AVIATION INCIDENT ANALYSIS: KEY INSIGHTS FOR SAFER OPERATIONS

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Outline

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- Data description
- Data process steps
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- Conclusion
- Recommendations

Business context

- Aviation incidents affect operators, passengers and regulatory compliance.
- Decision makers need clear evidence to prioritize safety interventions.
- Our analysis focuses on aircraft types, operator fatalities, and damage severity.

Data description

The dataset comprised **1,250 aviation incident records** 1,250 aviation incident records

Cleaning steps were applied:

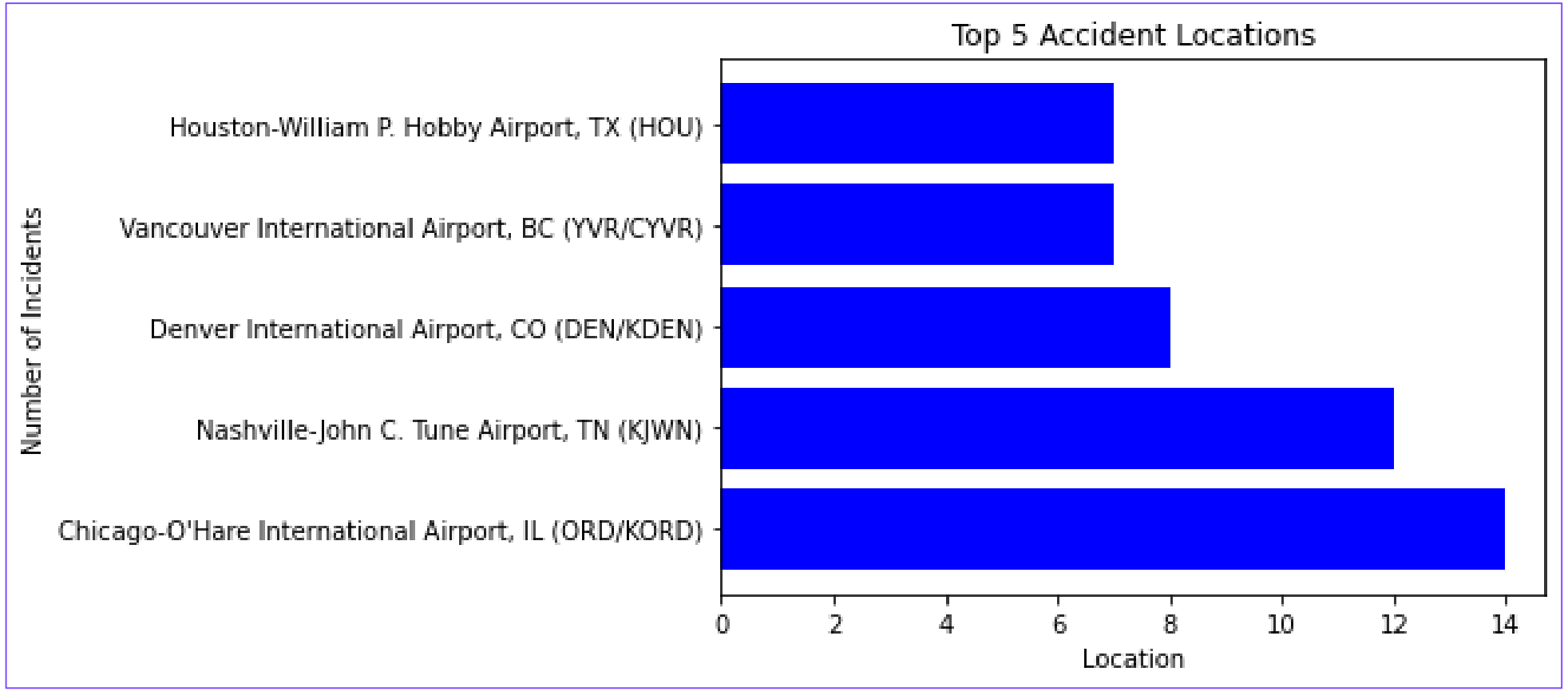
- Short codes in the damage column were mapped into descriptive categories (*Write-Off, Substantial, Minor, No Damage*), while unknown or missing entries were treated as NaN.
- One redundant column was deleted, duplicate records were removed and a new index was set for clarity.
- Four columns were renamed to improve readability
- **Datatype corrections:** the accident_date (previously crush_date) and fatalities columns were converted to appropriate datatypes (datetime and float respectively) to support accurate computation and visualization

