



Airline Passenger Satisfaction Dataset

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ROAD TO ANALYZE DATA

Exploration of Data
by Python

Cleaning &
Transformation
by Power Quary

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Visualization
of Data by
Power BI

ABOUT

1. This dataset contains information about

- airline passengers
- their experiences during flights.

2. It aims to analyze customer satisfaction and the factors that influence it, such as type of travel, travel class, in-flight services, flight delays, and overall flight experience.

3. The data helps in evaluating service quality and identifying areas for improvement to enhance passenger satisfaction and optimize airline performance.



DATASET DESCRIPTION



ID	Gender	Customer Type
Age	Type of Travel	Class
Flight Distance	Satisfaction	Departure Delay in Minutes
Arrival Delay in Minutes		



DATASET DESCRIPTION

EVALUATION



Inflight wifi service	Departure/Arrival time convenient	Ease of Online booking
Gate location	Food and drink	Online boarding
Seat comfort	Inflight entertainment	On-board service
Leg room service	Baggage handling	Checkin service
Cleanliness	inflighr Services	





EXPLORATION OF DATA

THE FIRST FIVE ROWS OF THE DATA

	ID.	Gender	Customer Type	Age	Type of Travel	Class	Flight Distance	Inflight wifi service	Departure/Arrival time convenient	Ease of Online booking	...	Inflight entertainment	On-board service	Leg room service	Baggage handling	Checkin service	Inflight service
0	19556	Female	Loyal Customer	52	Business travel	Eco	160	5	4	3	...	5	5	5	5	2	5
1	90035	Female	Loyal Customer	36	Business travel	Business	2863	1	1	3	...	4	4	4	4	3	4
2	12360	Male	disloyal Customer	20	Business travel	Eco	192	2	0	2	...	2	4	1	3	2	2
3	77959	Male	Loyal Customer	44	Business travel	Business	3377	0	0	0	...	1	1	1	1	3	1
4	36875	Female	Loyal Customer	49	Business travel	Eco	1182	2	3	4	...	2	2	2	2	4	2



EXPLORATION OF DATA

THE LAST FIVE ROWS OF THE DATA

ID.	Gender	Customer Type	Age	Type of Travel	Class	Flight Distance	Inflight wifi service	Departure/Arrival time convenient	Ease of Online booking	...	Inflight entertainment	On-board service	Leg room service	Baggage handling	Checkin service
78463	Male	disloyal Customer	34	Business travel	Business	526	3	3	3	...	4	3	2	4	4
71167	Male	Loyal Customer	23	Business travel	Business	646	4	4	4	...	4	4	5	5	5
37675	Female	Loyal Customer	17	Personal Travel	Eco	828	2	5	1	...	2	4	3	4	5
90086	Male	Loyal Customer	14	Business travel	Business	1127	3	3	3	...	4	3	2	5	4
34799	Female	Loyal Customer	42	Personal Travel	Eco	264	2	5	2	...	1	1	2	1	1



EXPLORATION OF DATA

- Column data types are ready for analysis.

