DATA ANALYSIS OF BIRD STRIKES BETWEEN 2000 – 2011

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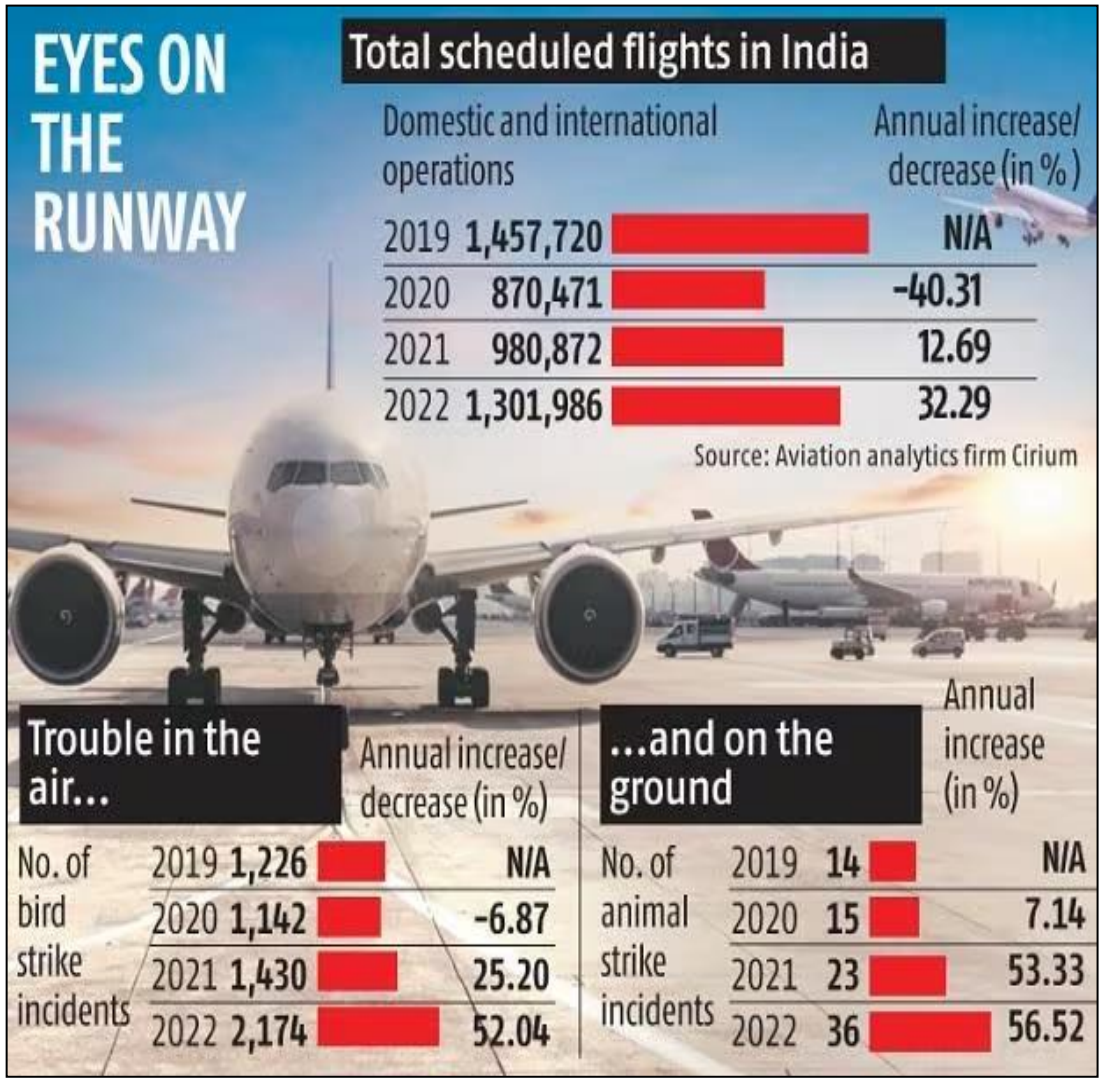
Group - 10

Why this problem is relevant?

