Bird Strikes

July 5, 2024

[1]:
```
import pandas as pd
df=pd.read_csv("Bird Strikes Data Original - Replaced Formatted.csv")
#display(df)
display(df.head(10))
df.info()
```

	Record ID	Aircraft: Type	Airport: Name	Altitude bin
0	208033	Airplane	MINNEAPOLIS-ST PAUL INTL	> 1000 ft
1	261733	Airplane	JOE FOSS FIELD ARPT	< 1000 ft
2	309151	Airplane	SALT LAKE CITY INTL	< 1000 ft
3	200097	Airplane	INDIANAPOLIS INTL	< 1000 ft
4	268701	Airplane	PORT COLUMBUS INTL	< 1000 ft
5	309212	Airplane	CHICAGO MIDWAY INTL ARPT	< 1000 ft
6	200219	Airplane	SPIRIT OF ST LOUIS	> 1000 ft
7	205904	Airplane	VANCOUVER INTL	< 1000 ft
8	204178	Airplane	SALT LAKE CITY INTL	< 1000 ft
9	6632	Airplane	EGLIN AFB/NW FLORIDA REGIONAL ARPT	< 1000 ft

	Aircraft: Make/Model	Wildlife: Number struck
0	SAAB-340	2 to 10
1	CITATION MUSTANG 510	2 to 10
2	A-320	2 to 10
3	B-737-300	11 to 100
4	EMB-145	1
5	B-737-500	2 to 10
6	C-560	2 to 10
7	B-737-400	2 to 10
8	RKWL SABRLNR	2 to 10
9	C-130E	2 to 10

	Wildlife: Number Struck	Actual Effect: Impact to flight	FlightDate
0	3	Precautionary Landing	13/11/2000
1	4	Precautionary Landing	10/03/2009
2	8	Precautionary Landing	24/11/2010
3	97	Precautionary Landing	11/03/2000
4	1	Precautionary Landing	18/09/2009
5	10	Other	25/12/2010
6	2	No Impact	30/01/2000

7		7	No Impact	14/12/2000
8		9	No Impact	12/02/2001
9		9	No Impact	01/02/2002

	Effect: Indicated Damage	…	Remains of wildlife sent to Smithsonian	\
0	Caused damage	…	NO	
1	Caused damage	…	NO	
2	No damage	…	YES	
3	Caused damage	…	NO	
4	No damage	…	NO	
5	Caused damage	…	NO	
6	No damage	…	NO	
7	Caused damage	…	NO	
8	No damage	…	NO	
9	No damage	…	NO	

	Remarks	Wildlife: Size	\
0	JUST ENTERING CLOUD BASES, STRUCK UNKN # OF BI…	Large	
1	BIRD REPTD AS BLUE GOOSE. DMG TO LWR L ENG COW…	Large	
2	ID BY SMITHSONIAN. A/C INGESTED BIRD IN #1 ENG…	Medium	
3	FLT 439. HIGH VIBRATIONS IN #1 ENG. ENG DID NO…	Small	
4	DEPARTURE END END RWY 28R.	Large	
5	ATIS WARNING. FLT 44 ADVISED OF BIRDSTRIKE IN …	Large	
6	HIT FLAP	Small	
7	SNOW PLOW PROBABLY DISTURBED GEESE CAUSING THE…	Large	
8	WE WERE 1ST A/C ON RWY.	Small	
9	NaN	Medium	

	Conditions: Sky	Wildlife: Species	Pilot warned of birds or wildlife?	\
0	Overcast	Unknown bird - large	No	
1	Overcast	Snow goose	No	
2	Overcast	Gadwall	Yes	
3	Overcast	European starling	No	
4	Some Cloud	Unknown bird - large	No	
5	Some Cloud	Canada goose	Yes	
6	Overcast	Unknown bird - small	No	
7	Some Cloud	Snow goose	No	
8	Overcast	Unknown bird - small	Yes	
9	Overcast	Unknown bird or bat	Yes	