Data processing steps

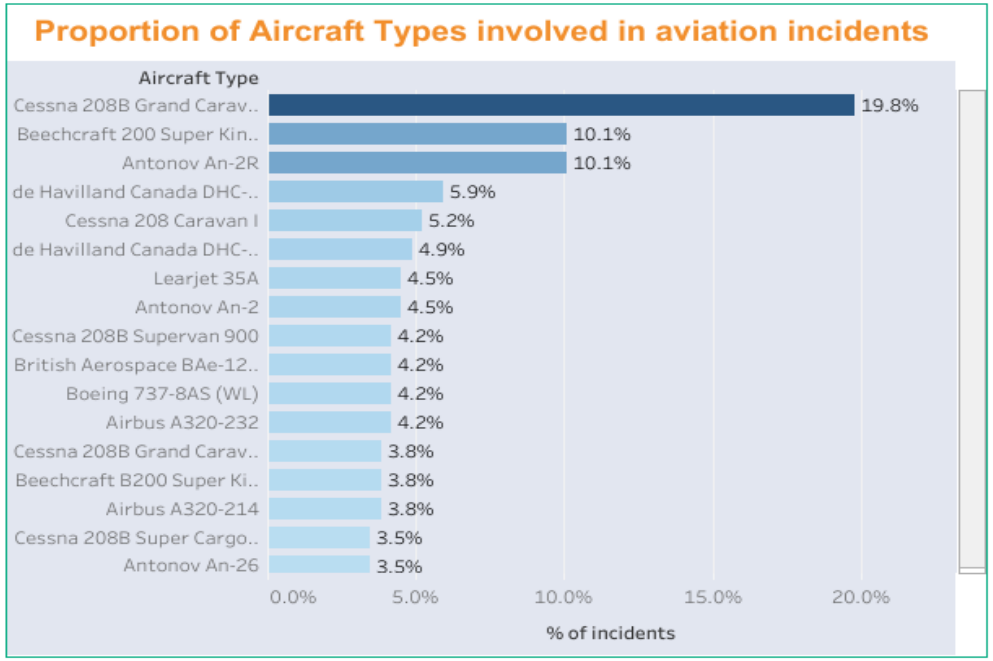
1. Exploratory data analysis was run
2. Filter Data
    - Deleted one column- "Unnamed: 0"
    - Deleted duplicate data- 1250 rows were found to be duplicates
    - New index set
    - Renamed 4 columns
    - Changed "acc_date" and "fat" column datatypes
- 3- Visualization