- ✓ Bird Strike: A collision between a bird and an aircraft.
- ✓ Bird and animal strikes are not all that uncommon at Indian airports.
- ✓ Bird and animal strike incidents are considered one of the most potent threats to flight operations in India.
- ✓ The Indian airspace saw a 52% jump in bird strike incidents in 2022 as commercial aviation picked up significant pace after the pandemic. According to the Directorate General of Civil Aviation (DGCA), last year the country witnessed 2,174 aircraft bird strike incidents, up from 1,430 in 2021.
- ✓ Not only bird hits, but animal strike incidents at airports also rose from 23 in 2021 to 36 in 2022, as per data reviewed by Business Standard from the DGCA.
- ✓ 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.
- ✓ Prevention of the birds strikes, can not save only people and birds but also millions in dollars of damage to the aircraft.



Incidents happened in India

- ✓ Earlier this month, an AirAsia India flight heading to Pune had to do an emergency landing at the Bhubaneswar airport after being hit by a bird.
- ✓ In June, a Boeing 737 operated by SpiceJet had to make an emergency landing shortly after take-off at Patna airport (PAT) due to a bird being ingested by one of its engines. Sparks were noticed coming from the left engine by both passengers and cabin crew.
- ✓ On the same day, an IndiGo Airbus A320neo operating flight 6E-6394 from Guwahati (GAU) to New Delhi (DEL) also returned to its airport of origin. The aircraft's number one engine was hit by a bird at an altitude of around 1,600 feet. The pilots declared PAN PAN and returned to Guwahati airport safely.
- ✓ Prevention of the birds strikes, can not save only people and birds but also millions in dollars of damage to the aircraft.

Problem Statement

- ✓ Transport and communication are in 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, are being recognized as ways to cope with and tackle these kinds of problems in a distributed and more appropriate way.
- ✓ To have a closer look the following document visually depicts the data collected on Bird Strikes between 2000-2011.

Descriptive Analysis

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- ✓ Our project visually depicts the data collected on Bird Strikes by Federal Aviation Administration (FAA) between 2000-2011.
- ✓ Approach:
  - ✓ Python: Used for Data Cleaning
  - ✓ Power BI: For Visualization.
- ✓ Based on the findings, a story is created.
- ✓ For better understanding, the results are displayed on 3 dashboards of the story, listed as:
  - ✓ Direct/Indirect Impact on Mankind
  - ✓ Air Service and Environmental Conditions
  - ✓ Study on Birds

✓ Link to Python Notebook:
https://colab.research.google.com/drive/1RCGSNC4JC5RiHvQtwuSX58iOUO3xiNec#scrollTo=944f0f1b

Attributes present in the data

```
Record ID
Aircraft: Type
Airport: Name
Altitude bin
Aircraft: Make/Model
Wildlife: Number struck
Wildlife: Number Struck Actual
Effect: Impact to flight
FlightDate
Effect: Indicated Damage
Aircraft: Number of engines?
Aircraft: Airline/Operator
Origin State
When: Phase of flight
Conditions: Precipitation
Remains of wildlife collected?
Remains of wildlife sent to Smithsonian
Remarks
Wildlife: Size
Conditions: Sky
Wildlife: Species
Pilot warned of birds or wildlife?
Cost: Total $
Feet above ground
Number of people injured
Is Aircraft Large?
```

Data Cleaning

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- ✓ Dataset was first read.
- ✓ Missing and null values were found and removed using dropna ( ) method. (5416 null values were removed, there were no duplicate values).
- ✓ Cleaned file is downloaded for visual analysis in Power BI.

```
In [37]: df.shape
Out[37]: (25558, 26)
```

```
In [42]: df.isnull().sum()
Out[42]: Record ID                              0
         Aircraft: Type                       129
         Airport: Name                        129
         Altitude bin                         129
         Aircraft: Make/Model                   0
         Wildlife: Number struck              129
         Wildlife: Number Struck Actual         0
         Effect: Impact to flight             129
         FlightDate                           129
         Effect: Indicated Damage               0
         Aircraft: Number of engines?         267
         Aircraft: Airline/Operator           129
         Origin State                         449
         When: Phase of flight                129
         Conditions: Precipitation              0
         Remains of wildlife collected?         0
         Remains of wildlife sent to Smithsonian  0
         Remarks                             4771
         Wildlife: Size                       129
         Conditions: Sky                        0
         Wildlife: Species                      0
         Pilot warned of birds or wildlife?   129
         Cost: Total $                          0
         Feet above ground                    129
         Number of people injured               0
         Is Aircraft Large?                   129
         dtype: int64

In [43]: df.dropna(inplace=True)
```

