

Sakshi Kharat

CognifyzTechnology

Predict Restaurant Ratings

```
import pandas as pd
import numpy as np
```

Loading the Dataset

```
from google.colab import files

uploaded = files.upload()
<IPython.core.display.HTML object>
Saving Dataset.csv to Dataset.csv
df = pd.read_csv('Dataset.csv')
```

Viewing the Dataset

```
df
```

	Restaurant ID	Restaurant Name	Country Code
City \			
0	6317637	Le Petit Souffle	162
Makati City			
1	6304287	Izakaya Kikufuji	162
Makati City			
2	6300002	Heat - Edsa Shangri-La	162
Mandaluyong City			
3	6318506	Ooma	162
Mandaluyong City			
4	6314302	Sambo Kojin	162
Mandaluyong City			
...
...			
9546	5915730	Naml \ Gurme	208
00istanbul			
9547	5908749	Ceviz A00ac \	208
00istanbul			
9548	5915807	Huqqa	208
00istanbul			
9549	5916112	A000k Kahve	208
00istanbul			
9550	5927402	Walter's Coffee Roastery	208

00istanbul

	Address \
0	Third Floor, Century City Mall, Kalayaan Avenu...
1	Little Tokyo, 2277 Chino Roces Avenue, Legaspi...
2	Edsa Shangri-La, 1 Garden Way, Ortigas, Mandal...
3	Third Floor, Mega Fashion Hall, SM Megamall, O...
4	Third Floor, Mega Atrium, SM Megamall, Ortigas...
...	...
9546	Kemanke00 Karamustafa Pa00a Mahallesi, R\ht\m ...
9547	Ko00uyolu Mahallesi, Muhittin 00st0_nda00 Cadd...
9548	Kuru0_e00me Mahallesi, Muallim Naci Caddesi, N...
9549	Kuru0_e00me Mahallesi, Muallim Naci Caddesi, N...
9550	Cafea00a Mahallesi, Bademalt\ Sokak, No 21/B, ...

	Locality \
0	Century City Mall, Poblacion, Makati City
1	Little Tokyo, Legaspi Village, Makati City
2	Edsa Shangri-La, Ortigas, Mandaluyong City
3	SM Megamall, Ortigas, Mandaluyong City
4	SM Megamall, Ortigas, Mandaluyong City
...	...
9546	Karak0_y
9547	Ko00uyolu
9548	Kuru0_e00me
9549	Kuru0_e00me
9550	Moda

	Locality Verbose	Longitude \
0	Century City Mall, Poblacion, Makati City, Mak...	121.027535
1	Little Tokyo, Legaspi Village, Makati City, Ma...	121.014101
2	Edsa Shangri-La, Ortigas, Mandaluyong City, Ma...	121.056831
3	SM Megamall, Ortigas, Mandaluyong City, Mandal...	121.056475
4	SM Megamall, Ortigas, Mandaluyong City, Mandal...	121.057508
...
9546	Karak0_y, 00istanbul	28.977392
9547	Ko00uyolu, 00istanbul	29.041297
9548	Kuru0_e00me, 00istanbul	29.034640
9549	Kuru0_e00me, 00istanbul	29.036019
9550	Moda, 00istanbul	29.026016

	Latitude	Cuisines ...
Currency \		
0	14.565443	French, Japanese, Desserts ... Botswana Pula(P)
1	14.553708	Japanese ... Botswana Pula(P)
2	14.581404	Seafood, Asian, Filipino, Indian ... Botswana Pula(P)

3	14.585318		Japanese, Sushi	...	Botswana
Pula(P)					
4	14.584450		Japanese, Korean	...	Botswana
Pula(P)					
...
..					
9546	41.022793		Turkish	...	Turkish
Lira(TL)					
9547	41.009847	World Cuisine, Patisserie, Cafe		...	Turkish
Lira(TL)					
9548	41.055817	Italian, World Cuisine		...	Turkish
Lira(TL)					
9549	41.057979	Restaurant Cafe		...	Turkish
Lira(TL)					
9550	40.984776	Cafe		...	Turkish
Lira(TL)					