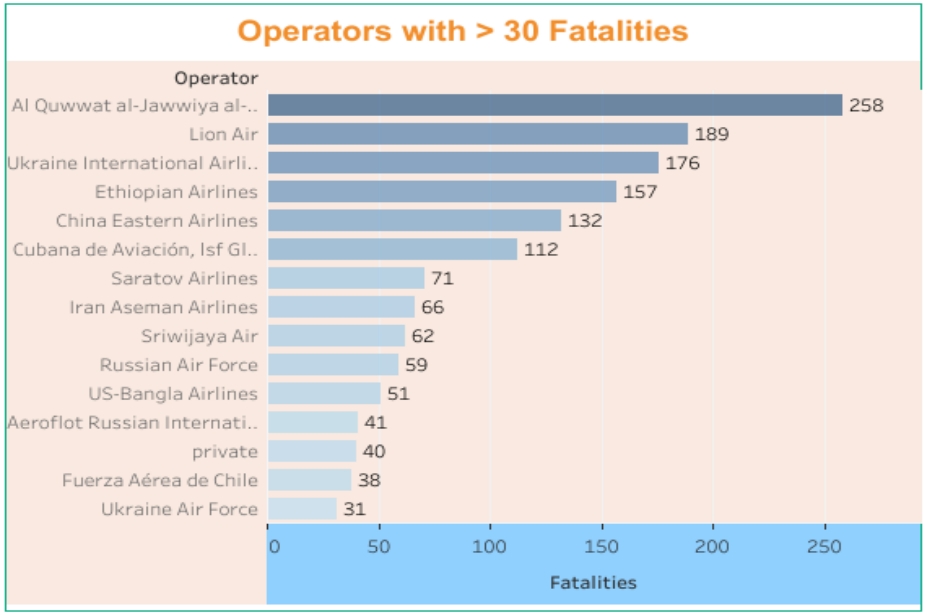
Result

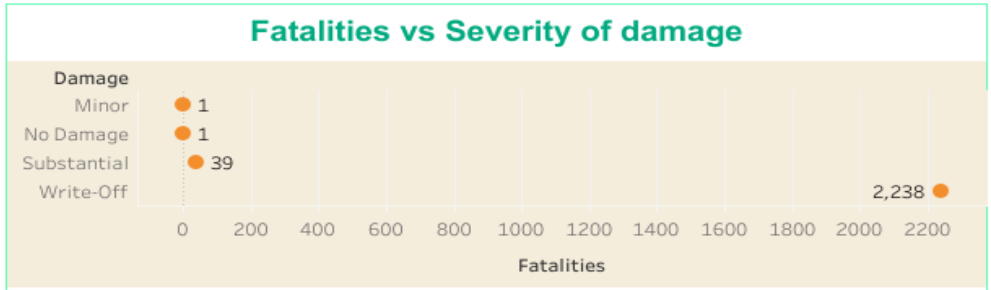
- *Aircraft Types:* Top 5 models dominate incident records.