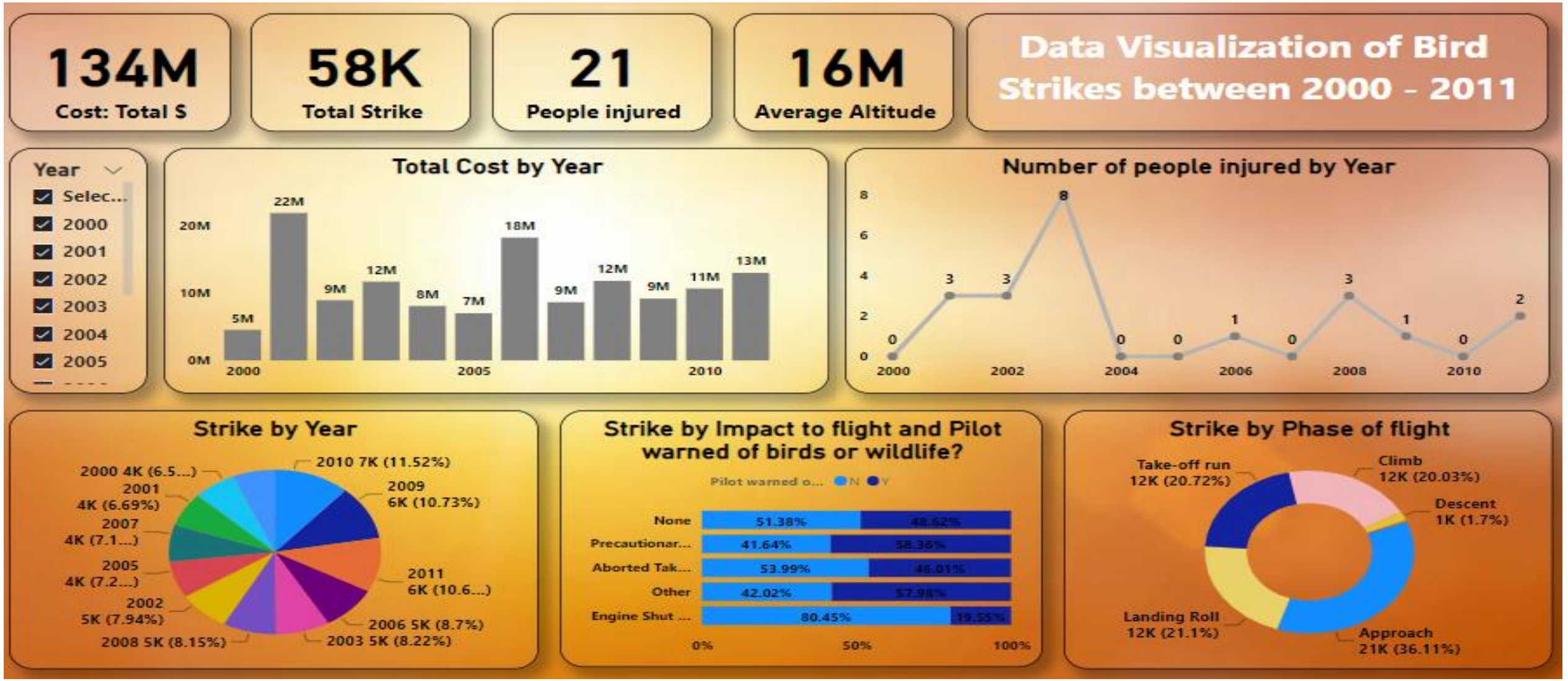
```
In [44]: df.shape
Out[44]: (20142, 26)
```

```
In [45]: df.isna().sum()
Out[45]: Record ID                              0
         Aircraft: Type                         0
         Airport: Name                          0
         Altitude bin                           0
         Aircraft: Make/Model                   0
         Wildlife: Number struck                0
         Wildlife: Number Struck Actual         0
         Effect: Impact to flight               0
         FlightDate                             0
         Effect: Indicated Damage               0
         Aircraft: Number of engines?           0
         Aircraft: Airline/Operator             0
         Origin State                           0
         When: Phase of flight                  0
         Conditions: Precipitation              0
         Remains of wildlife collected?         0
         Remains of wildlife sent to Smithsonian  0
         Remarks                                0
         Wildlife: Size                         0
         Conditions: Sky                        0
         Wildlife: Species                      0
         Pilot warned of birds or wildlife?     0
         Cost: Total $                          0
         Feet above ground                      0
         Number of people injured               0
         Is Aircraft Large?                     0
         dtype: int64
```

```
In [57]: df1=pd.DataFrame(df)
```

```
In [60]: df1.to_csv('Cleaned_Project1_Data_BirdStrikes.csv', index=True)
```