	Has Table booking	Has Online delivery	Is delivering now	\
0	Yes	No	No	
1	Yes	No	No	
2	Yes	No	No	
3	No	No	No	
4	Yes	No	No	
...	
9546	No	No	No	
9547	No	No	No	
9548	No	No	No	
9549	No	No	No	
9550	No	No	No	

	Switch to order menu	Price range	Aggregate rating	Rating color
\				
0	No	3	4.8	Dark Green
1	No	3	4.5	Dark Green
2	No	4	4.4	Green
3	No	4	4.9	Dark Green
4	No	4	4.8	Dark Green
...
9546	No	3	4.1	Green
9547	No	3	4.2	Green
9548	No	4	3.7	Yellow

9549	No	4	4.0	Green
9550	No	2	4.0	Green

	Rating	text	Votes
0	Excellent		314
1	Excellent		591
2	Very Good		270
3	Excellent		365
4	Excellent		229
...			...
9546	Very Good		788
9547	Very Good		1034
9548	Good		661
9549	Very Good		901
9550	Very Good		591

[9551 rows x 21 columns]

df.info

```
<bound method DataFrame.info of          Restaurant ID
Restaurant Name  Country Code          City \
0          6317637          Le Petit Souffle          162
Makati City
1          6304287          Izakaya Kikufuji          162
Makati City
2          6300002      Heat - Edsa Shangri-La          162
Mandaluyong City
3          6318506                      Ooma          162
Mandaluyong City
4          6314302          Sambo Kojin          162
Mandaluyong City
...          ...          ...          ...
...
9546          5915730          Naml \ Gurme          208
00istanbul
9547          5908749          Ceviz A00ac \          208
00istanbul
9548          5915807          Huqqa          208
00istanbul
9549          5916112          A000k Kahve          208
00istanbul
9550          5927402  Walter's Coffee Roastery          208
00istanbul
```

```
Address \
0  Third Floor, Century City Mall, Kalayaan Avenu...
1  Little Tokyo, 2277 Chino Roces Avenue, Legaspi...
```

2	Edsa Shangri-La, 1 Garden Way, Ortigas, Mandal...
3	Third Floor, Mega Fashion Hall, SM Megamall, O...
4	Third Floor, Mega Atrium, SM Megamall, Ortigas...
...	...
9546	Kemanke Karamustafa Pa Mahallesi, R\ht\m ...
9547	Ko uyolu Mahallesi, Muhittin 00st0 nda00 Cadd...
9548	Kuru_e00me Mahallesi, Muallim Naci Caddesi, N...
9549	Kuru_e00me Mahallesi, Muallim Naci Caddesi, N...
9550	Cafea00a Mahallesi, Bademalt\ Sokak, No 21/B, ...

	Locality \
0	Century City Mall, Poblacion, Makati City
1	Little Tokyo, Legaspi Village, Makati City
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3	SM Megamall, Ortigas, Mandaluyong City
4	SM Megamall, Ortigas, Mandaluyong City
...	...
9546	Karak_y
9547	Ko uyolu
9548	Kuru_e00me
9549	Kuru_e00me
9550	Moda

	Locality Verbose	Longitude \
0	Century City Mall, Poblacion, Makati City, Mak...	121.027535
1	Little Tokyo, Legaspi Village, Makati City, Ma...	121.014101
2	Edsa Shangri-La, Ortigas, Mandaluyong City, Ma...	121.056831
3	SM Megamall, Ortigas, Mandaluyong City, Mandal...	121.056475
4	SM Megamall, Ortigas, Mandaluyong City, Mandal...	121.057508
...
9546	Karak_y, 00stanbul	28.977392
9547	Ko uyolu, 00stanbul	29.041297
9548	Kuru_e00me, 00stanbul	29.034640
9549	Kuru_e00me, 00stanbul	29.036019
9550	Moda, 00stanbul	29.026016

	Latitude	Cuisines ...	
Currency \			
0	14.565443	French, Japanese, Desserts ...	Botswana
Pula(P)			
1	14.553708	Japanese ...	Botswana
Pula(P)			
2	14.581404	Seafood, Asian, Filipino, Indian ...	Botswana
Pula(P)			
3	14.585318	Japanese, Sushi ...	Botswana
Pula(P)			
4	14.584450	Japanese, Korean ...	Botswana
Pula(P)			
...