	Cost: Total $	Feet above ground	Number of people injured	Is Aircraft Large?
0	0	1,800	0	No
1	31,624	500	0	No
2	0	300	0	No
3	0	200	0	Yes
4	0	700	0	No
5	0	200	0	Yes
6	0	1,800	0	No

```
7              0                50                          0                 Yes
8              0                 0                          0                  No
9              0               150                          0                  No

[10 rows x 26 columns]
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 25558 entries, 0 to 25557
Data columns (total 26 columns):
 #   Column                                  Non-Null Count  Dtype
---  ------                                  --------------  -----
 0   Record ID                               25558 non-null  int64
 1   Aircraft: Type                          25429 non-null  object
 2   Airport: Name                           25429 non-null  object
 3   Altitude bin                            25429 non-null  object
 4   Aircraft: Make/Model                    25558 non-null  object
 5   Wildlife: Number struck                 25429 non-null  object
 6   Wildlife: Number Struck Actual          25558 non-null  int64
 7   Effect: Impact to flight                25429 non-null  object
 8   FlightDate                              25429 non-null  object
 9   Effect: Indicated Damage                25558 non-null  object
 10  Aircraft: Number of engines?            25291 non-null  object
 11  Aircraft: Airline/Operator              25429 non-null  object
 12  Origin State                            25109 non-null  object
 13  When: Phase of flight                   25429 non-null  object
 14  Conditions: Precipitation               25558 non-null  object
 15  Remains of wildlife collected?          25558 non-null  object
 16  Remains of wildlife sent to Smithsonian 25558 non-null  object
 17  Remarks                                 20787 non-null  object
 18  Wildlife: Size                          25429 non-null  object
 19  Conditions: Sky                         25558 non-null  object
 20  Wildlife: Species                       25558 non-null  object
 21  Pilot warned of birds or wildlife?      25429 non-null  object
 22  Cost: Total $                           25558 non-null  object
 23  Feet above ground                       25429 non-null  object
 24  Number of people injured                25558 non-null  int64
 25  Is Aircraft Large?                      25429 non-null  object
dtypes: int64(3), object(23)
memory usage: 5.1+ MB
```