Direct/Indirect Impact on Mankind



Air Service and Environment Condition

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Study of Birds

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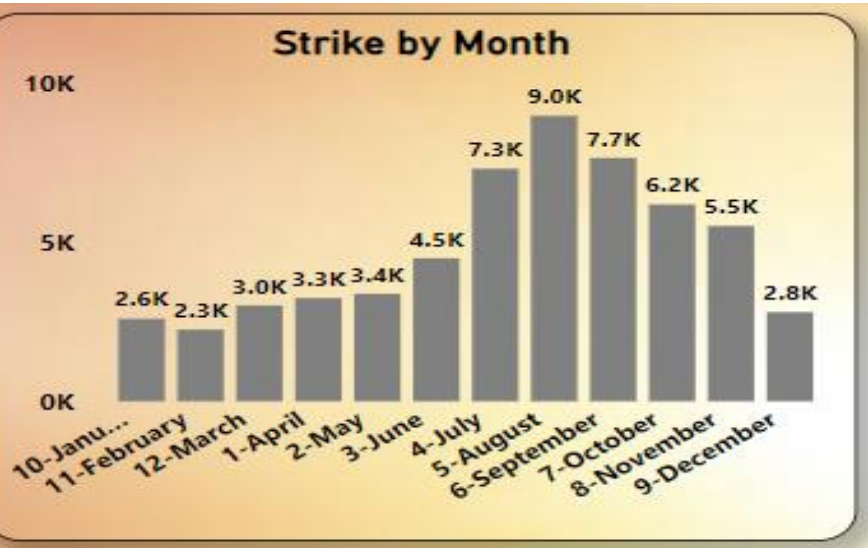
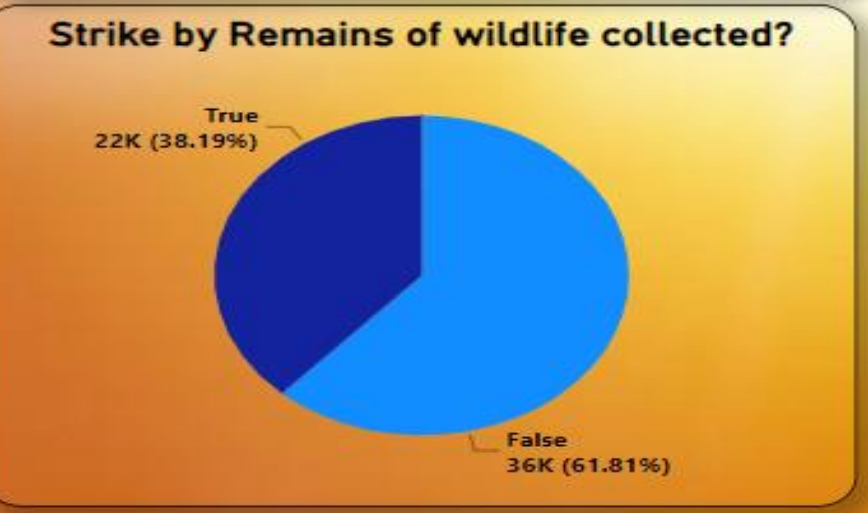
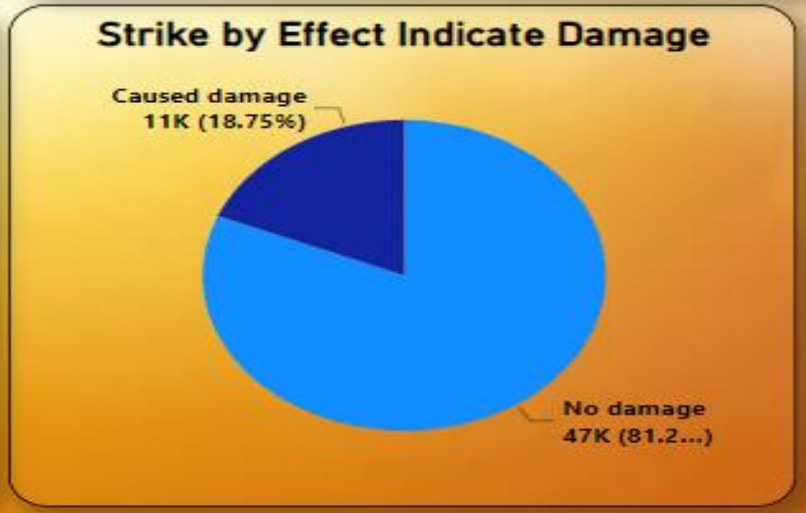
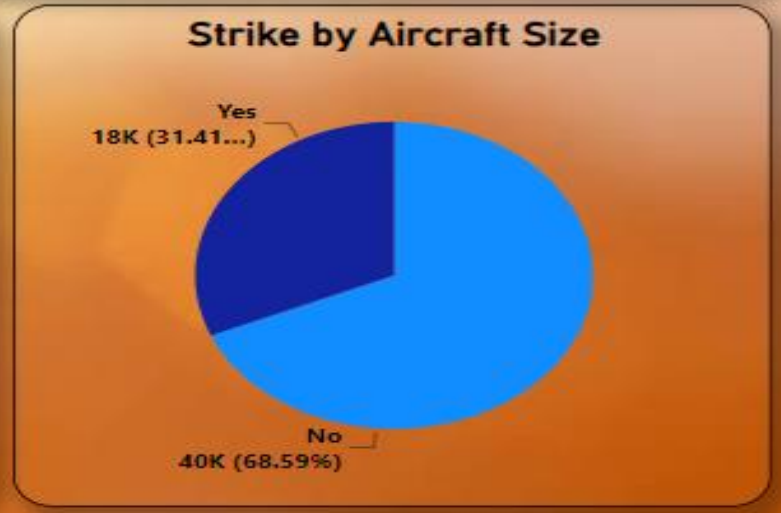