9546	41.022793		Turkish	...	Turkish
Lira(TL)					
9547	41.009847	World Cuisine, Patisserie, Cafe	...	Turkish	
Lira(TL)					
9548	41.055817	Italian, World Cuisine	...	Turkish	
Lira(TL)					
9549	41.057979	Restaurant Cafe	...	Turkish	
Lira(TL)					
9550	40.984776	Cafe	...	Turkish	
Lira(TL)					

	Has Table booking	Has Online delivery	Is delivering now	\
0	Yes	No	No	
1	Yes	No	No	
2	Yes	No	No	
3	No	No	No	
4	Yes	No	No	
...	
9546	No	No	No	
9547	No	No	No	
9548	No	No	No	
9549	No	No	No	
9550	No	No	No	

	Switch to order menu	Price range	Aggregate rating	Rating color
\				
0	No	3	4.8	Dark Green
1	No	3	4.5	Dark Green
2	No	4	4.4	Green
3	No	4	4.9	Dark Green
4	No	4	4.8	Dark Green
...
9546	No	3	4.1	Green
9547	No	3	4.2	Green
9548	No	4	3.7	Yellow
9549	No	4	4.0	Green
9550	No	2	4.0	Green

Rating text	Votes
-------------	-------

```

0      Excellent    314
1      Excellent    591
2      Very Good    270
3      Excellent    365
4      Excellent    229
...
9546   Very Good    788
9547   Very Good   1034
9548           Good    661
9549   Very Good    901
9550   Very Good    591

[9551 rows x 21 columns]>

```

Viewing the Columns

```

df.columns
Index(['Restaurant ID', 'Restaurant Name', 'Country Code', 'City',
      'Address',
      'Locality', 'Locality Verbose', 'Longitude', 'Latitude',
      'Cuisines',
      'Average Cost for two', 'Currency', 'Has Table booking',
      'Has Online delivery', 'Is delivering now', 'Switch to order
menu',
      'Price range', 'Aggregate rating', 'Rating color', 'Rating
text',
      'Votes'],
      dtype='object')

```

```

df.describe

<bound method NDFrame.describe of Restaurant ID
Restaurant Name Country Code City \
0      6317637      Le Petit Souffle      162
Makati City
1      6304287      Izakaya Kikufuji      162
Makati City
2      6300002      Heat - Edsa Shangri-La      162
Mandaluyong City
3      6318506      Ooma      162
Mandaluyong City
4      6314302      Sambo Kojin      162
Mandaluyong City
...      ...      ...      ...
...
9546      5915730      Naml \ Gurme      208
00istanbul
9547      5908749      Ceviz A00ac \      208
00istanbul