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 25976 entries, 0 to 25975
Data columns (total 24 columns):
 #   Column                         Non-Null Count  Dtype  
--- 
 0   ID.                           25976 non-null   int64  
 1   Gender                         25976 non-null   object  
 2   Customer Type                  25976 non-null   object  
 3   Age                            25976 non-null   int64  
 4   Type of Travel                 25976 non-null   object  
 5   Class                          25976 non-null   object  
 6   Flight Distance                25976 non-null   int64  
 7   Inflight wifi service          25976 non-null   int64  
 8   Departure/Arrival time convenient  25976 non-null   int64  
 9   Ease of Online booking          25976 non-null   int64  
 10  Gate location                  25976 non-null   int64  
 11  Food and drink                25976 non-null   int64  
 12  Online boarding                25976 non-null   int64  
 13  Seat comfort                  25976 non-null   int64  
 14  Inflight entertainment          25976 non-null   int64  
 15  On-board service               25976 non-null   int64  
 16  Leg room service               25976 non-null   int64  
 17  Baggage handling               25976 non-null   int64  
 18  Checkin service                25976 non-null   int64  
 19  Inflight service               25976 non-null   int64  
 20  Cleanliness                   25976 non-null   int64  
 21  Departure Delay in Minutes    25976 non-null   int64  
 22  Arrival Delay in Minutes      25893 non-null   float64 
 23  Satisfaction                  25976 non-null   object  
dtypes: float64(1), int64(18), object(5)
```



EXPLORATION OF DATA

	ID.	Age	Flight Distance	Inflight wifi service	Departure/Arrival time convenient	Ease of Online booking	Gate location	Food and drink	Online boarding	Seat comfort	Inflight entertainment
count	25976.000000	25976.000000	25976.000000	25976.000000	25976.000000	25976.000000	25976.000000	25976.000000	25976.000000	25976.000000	25976.000000
mean	65005.657992	39.620958	1193.788459	2.724746	3.046812	2.756775	2.977094	3.215353	3.261665	3.449222	3.357753
std	37611.526647	15.135685	998.683999	1.335384	1.533371	1.412951	1.282133	1.331506	1.355536	1.320090	1.338299
min	17.000000	7.000000	31.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	1.000000	0.000000
25%	32170.500000	27.000000	414.000000	2.000000	2.000000	2.000000	2.000000	2.000000	2.000000	2.000000	2.000000
50%	65319.500000	40.000000	849.000000	3.000000	3.000000	3.000000	3.000000	3.000000	4.000000	4.000000	4.000000
75%	97584.250000	51.000000	1744.000000	4.000000	4.000000	4.000000	4.000000	4.000000	4.000000	5.000000	4.000000
max	129877.000000	85.000000	4983.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000

The table shows that the dataset contains

- 25,976 records.
- The average passenger age is about 40 years, with a minimum of 7 years and a maximum of 85 years.
- The average flight distance is around 1,194 miles, ranging from 31 miles to nearly 5,000 miles, showing a wide variation between short and long flights.
- Most service ratings fall between 3 and 4, indicating that passengers generally find the services satisfactory.
- Inflight Wi-Fi, Ease of online booking, and Gate location receive relatively lower scores
- The average departure and arrival delays are about 14–15 minutes, with most flights experiencing no delay, but a few exceptional cases reaching delays of over 1,100 minutes.



EXPLORATION OF DATA

- The dataset is almost complete with no missing values in most columns.
- Only the Arrival Delay in Minutes column has 83 missing records (about 0.3% of the data), which is a very small portion and can be easily handled."

```
df.isnull().sum()
```

Column1	0
id	0
Gender	0
Customer Type	0
Age	0
Type of Travel	0
Class	0
Flight Distance	0
Inflight wifi service	0
Departure/Arrival time convenient	0
Ease of Online booking	0
Gate location	0
Food and drink	0
Online boarding	0
Seat comfort	0
Inflight entertainment	0
On-board service	0
Leg room service	0
Baggage handling	0
Checkin service	0
Inflight service	0
Cleanliness	0
Departure Delay in Minutes	0
Arrival Delay in Minutes	83
satisfaction	0
dtype: int64	



EXPLORATION OF DATA

- There are no duplicated values

```
df.duplicated()  
  