Wildlife: Species	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Unknown bird - small	878	1047	1145	1154	1258	1297	1543	1388	1169	2027	1675	1531	16112
European starling	349	584	1302	1310	477	328	981	495	1013	545	676	568	8628
Unknown bird - medium	1285	329	444	443	428	636	539	471	454	636	457	611	6733
Rock pigeon	309	949	256	381	169	314	114	112	113	275	392	389	3773
Mourning dove	122	89	238	198	110	258	317	201	210	246	305	202	2496
Canada goose	116	207	219	118	222	79	115	75	103	92	108	33	1487
Barn swallow	2	12	33	16	50	88	33	66	67	238	473	221	1299
Unknown bird - large	58	58	68	119	66	70	60	81	76	124	82	79	941
Killdeer	99	27	30	99	38	41	33	66	37	193	143	116	922
Ring-billed gull	37	45	124	29	60	31	304	55	50	40	59	58	892
Horned lark	3	10	18	35	35	31	195	77	95	93	170	127	889
Snow bunting	8	15	17	144	3	195	15	62	27	64	89	114	753
Pacific golden-plover	7	25	25	33	92	33	18	19	117	34	168	45	616
Total	3766	3858	4578	4738	3746	4157	5013	4129	4698	6184	6643	6136	57646







Solution…

Modifying Habitat

- Remove Seed bearing Plants to eliminate food sources
- Remove Bushes and Trees that serve as attractive nesting sites
- Use insecticides/ Pesticides to eliminate food sources for insect-eating birds

Modifying Bird Behavior

- Use of Noise generators to disrupt Birds
- Use of lasers at dawn and dusk to scare them away
- Use of trained Falcons/ Dogs in the airport area to teach birds that the area has many predators

Modifying Plane Behavior

- Use of radar equipment to track the density and movement of birds.
- Adjust flight times to avoid busiest hours to bird activity as per the location.

DRAWBACKS & SOLUTIONS/FUTURE SCOPE

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Drawbacks:

- ✓ Habitats of Birds can get affected.
- ✓ Predators can sometimes themselves be a risk to the aircraft and cause confusion at the runway.
- ✓ It will require a proper infrastructure, that will be a costly affair.
- ✓ Restoration of electricity & Broadband might take sometime due to underground cabling

Which one is real and which one a robird ?

Solutions/Future Scope:

- ✓ Bird Sanctuary can be set up wherein breeding box will also be a priority.
- ✓ Bird houses can be built to attract birds
- ✓ Bird robots in the form of predators can be used.
- ✓ Proper planning through Data Analysis.
- ✓ Use of robirds / drones/laser/radar equipment.

THANK YOU