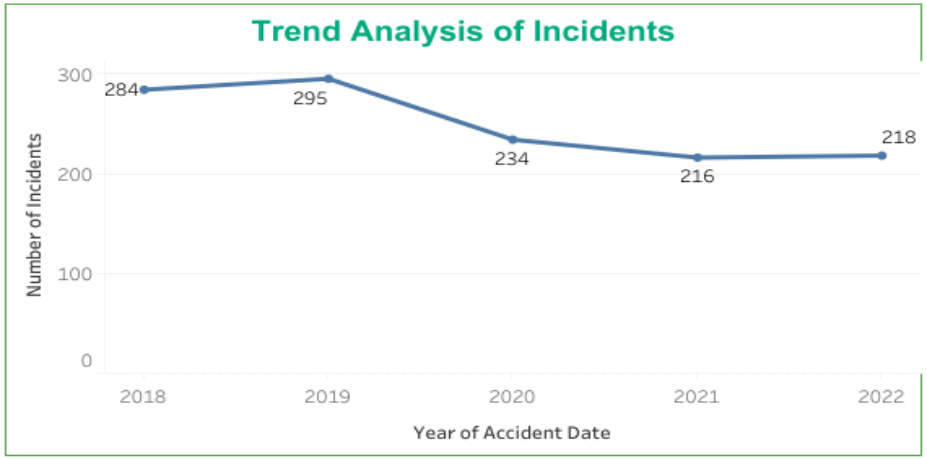


Result





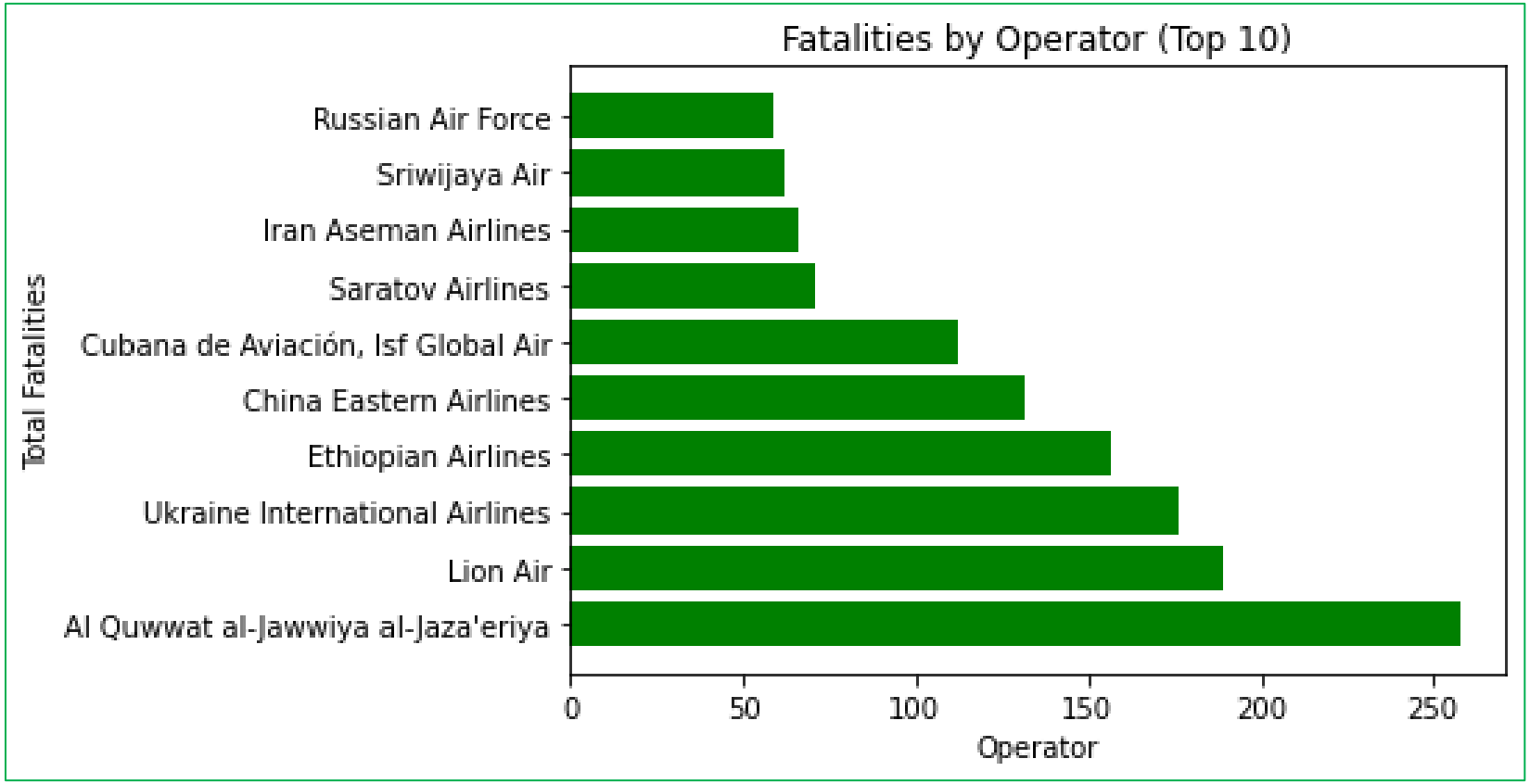




Result:
- Three aicrafts such as Cessna 208B Grand Caravan, Al Quwwat al-Jawwiya al-Iraqiya and Lion Air account for over 30% of the aircraft accidents.
- 97% of all fatalities (2,238 of 2,301) occur in write-off cases, underscoring that severe damage drives risk, ..

