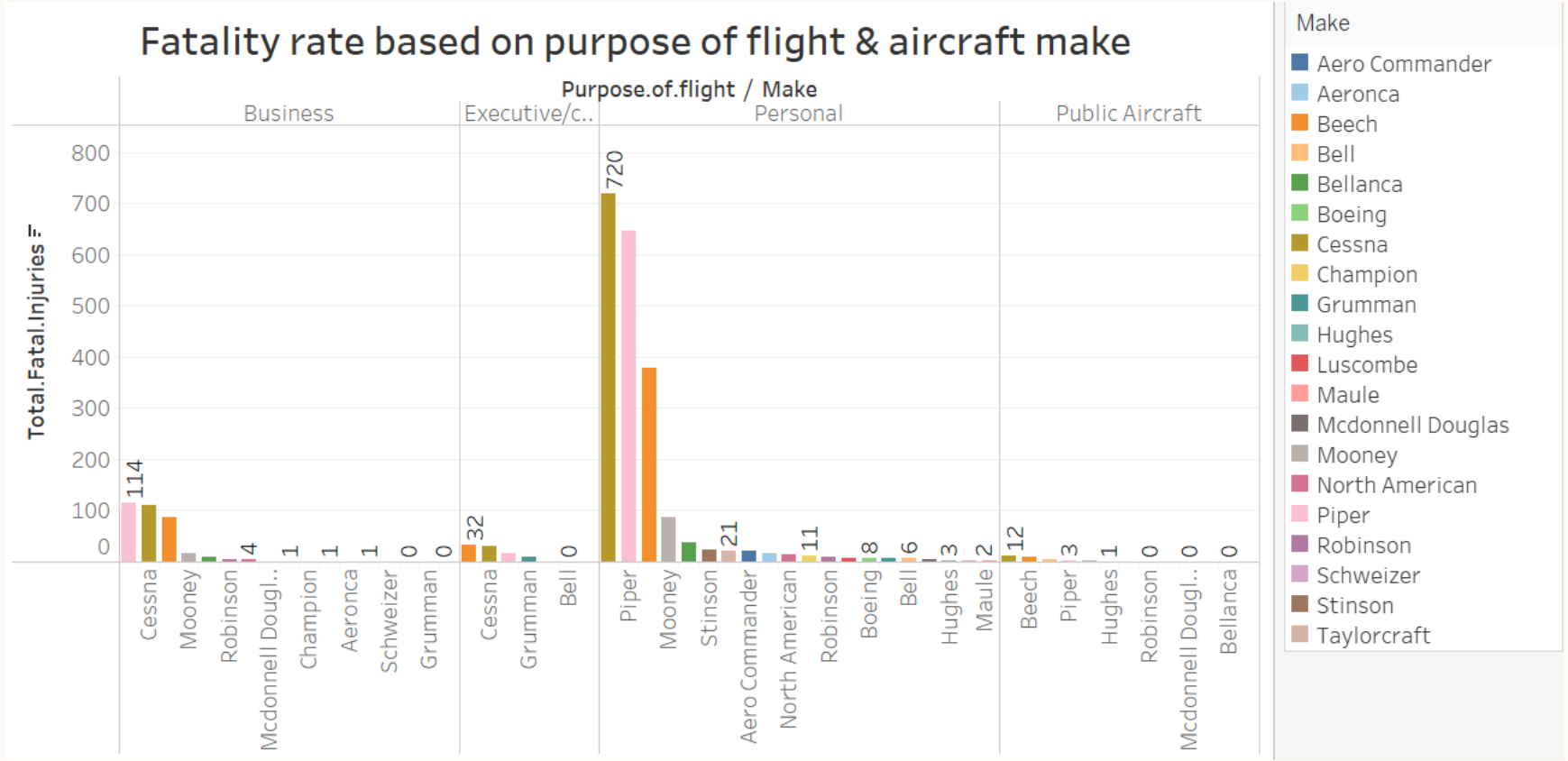
This visualization will show the relationship between the fatal injuries column and the plane make column to show which plane make has the most fatal injuries inflicted on passengers during their operations.



