Data Visualization of Bird Strikes between 2000-2011

Done by

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PROJECT DETAILS

Project Title	**Data Visualization of Bird Strikes between 2000-2011**
Technology	**Business Intelligence**
Domain	**Transportation and Communication**
Project Difficulty Level	**Advanced**
Tools used	**MS-POWER BI**

Problem Statement

Transport and communication is one of the crucial domain in the field of analytics. Environmental impacts and safety are, nowadays, two major concerns of the scientific community with respect to transport scenarios and to the ever-growing urban areas. These issues gain more importance due to the increasing amount of vehicles and people. Seeking new solutions is reaching a point where available technologies and artificial intelligence, especially MAS, are being recognized as ways to cope and tackle these kinds of problems in a distributed and more appropriate way. A bird strike is strictly defined as a collision between a bird and an aircraft which is in flight or on a take-off or landing roll. The term is often expanded to cover other wildlife strikes with bats or ground animals. Bird Strike is common and can be a significant threat to aircraft safety. For smaller aircraft, significant damage may be caused to the aircraft structure and all aircraft, especially jet-engine ones, are vulnerable to the loss of thrust which can follow the ingestion of birds into engine air intakes. This has resulted in several fatal accidents. Bird strikes may occur during any phase of flight, but are most likely during the take-off, initial climb, approach and landing phases due to the greater numbers of birds in flight at lower levels. To have a closer look the following document visually depicts the data collected on Bird Strikes by FAA between 2000- 2011.

MAIN KPIs

- **Bird Strike Rate:** Frequency of bird strikes per flight.
- **Severity of Bird Strikes:** Damage or impact caused by bird strikes.
- **Economic Impact:** Financial cost incurred due to bird strikes.
- **Altitude of Bird Strikes:** Height at which bird strikes occur.
- **Phase of Flight:** Stage of flight during which bird strikes occur.
- **Incidents with Prior Warning:** Analysis of incidents where pilots were informed of bird activity beforehand.

Architecture Implementation

Raw Data Collection

Source: The dataset is provided from a reliable source, such as Unified Mentor Project Description Document.

Data Acquisition: Data is imported into Power BI from various formats (e.g., CSV, Excel, database).

Data Transformation: Before building any visuals or models, it's crucial to perform data Transformation to ensure the data's quality. This process includes:

a) Handling Null/Missing Values: Identify and fill or remove missing values.

b) Handling Skewed Data: Transform skewed data to ensure a normal distribution if required.

c) Outliers Detection and Removal: Detect and remove outliers to prevent them from skewing the analysis.

Data Cleaning

Data cleaning is the process of fixing or removing incorrect, corrupted, incorrectly formatted, duplicate, or incomplete data within a dataset. This includes:

a) Remove Duplicate or Irrelevant Observations: Eliminate duplicate entries and any data that is not relevant to the analysis.

b) Filter Unwanted Outliers*:* Exclude outliers that do not fit within the expected data range.

c) Renaming Required Attributes: Rename columns and attributes for clarity and consistency.

Exploratory Data Analysis (EDA)

Exploratory Data Analysis involves performing initial investigations on data to discover patterns, spot anomalies, and test hypotheses using summary statistics and graphical representations. This includes:

Descriptive Statistics: Summary statistics such as mean, median, and standard deviation.

Graphical Representations: Visualizations such as histograms, bar charts, line graphs, scatter plots, and box plots to explore the data.