0      False  
1      False  
2      False  
3      False  
4      False  
      ...  
25971  False  
25972  False  
25973  False  
25974  False  
25975  False  
Length: 25976, dtype: bool
```

CLEANING BY POWER QUARRY



Data Cleaning

- Handled 83 missing values using mean imputation.
- Removed the **Inflight Services** column because it was a general summary and detailed service ratings were already available.
- Standardized text fields:
 - Converted Loyal / Disloyal → Regular / Irregular.
 - Fixed the **Satisfaction** column, which originally included an inconsistent label (“Neutral or Dissatisfied”).
- Reclassified **Satisfaction** into **Satisfied – Neutral – Dissatisfied** based on the average Overall Rating = 42.

Data Transformation

- Created an **Overall Rating** column based on the average of all service ratings.
- Created an **Overall Delay** column by combining **Arrival Delay + Departure Delay**.
- Converted service ratings from numeric (1–5) into clear descriptive labels: **Excellent – Good – Average – Fair – Bad – Very Bad**.





CLEANING DATA

id	Gender	Customer Type	Age	Type of Travel	Class	Flight Distance	Inflight wifi service	Departure/Arrival time convenient	Ease of Online booking	Gate location	Food and drink	Online boarding	Seat comfort	Inflight entertainment	On-board service	Leg room service
0,19556	Female	Loyal Customer	52	Business travel	Eco	160	5,4,3,4,3,4,3,5,5,5,5,2,5,5,50,44.0	satisfied								
1,90035	Female	Loyal Customer	36	Business travel	Business	2863	1,1,3,1,5,4,5,4,4,4,3,4,5,0,0.0	satisfied								
2,12360	Male	disloyal Customer	20	Business travel	Eco	192	2,0,2,4,2,2,2,2,4,1,3,2,2,2,0,0.0	neutral or dissatisfied								
3,77959	Male	Loyal Customer	44	Business travel	Business	3377	0,0,0,2,3,4,4,1,1,1,1,3,1,4,0,6.0	satisfied								
4,36875	Female	Loyal Customer	49	Business travel	Eco	1182	2,3,4,3,4,1,2,2,2,2,2,4,2,4,0,20.0	satisfied								
5,39177	Male	Loyal Customer	16	Business travel	Eco	311	3,3,3,5,5,3,5,4,3,1,1,2,5,0,0.0	satisfied								
6,79433	Female	Loyal Customer	77	Business travel	Business	3987	5,5,5,5,3,5,5,5,5,5,4,5,3,0,0.0	satisfied								
7,97286	Female	Loyal Customer	43	Business travel	Business	2556	2,2,2,2,4,4,5,4,4,4,4,5,4,3,77,65.0	satisfied								
8,27508	Male	Loyal Customer	47	Business travel	Eco	556	5,2,2,2,5,5,5,5,2,2,5,3,3,5,1,0.0	satisfied								

id	Gender	Customer Type	Age	Type of Travel	Class	Flight Distance	Inflight wifi service	Departure/Arrival time convenient	Ease of Online booking	Gate location	Food and drink	Online boarding	Seat comfort	Inflight entertainment	On-board service	Leg room service
56	Female	Regular Customer	52	Business travel	Eco	160	Excellent	Good	Average	Good	Average	Good	Average	Excellent	Excellent	Excellent
35	Female	Regular Customer	36	Business travel	Business	2863	Bad	Bad	Average	Bad	Excellent	Good	Excellent	Good	Good	Good
60	Male	Irregular Customer	20	Business travel	Eco	192	Fair	Very Bad	Fair	Good	Fair	Fair	Fair	Fair	Good	Bad
59	Male	Regular Customer	44	Business travel	Business	3377	Very Bad	Very Bad	Very Bad	Fair	Average	Good	Good	Bad	Bad	Bad
75	Female	Regular Customer	49	Business travel	Eco	1182	Fair	Average	Good	Average	Good	Bad	Fair	Fair	Fair	Fair
77	Male	Regular Customer	16	Business travel	Eco	311	Average	Average	Average	Average	Excellent	Excellent	Average	Excellent	Good	Average
33	Female	Regular Customer	77	Business travel	Business	3987	Excellent	Excellent	Excellent	Excellent	Average	Excellent	Excellent	Excellent	Excellent	Excellent
86	Female	Regular Customer	43	Business travel	Business	2556	Fair	Fair	Fair	Fair	Good	Good	Excellent	Good	Good	Good
08	Male	Regular Customer	47	Business travel	Eco	556	Excellent	Fair	Fair	Fair	Excellent	Excellent	Excellent	Fair	Fair	Fair
82	Female	Regular Customer	46	Business travel	Business	1744	Fair	Fair	Fair	Fair	Average	Good	Good	Good	Good	Good
83	Female	Regular Customer	47	Business travel	Eco	1235	Good	Bad	Bad	Bad	Excellent	Bad	Excellent	Average	Average	Good
50	Female	Regular Customer	33	Business travel	Business	325	Fair	Excellent	Excellent	Excellent	Bad	Average	Good	Fair	Fair	Fair
87	Female	Regular Customer	46	Business travel	Business	1009	Excellent	Excellent	Excellent	Excellent	Good	Excellent	Excellent	Excellent	Excellent	Excellent
41	Female	Regular Customer	60	Business travel	Business	451	Bad	Bad	Good	Bad	Excellent	Excellent	Good	Excellent	Excellent	Excellent
74	Female	Regular Customer	52	Business travel	Business	925	Fair	Fair	Fair	Fair	Excellent	Excellent	Good	Good	Good	Good
70	Male	Regular Customer	50	Personal Travel	Eco	83	Average	Good	Very Bad	Average	Fair	Very Bad	Fair	Fair	Good	Fair
15	Female	Regular Customer	31	Business travel	Eco	728	Fair	Excellent	Excellent	Excellent	Fair	Fair	Fair	Fair	Good	Average
36	Male	Regular Customer	52	Personal Travel	Eco Plus	1075	Excellent	Good	Excellent	Average	Good	Excellent	Good	Good	Average	Excellent
72	Female	Regular Customer	43	Personal Travel	Eco	1927	Average	Good	Average	Bad	Good	Good	Excellent	Excellent	Excellent	Average
87	Female	Regular Customer	50	Business travel	Business	3799	Excellent	Excellent	Excellent	Excellent	Good	Excellent	Good	Good	Good	Excellent
95	Male	Regular Customer	60	Business travel	Business	612	Good	Good	Good	Good	Fair	Good	Excellent	Excellent	Excellent	Excellent
55	Male	Regular Customer	43	Personal Travel	Eco	1437	Average	Good	Average	Good	Fair	Average	Fair	Fair	Good	Fair
81	Male	Regular Customer	55	Personal Travel	Eco	302	Bad	Fair	Good	Average	Good	Good	Good	Good	Bad	Average