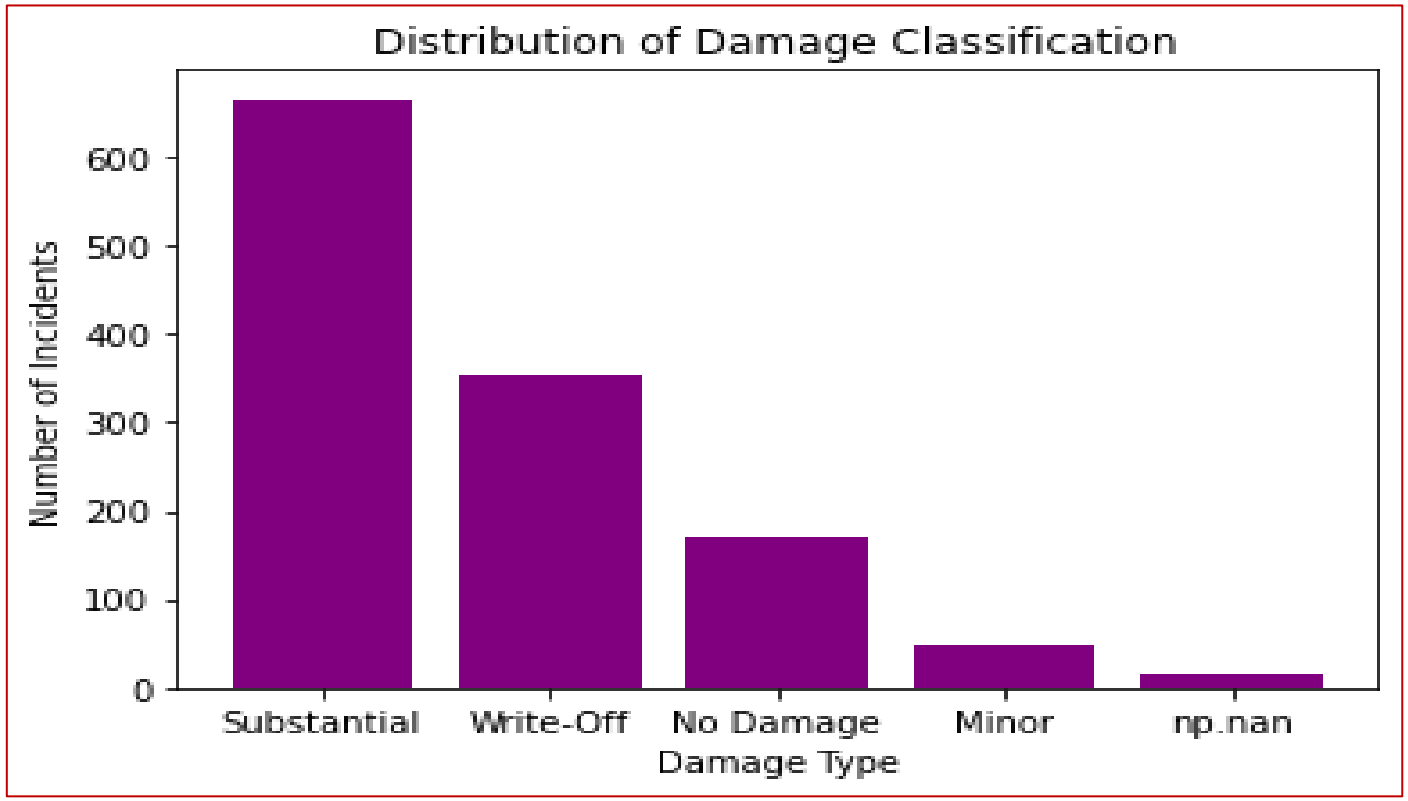
Result

A few operators account for most aircraft fatalities



Result

Severe damage (Write-Off, Substantial) is most common



Conclusion

- The top 5 most common aircraft types dominate the dataset, suggesting that incident reporting is concentrated among widely used models.
- A small number of operators account for disproportionately high fatalities
- The majority of incidents fall under Write-Off and Substantial damage categories, while Minor and No Damage are relatively rare. The presence of missing/unknown entries highlights gaps in reporting consistency and data quality.

Recommendations

- There is need for deeper analysis on the top 5 aircraft types to identify whether their high incident counts are purely due to usage volume or linked to specific safety vulnerabilities.
- Strengthen reporting standards to minimize “Unknown” or “Missing” classifications.
- Extend the study to temporal trends (accident dates) and geographic distribution (locations) to uncover patterns that could inform preventive measures

Questions

Thank you

Profile

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