DATA VISUALIZATION

Fatality rate based on purpose of flight & plane make

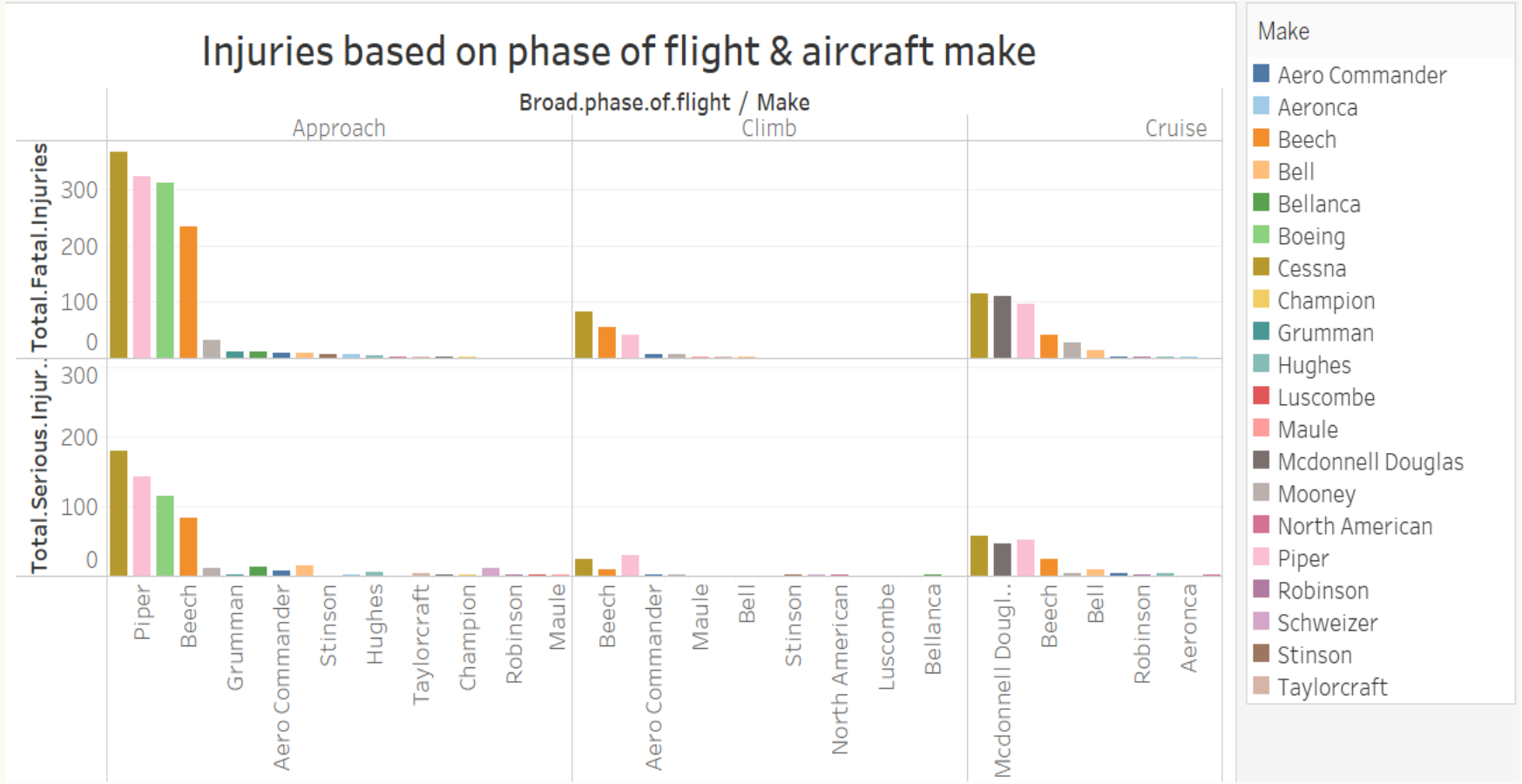
This visualization will show the relationship between the fatal injuries column and the plane make column and the purpose of flight column to show which plane make has the most fatal injuries inflicted on passengers under which purpose of flight during their operations.