[2]:
```
#df['Aircraft: Type'] = df['Aircraft: Type'].fillna('Not Available')
#df['Airport: Name'] = df['Airport: Name'].fillna('Not Available')
#df['Altitude bin'] = df['Altitude bin'].fillna('Not Available')
#df['Aircraft: Make/Model'] = df['Aircraft: Make/Model'].fillna('Not Available')
#df['Wildlife: Number struck'] = df['Wildlife: Number struck'].fillna('Not␣
 ↪Available')
#df['Effect: Impact to flight'] = df['Effect: Impact to flight'].fillna('Not␣
 ↪Available')
```

```
df_cleaned = df.fillna('Unvailable')
display(df_cleaned.head(10))
df_cleaned.info()
```

```
   Record ID Aircraft: Type                      Airport: Name Altitude bin  \
0     208033       Airplane            MINNEAPOLIS-ST PAUL INTL    > 1000 ft
1     261733       Airplane                 JOE FOSS FIELD ARPT    < 1000 ft
2     309151       Airplane                SALT LAKE CITY INTL    < 1000 ft
3     200097       Airplane                  INDIANAPOLIS INTL    < 1000 ft
4     268701       Airplane                PORT COLUMBUS INTL    < 1000 ft
5     309212       Airplane            CHICAGO MIDWAY INTL ARPT    < 1000 ft
6     200219       Airplane                  SPIRIT OF ST LOUIS    > 1000 ft
7     205904       Airplane                      VANCOUVER INTL    < 1000 ft
8     204178       Airplane                SALT LAKE CITY INTL    < 1000 ft
9       6632       Airplane  EGLIN AFB/NW FLORIDA REGIONAL ARPT    < 1000 ft

   Aircraft: Make/Model Wildlife: Number struck  \
0              SAAB-340                2 to 10
1  CITATION MUSTANG 510                2 to 10
2                 A-320                2 to 10
3             B-737-300               11 to 100
4               EMB-145                       1
5             B-737-500                2 to 10
6                 C-560                2 to 10
7             B-737-400                2 to 10
8          RKWL SABRLNR                2 to 10
9                C-130E                2 to 10

   Wildlife: Number Struck Actual Effect: Impact to flight  FlightDate  \
0                                3    Precautionary Landing  13/11/2000
1                                4    Precautionary Landing  10/03/2009
2                                8    Precautionary Landing  24/11/2010
3                               97    Precautionary Landing  11/03/2000
4                                1    Precautionary Landing  18/09/2009
5                               10                    Other  25/12/2010
6                                2                No Impact  30/01/2000
7                                7                No Impact  14/12/2000
8                                9                No Impact  12/02/2001
9                                9                No Impact  01/02/2002

  Effect: Indicated Damage  … Remains of wildlife sent to Smithsonian  \
0            Caused damage  …                                       NO
1            Caused damage  …                                       NO
2                No damage  …                                      YES
3            Caused damage  …                                       NO
4                No damage  …                                       NO
5            Caused damage  …                                       NO
6                No damage  …                                       NO
```

```
7            Caused damage  …                                        NO
8                No damage  …                                        NO
9                No damage  …                                        NO

                                                 Remarks Wildlife: Size  \
0  JUST ENTERING CLOUD BASES, STRUCK UNKN # OF BI…          Large
1  BIRD REPTD AS BLUE GOOSE. DMG TO LWR L ENG COW…          Large
2  ID BY SMITHSONIAN. A/C INGESTED BIRD IN #1 ENG…         Medium
3  FLT 439. HIGH VIBRATIONS IN #1 ENG. ENG DID NO…          Small
4                        DEPARTURE END END RWY 28R.           Large
5  ATIS WARNING. FLT 44 ADVISED OF BIRDSTRIKE IN …          Large
6                                          HIT FLAP           Small
7  SNOW PLOW PROBABLY DISTURBED GEESE CAUSING THE…          Large
8                           WE WERE 1ST A/C ON RWY.           Small
9                                       Unvailable          Medium

  Conditions: Sky     Wildlife: Species Pilot warned of birds or wildlife?  \
0        Overcast  Unknown bird - large                                  No
1        Overcast            Snow goose                                  No
2        Overcast               Gadwall                                 Yes
3        Overcast     European starling                                  No
4      Some Cloud  Unknown bird - large                                  No
5      Some Cloud          Canada goose                                 Yes
6        Overcast  Unknown bird - small                                  No
7      Some Cloud            Snow goose                                  No
8        Overcast  Unknown bird - small                                 Yes
9        Overcast   Unknown bird or bat                                 Yes

  Cost: Total $ Feet above ground Number of people injured Is Aircraft Large?
0             0             1,800                        0                  No
1        31,624               500                        0                  No
2             0               300                        0                  No
3             0               200                        0                 Yes
4             0               700                        0                  No
5             0               200                        0                 Yes
6             0             1,800                        0                  No
7             0                50                        0                 Yes
8             0                 0                        0                  No
9             0               150                        0                  No

[10 rows x 26 columns]

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 25558 entries, 0 to 25557
Data columns (total 26 columns):
 #   Column                                  Non-Null Count  Dtype
---  ------                                  --------------  -----
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 2   Airport: Name                           25558 non-null  object
 3   Altitude bin                            25558 non-null  object
 4   Aircraft: Make/Model                    25558 non-null  object
 5   Wildlife: Number struck                 25558 non-null  object
 6   Wildlife: Number Struck Actual          25558 non-null  int64
 7   Effect: Impact to flight                25558 non-null  object
 8   FlightDate                              25558 non-null  object
 9   Effect: Indicated Damage                25558 non-null  object
 10  Aircraft: Number of engines?            25558 non-null  object
 11  Aircraft: Airline/Operator              25558 non-null  object
 12  Origin State                            25558 non-null  object
 13  When: Phase of flight                   25558 non-null  object
 14  Conditions: Precipitation               25558 non-null  object
 15  Remains of wildlife collected?          25558 non-null  object
 16  Remains of wildlife sent to Smithsonian 25558 non-null  object
 17  Remarks                                 25558 non-null  object
 18  Wildlife: Size                          25558 non-null  object
 19  Conditions: Sky                         25558 non-null  object
 20  Wildlife: Species                       25558 non-null  object
 21  Pilot warned of birds or wildlife?      25558 non-null  object
 22  Cost: Total $                           25558 non-null  object
 23  Feet above ground                       25558 non-null  object
 24  Number of people injured                25558 non-null  int64
 25  Is Aircraft Large?                      25558 non-null  object
dtypes: int64(3), object(23)
memory usage: 5.1+ MB
```

