Analysis of the Wildlife Strikes to Civil Aviation

Introduction:

This project looks at the FAA Wildlife Strike Database and its relationship with migratory patterns of various bird species, terrestrial mammals, and reptiles. Through this analysis we hope to discover some insights into the major causes of these strikes and what can be done to avoid them and share the sky more cohesively.

Data Source: https://wildlife.faa.gov/

Problem statement:

With more flights operated by a greater choice of airlines that use an ever-increasing number of airports, the effect on birdlife is staggering. The problem of wildlife, specifically birds, striking aircraft has been an issue in the commercial airline industry for a long time Globally, bird strikes will cause a plane to land prematurely at least once a day. It is also estimated that bird strikes cost airlines $1.2 billion a year, worldwide. In the United States alone, annual aircraft downtime from these strikes can range from 94,000 hours to over 400,000 hours, costing over $50 million. The amount of bird strikes is on the rise which should cause major concern not just for the downtime and monetary losses but for the potential safety concerns it raises for pilots and their passengers.

A news article from U.S Today reported that there are several factors that contributed to the increase in plane-bird collisions including an increase in flights; changing migratory patterns and so on. So, with this project, we aim to analyze the factors that contribute to wildlife strikes to answer a few fundamental questions such as what the strike trend is, when do they take place most, what is the relationship between the strikes and flights, climate change, bird migration patterns, air traffic density. The focus of our project is to analyze past years wildlife strike data with respect to phase of flight, time of day, pilot warning status and various other parameters to make predictions about the occurrence of bird strikes in future years to make important decisions to avoid such havocs.

Motivation:

Civil aviation is an industry which is booming a lot in current times, however it also needs advancements in the direction of wildlife strike prevention as it needs constant attention, since it not only compromises the aircraft safety but also leads to loss of humankind and wildlife. A few years ago at New York's LaGuardia airport, US Airways Flight 1549 flew into a flock of Canada geese, and birds sucked into the two engines caused a complete loss of power. Captain Chesley Sullenberger brought the Airbus A320 down safely on the Hudson River, saving the lives of the 155 on board. This incident motivated us to do the analysis on bird strikes. Furthermore, we think that the study of wildlife strikes, migration and flight patterns is the one that needs more scholarly research.

Milestones/Tasks:

This database has data from 1990 to the present. Data contained is voluntarily reported. There are currently over 260,000 records in this database, which contain 105 fields that can be queried on customized interest. We found that there were a large number of null and unknown values that skewed the query results. We choose to use Python for Data cleaning and Wrangling techniques and for Visualizations - Tableau. Visualizations will include bar graphs, tree maps, heatmaps, bubble charts, geographical representation of the strikes across the USA and various other charts. Each visualization used in this report highlights a specific topic and allows a deeper interaction with the information described in the database. We wanted to show various methods of displaying the wildlife strikes.

- Responsible for the Data cleaning part of the project. Filtering out the bad data, checking for the null or missing values in the data.
- Wildlife species involved in strikes and their effect.
- Analysis of the Birds - species types, bird migration and traits.
- Responsible for outlier analysis of the data. Checking for the outliers and replacing with the appropriate data measures upon the analysis.
- Analysis of Bird strikes by State, region and altitude.
- Analysis of Bird strikes by weather conditions.
- Responsible for the data transformation. Reformatting the data, changing the structure, or values of data by making it more organized for the visualizations.
- Analysis of the Airports and aircraft damages.
- Impact of Phase of Flight and Time of Day on the strikes.
- Responsible for checking the correlation between the fields, checking for any patterns or relations between the fields in the data.
- Analysis of economic losses due to wildlife strikes.
- Impact on Human fatalities and injuries due to strikes.

We plan to proceed as mentioned above. However, we are still exploring the dataset and would be interested to add anything new found from our analysis along with the future scope, learnings, and key takeaways from the project.