DATA VISUALIZATION

Injuries based on phase of flight and aircraft make

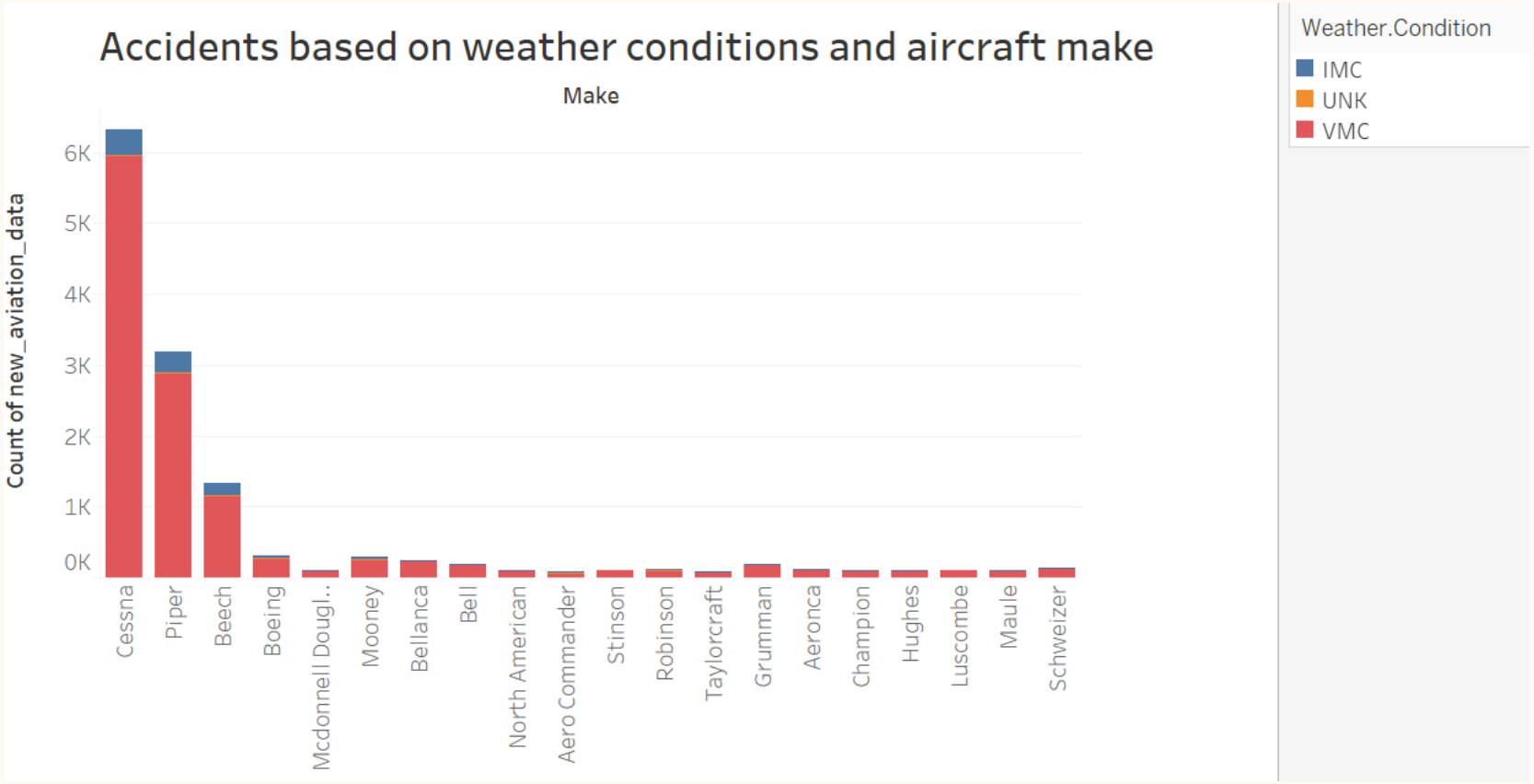
This visualization will show the relationship between the injuries column which include fatal injuries and serious injuries, and the plane make column and the phase of flight column to show which plane make inflicted the most injuries to passengers during the phase of the flight either landing or taking off during their operations.



DATA VISUALIZATION

Accidents based on weather conditions and aircraft make

This visualization will show the relationship between weather conditions column and aircraft make column and total accidents column. It shows which weather conditions has affected which plane make the most and how many accidents has the certain plane make endured.



DATA VISUALIZATION RESULTS

From the first data visualization, total fatal injuries vs make the results obtained show that the plane make Cesna had the most fatal injuries endured by passengers with a total of 1,238 injuries. Plane make Schwezier had the least fatal injuries of 4.

NB: Only the top 20 plane makes were used.

From the second visualization, fatality rate based on the purpose of flight and plane makes. The results obtained shows that most of the fatal injuries happened in personal purpose flights and were inflicted by the Cesna plane make with a total of 720 fatal injuries. The plane make with the least fatal injuries on personal purpose flights is Maule with only 2 fatal injuries.

The least fatal injuries happened in public aircraft with plane make Cesna having a total of 12 fatal injuries and a number of plane makes having a total of 0 fatal injuries.

From the third visualization, injuries based on phase of flight and plane make. The results shows that most of injuries were inflicted during takeoff and approach following close second. Cesna plane make had the highest number of injuries in both categories and plane make Maule had the least number of injuries in both categories.

The least inflicted injuries were during standing and taxi.

DATA VISUALIZATION RESULTS

From the fourth visualization, accidents based on weather conditions and aircraft make. The results obtained shows that the weather condition VMC is the reason for the highest number of accidents and the Cesna plane make is the most inflicted with this accidents with a total of 5,943 accidents. The UNK weather seems to have the least effect on planes.

The plane make that is seemed to be the least inflicted by the VMC weather condition is Schwezier with a total of 132 accidents.

RECOMMENDATIONS

From the data analysis done, I would recommend the buyers to adhere to the safety of passengers by making them first priority.

This can be done by choosing plane makes that over the years have had less fatal and serious inflicted injuries on the passengers.

Another way is by understanding why many accidents occur during takeoff and approach and why do many accidents occur during personal purpose flights. This can be done by seeking further information from aviation specialists.

Lastly I would recommend the buyers to understand different weather patterns so as to understand which weather conditions are unsuitable for flying as seen that VMC is unsuitable for flying.

This will enable them to choose and buy a low-risk aircraft that can sustain all these recommendations.

FUTURE RESEARCH

For future research, I would recommend researching more on other causes of plane accidents such as mechanical issues and human error.

This will be provide further information on the fatal and serious injuries inflicted on passengers.

THANK YOU