```

9548	5915807	Huqqa	208
İstanbul			
9549	5916112	Ak Kahve	208
İstanbul			
9550	5927402	Walter's Coffee Roastery	208
İstanbul			
Address \			
0	Third Floor, Century City Mall, Kalayaan Avenu...		
1	Little Tokyo, 2277 Chino Roces Avenue, Legaspi...		
2	Edsa Shangri-La, 1 Garden Way, Ortigas, Mandal...		
3	Third Floor, Mega Fashion Hall, SM Megamall, O...		
4	Third Floor, Mega Atrium, SM Megamall, Ortigas...		
...	...		
9546	Kemanke Karamustafa Pa Mahallesi, R\ht\m ...		
9547	Koyolu Mahallesi, Muhittin st\nda Cadd...		
9548	Kuru_eome Mahallesi, Muallim Naci Caddesi, N...		
9549	Kuru_eome Mahallesi, Muallim Naci Caddesi, N...		
9550	Cafea Mahallesi, Bademalt\ Sokak, No 21/B, ...		
Locality \			
0	Century City Mall, Poblacion, Makati City		
1	Little Tokyo, Legaspi Village, Makati City		
2	Edsa Shangri-La, Ortigas, Mandaluyong City		
3	SM Megamall, Ortigas, Mandaluyong City		
4	SM Megamall, Ortigas, Mandaluyong City		
...	...		
9546	Karak_y		
9547	Koyolu		
9548	Kuru_eome		
9549	Kuru_eome		
9550	Moda		
Locality Verbose Longitude \			
0	Century City Mall, Poblacion, Makati City, Mak...		121.027535
1	Little Tokyo, Legaspi Village, Makati City, Ma...		121.014101
2	Edsa Shangri-La, Ortigas, Mandaluyong City, Ma...		121.056831
3	SM Megamall, Ortigas, Mandaluyong City, Mandal...		121.056475
4	SM Megamall, Ortigas, Mandaluyong City, Mandal...		121.057508
...
9546	Karak_y, İstanbul		28.977392
9547	Koyolu, İstanbul		29.041297
9548	Kuru_eome, İstanbul		29.034640
9549	Kuru_eome, İstanbul		29.036019
9550	Moda, İstanbul		29.026016
Latitude Cuisines ...			
Currency \			
0	14.565443	French, Japanese, Desserts ...	Botswana

Pula(P)					
1	14.553708		Japanese	...	Botswana
Pula(P)					
2	14.581404	Seafood, Asian, Filipino, Indian		...	Botswana
Pula(P)					
3	14.585318		Japanese, Sushi	...	Botswana
Pula(P)					
4	14.584450		Japanese, Korean	...	Botswana
Pula(P)					
...
..					
9546	41.022793		Turkish	...	Turkish
Lira(TL)					
9547	41.009847	World Cuisine, Patisserie, Cafe		...	Turkish
Lira(TL)					
9548	41.055817		Italian, World Cuisine	...	Turkish
Lira(TL)					
9549	41.057979		Restaurant Cafe	...	Turkish
Lira(TL)					
9550	40.984776		Cafe	...	Turkish
Lira(TL)					
Has Table booking Has Online delivery Is delivering now \					
0		Yes	No		No
1		Yes	No		No
2		Yes	No		No
3		No	No		No
4		Yes	No		No
...	
9546		No	No		No
9547		No	No		No
9548		No	No		No
9549		No	No		No
9550		No	No		No
Switch to order menu Price range Aggregate rating Rating color					
\					
0		No	3	4.8	Dark Green
1		No	3	4.5	Dark Green
2		No	4	4.4	Green
3		No	4	4.9	Dark Green
4		No	4	4.8	Dark Green
...	
9546		No	3	4.1	Green

9547	No	3	4.2	Green
9548	No	4	3.7	Yellow
9549	No	4	4.0	Green
9550	No	2	4.0	Green

	Rating text	Votes
0	Excellent	314
1	Excellent	591
2	Very Good	270
3	Excellent	365
4	Excellent	229
...
9546	Very Good	788
9547	Very Good	1034
9548	Good	661
9549	Very Good	901
9550	Very Good	591

[9551 rows x 21 columns]>

df.head(10)

Restaurant ID	Restaurant Name	Country
Code \		
0 6317637	Le Petit Souffle	
162		
1 6304287	Izakaya Kikufuji	
162		
2 6300002	Heat - Edsa Shangri-La	
162		
3 6318506	Ooma	
162		
4 6314302	Sambo Kojin	
162		
5 18189371	Din Tai Fung	
162		
6 6300781	Buffet 101	
162		
7 6301290	Vikings	
162		
8 6300010	Spiral - Sofitel Philippine Plaza Manila	
162		
9 6314987	Locavore	
162		