[3]:
```
#df_cleaned[['Number of people injured', 'Wildlife: Number struck', 'Cost: Total $']].describe()
df_cleaned.describe()
```

[3]:

	Record ID	Wildlife: Number Struck Actual	Number of people injured
count	25558.000000	25558.000000	25558.000000
mean	253916.085609	2.691525	0.001056
std	38510.453382	12.793975	0.050420
min	1195.000000	1.000000	0.000000
25%	225783.750000	1.000000	0.000000
50%	248749.000000	1.000000	0.000000
75%	269168.750000	1.000000	0.000000
max	321909.000000	942.000000	6.000000

[4]:
```
display(df_cleaned.head(10))
```

	Record ID	Aircraft: Type	Airport: Name	Altitude bin	\
0	208033	Airplane	MINNEAPOLIS-ST PAUL INTL	> 1000 ft	
1	261733	Airplane	JOE FOSS FIELD ARPT	< 1000 ft	
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5	10	Other	25/12/2010
6	2	No Impact	30/01/2000
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9	9	No Impact	01/02/2002

	Effect: Indicated Damage	…	Remains of wildlife sent to Smithsonian
0	Caused damage	…	NO
1	Caused damage	…	NO
2	No damage	…	YES
3	Caused damage	…	NO
4	No damage	…	NO
5	Caused damage	…	NO
6	No damage	…	NO
7	Caused damage	…	NO
8	No damage	…	NO
9	No damage	…	NO

	Remarks	Wildlife: Size
0	JUST ENTERING CLOUD BASES, STRUCK UNKN # OF BI…	Large
1	BIRD REPTD AS BLUE GOOSE. DMG TO LWR L ENG COW…	Large
2	ID BY SMITHSONIAN. A/C INGESTED BIRD IN #1 ENG…	Medium

```
3  FLT 439. HIGH VIBRATIONS IN #1 ENG. ENG DID NO…          Small
4                        DEPARTURE END END RWY 28R.          Large
5  ATIS WARNING. FLT 44 ADVISED OF BIRDSTRIKE IN …          Large
6                                          HIT FLAP          Small
7  SNOW PLOW PROBABLY DISTURBED GEESE CAUSING THE…          Large
8                           WE WERE 1ST A/C ON RWY.          Small
9                                       Unvailable         Medium

  Conditions: Sky     Wildlife: Species Pilot warned of birds or wildlife?  \
0        Overcast  Unknown bird - large                                  No
1        Overcast            Snow goose                                  No
2        Overcast               Gadwall                                 Yes
3        Overcast     European starling                                  No
4      Some Cloud  Unknown bird - large                                  No
5      Some Cloud          Canada goose                                 Yes
6        Overcast  Unknown bird - small                                  No
7      Some Cloud            Snow goose                                  No
8        Overcast  Unknown bird - small                                 Yes
9        Overcast   Unknown bird or bat                                 Yes

  Cost: Total $ Feet above ground Number of people injured Is Aircraft Large?
0             0             1,800                        0                  No
1        31,624               500                        0                  No
2             0               300                        0                  No
3             0               200                        0                 Yes
4             0               700                        0                  No
5             0               200                        0                 Yes
6             0             1,800                        0                  No
7             0                50                        0                 Yes
8             0                 0                        0                  No
9             0               150                        0                  No

[10 rows x 26 columns]
```

[5]:
```
df_cleaned.to_csv('output.csv')
df_cleaned.to_excel('output.xlsx')
```

[ ]:
```

```