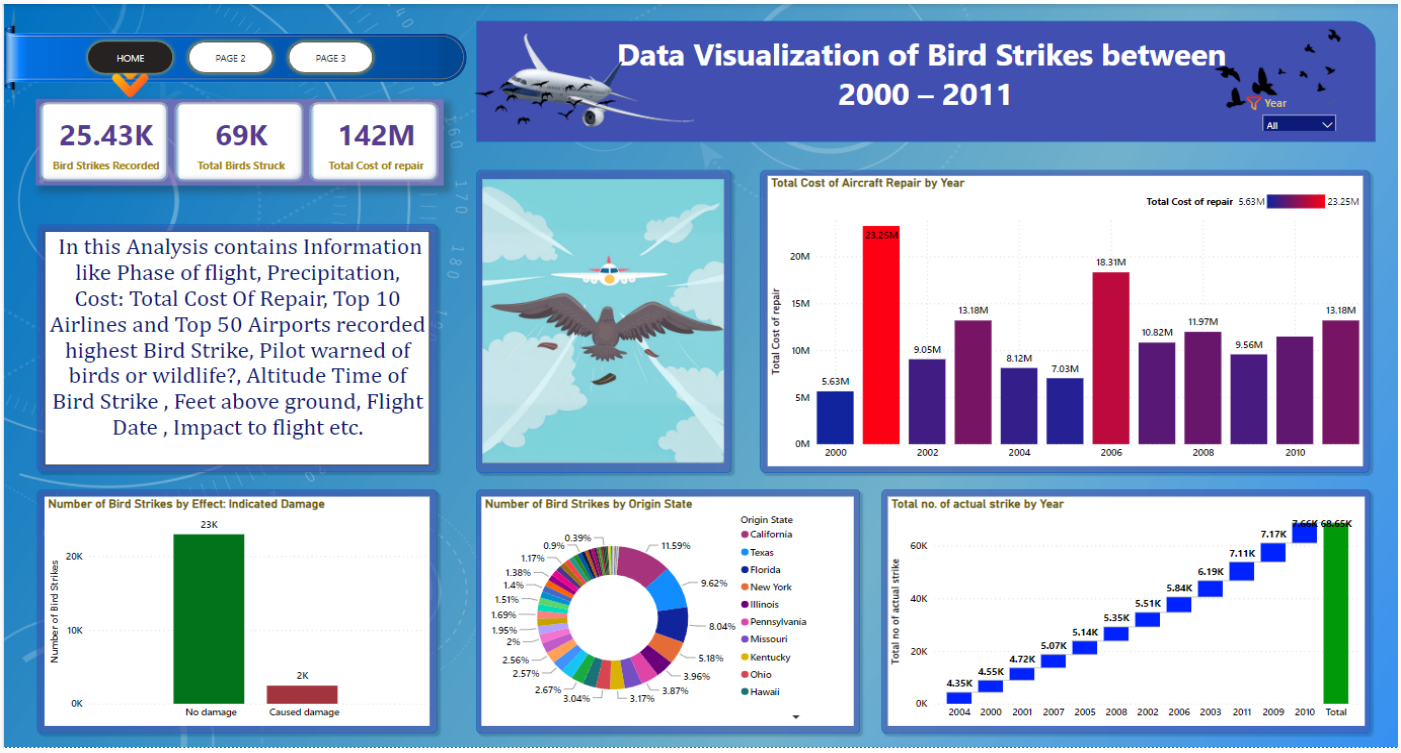
Reporting

Dashboard Creation: Building interactive dashboards with key metrics and KPIs.

Visual Reports: Creating visual reports that are easy to understand and interpret.

elf-Explanatory Reports: Ensuring that all reports are intuitive and provide insights at a glance.

In this Analysis contains Information like Phase of flight, Precipitation, Cost: Total Cost Of Repair, Top 10 Airlines and Top 50 Airports recorded highest Bird Strike, Pilot warned of birds or wildlife?, Altitude Time of Bird Strike , Feet above ground, Flight Date , Impact to flight etc.



In this page contains the following

- **25.43K** Birds Strikes have been Recorded in **USA**.
- **69k** Total number of **Birds have been struck**.
- **142** Million Dollars is **the total cost of repair** caused by bird strike.
- **Indicated Damaged** as per Record: **23k** record shows no damage and **2k** record shows caused.
- **2001** is the **year when cost of repair of the flights damage** caused by bird strike has been record the Highest of **23.5** million dollars.
- **California** has recorded the highest State of Bird Strikes of **11.59%** from all the other states in USA and followed by **Texas 9.62%** is the second highest state.
- Total number of Actual Bird strike is **68.65k**, **2010** has the highest strike of **7657**.

- **Average Altitude** of Birds strikes occurred is **799.03 feet.**
- **87.11%** of the Bird strikes occurred **above 1000ft** of altitude and only **12.89%** of strikes occurred **below 1000ft**.
- **24.56k** of the bird strikes occurred at **Approach phase of the aircraft**, which is the highest strikes in the phases. And **Take-Off run** and **Landing roll** have been recorded mostly same strikes of **14.48k** and **14.27k** Respectively.
- In the Top 10 Airlines which encountered Bird strikes, the **Business** and **Southwest Airlines** are highest encountered Airlines with **9.3k** and **9.2k** respectively.
- In the Top 50 Airports with most incidents of bird Strikes, **DALLAS/FORT WORTH INTL ARPT** and **SACRAMENTO INTL** are the top two most incidents of bird strike of **803** and **676** respectively.

- **46.41% Pilots warned before** the bird strike and **53.59% Pilots were not warned before** the bird strike. By this we can say moreover the Pilots warned or not the bird strikes still occur.
- **83.19%** Total no. of actual strike have **caused indicated damage** and **16.81%** have **caused no damage**.
- Most bird strikes occur on the **clear sky precipitation of weather** which is above **62k**.
- Most the bird strike **did not do any damage to aircraft** which is **2.34k** of the bird strikes cause no damage.

CONCLUSION

- The analysis of bird strikes from 2000 to 2011, using MS-Power BI, reveals crucial insights into their frequency, severity, and impact on aviation. With 25.43K incidents involving 69K birds, the total repair cost reached $142 million, peaking at $23.5 million in 2001. California and Texas reported the highest strikes.

- Most bird strikes (87.11%) occur above 1000 feet, especially during the approach phase. Despite warnings, strikes still happen, highlighting the need for improved detection and communication. Southwest Airlines and Dallas/Fort Worth International Airport faced the most incidents.

- This study emphasizes the need for enhanced safety measures and strategies to mitigate bird strike risks, ensuring better aviation safety and reduced economic losses.

THANK YOU