	City	Address
\		
0	Makati City	Third Floor, Century City Mall, Kalayaan Avenu...
1	Makati City	Little Tokyo, 2277 Chino Roces Avenue, Legaspi...
2	Mandaluyong City	Edsa Shangri-La, 1 Garden Way, Ortigas, Mandal...
3	Mandaluyong City	Third Floor, Mega Fashion Hall, SM Megamall, 0...
4	Mandaluyong City	Third Floor, Mega Atrium, SM Megamall, Ortigas...
5	Mandaluyong City	Ground Floor, Mega Fashion Hall, SM Megamall, ...
6	Pasay City	Building K, SM By The Bay, Sunset Boulevard, M...
7	Pasay City	Building B, By The Bay, Seaside Boulevard, Mal...
8	Pasay City	Plaza Level, Sofitel Philippine Plaza Manila, ...
9	Pasig City	Brixton Technology Center, 10 Brixton Street, ...
	Locality	\
0	Century City Mall, Poblacion, Makati City	
1	Little Tokyo, Legaspi Village, Makati City	
2	Edsa Shangri-La, Ortigas, Mandaluyong City	
3	SM Megamall, Ortigas, Mandaluyong City	
4	SM Megamall, Ortigas, Mandaluyong City	
5	SM Megamall, Ortigas, Mandaluyong City	
6	SM by the Bay, Mall of Asia Complex, Pasay City	
7	SM by the Bay, Mall of Asia Complex, Pasay City	
8	Sofitel Philippine Plaza Manila, Pasay City	
9	Kapitolyo	
	Locality Verbose	Longitude
Latitude	\	
0	Century City Mall, Poblacion, Makati City, Mak...	121.027535
	14.565443	
1	Little Tokyo, Legaspi Village, Makati City, Ma...	121.014101
	14.553708	
2	Edsa Shangri-La, Ortigas, Mandaluyong City, Ma...	121.056831
	14.581404	
3	SM Megamall, Ortigas, Mandaluyong City, Mandal...	121.056475
	14.585318	
4	SM Megamall, Ortigas, Mandaluyong City, Mandal...	121.057508
	14.584450	
5	SM Megamall, Ortigas, Mandaluyong City, Mandal...	121.056314
	14.583764	
6	SM by the Bay, Mall of Asia Complex, Pasay Cit...	120.979667

14.531333
7 SM by the Bay, Mall of Asia Complex, Pasay Cit... 120.979333
14.540000
8 Sofitel Philippine Plaza Manila, Pasay City, P... 120.980090
14.552990
9 Kapitolyo, Pasig City 121.056532
14.572041

	Cuisines	...	Currency	\
0	French, Japanese, Desserts	...	Botswana Pula(P)	
1	Japanese	...	Botswana Pula(P)	
2	Seafood, Asian, Filipino, Indian	...	Botswana Pula(P)	
3	Japanese, Sushi	...	Botswana Pula(P)	
4	Japanese, Korean	...	Botswana Pula(P)	
5	Chinese	...	Botswana Pula(P)	
6	Asian, European	...	Botswana Pula(P)	
7	Seafood, Filipino, Asian, European	...	Botswana Pula(P)	
8	European, Asian, Indian	...	Botswana Pula(P)	
9	Filipino	...	Botswana Pula(P)	

	Has Table booking	Has Online delivery	Is delivering now	\
0	Yes	No	No	
1	Yes	No	No	
2	Yes	No	No	
3	No	No	No	
4	Yes	No	No	
5	No	No	No	
6	Yes	No	No	
7	Yes	No	No	
8	Yes	No	No	
9	Yes	No	No	

	Switch to order menu	Price range	Aggregate rating	Rating color	\
0	No	3	4.8	Dark Green	
1	No	3	4.5	Dark Green	
2	No	4	4.4	Green	
3	No	4	4.9	Dark Green	
4	No	4	4.8	Dark Green	
5	No	3	4.4	Green	
6	No	4	4.0	Green	
7	No	4	4.2	Green	
8	No	4	4.9	Dark Green	
9	No	3	4.8	Dark Green	

	Rating text	Votes
0	Excellent	314
1	Excellent	591
2	Very Good	270
3	Excellent	365
4	Excellent	229

5	Very Good	336
6	Very Good	520
7	Very Good	677
8	Excellent	621
9	Excellent	532

```
[10 rows x 21 columns]
```

```
df.shape
```

(9551, 21)

```
print(df)
```

City \ Restaurant ID	Restaurant Name	Country Code
0 Makati City 6317637	Le Petit Souffle	162
1 Makati City 6304287	Izakaya Kikufuji	162
2 Mandaluyong City 6300002	Heat - Edsa Shangri-La	162
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9547 Istanbul 5908749	Ceviz A00ac \	208
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9549 Istanbul 5916112	A000k Kahve	208
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	Address
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...	...
9546	Kemanke00 Karamustafa Pa00a Mahallesi, R\htm ...
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9549	Kuru0_e00me Mahallesi, Muallim Naci Caddesi, N...

9550 Cafea00a Mahallesi, Bademaltı Sokak, No 21/B, ...

	Locality \
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1	Little Tokyo, Legaspi Village, Makati City
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...	...
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9547	Koşuyolu
9548	Kuruçeşme
9549	Kuruçeşme
9550	Moda

	Locality Verbose	Longitude \
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9550	Moda, İstanbul	29.026016

	Latitude	Cuisines ...
Currency \		
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4	14.584450	Japanese, Korean ... Botswana Pula(P)

... .. .

9546	41.022793	Turkish ... Turkish Lira(TL)
9547	41.009847	World Cuisine, Patisserie, Cafe ... Turkish Lira(TL)
9548	41.055817	Italian, World Cuisine ... Turkish Lira(TL)
9549	41.057979	Restaurant Cafe ... Turkish

Lira(TL)

9550 40.984776

Cafe ... Turkish

Lira(TL)

	Has Table booking	Has Online delivery	Is delivering now	\
0	Yes	No	No	
1	Yes	No	No	
2	Yes	No	No	
3	No	No	No	
4	Yes	No	No	
...	
9546	No	No	No	
9547	No	No	No	
9548	No	No	No	
9549	No	No	No	
9550	No	No	No	

	Switch to order menu	Price range	Aggregate rating	Rating color
\				
0	No	3	4.8	Dark Green
1	No	3	4.5	Dark Green
2	No	4	4.4	Green
3	No	4	4.9	Dark Green
4	No	4	4.8	Dark Green
...
9546	No	3	4.1	Green
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	Rating text	Votes
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9548      Good    661
9549  Very Good    901
9550  Very Good    591
```

```
[9551 rows x 21 columns]
```

```
df.iloc[2]
```

```
Restaurant ID
6300002
Restaurant Name      Heat - Edsa
Shangri-La
Country Code
162
City      Mandaluyong
City
Address      Edsa Shangri-La, 1 Garden Way, Ortigas,
Mandal...
Locality      Edsa Shangri-La, Ortigas, Mandaluyong
City
Locality Verbose      Edsa Shangri-La, Ortigas, Mandaluyong City,
Ma...
Longitude
121.056831
Latitude
14.581404
Cuisines      Seafood, Asian, Filipino,
Indian
Average Cost for two
4000
Currency      Botswana
Pula(P)
Has Table booking
Yes
Has Online delivery
No
Is delivering now
No
Switch to order menu
No
Price range
4
Aggregate rating
4.4
Rating color
Green
Rating text      Very
Good
Votes
```



```
270
Name: 2, dtype: object
```

Calculating the aggregate ratings

```
df["Aggregate rating"].value_counts()
0.0      2148
3.2       522
3.1       519
3.4       498
3.3       483
3.5       480
3.0       468
3.6       458
3.7       427
3.8       400
2.9       381
3.9       335
2.8       315
4.1       274
4.0       266
2.7       250
4.2       221
2.6       191
4.3       174
4.4       144
2.5       110
4.5        95
2.4        87
4.6        78
4.9        61
2.3        47
4.7        42
2.2        27
4.8        25
2.1        15
2.0         7
1.9         2
1.8         1
Name: Aggregate rating, dtype: int64
```

Preprocessing The Data

Calculating the missing values in the dataset

```
df.isnull()
```

Restaurant ID	Restaurant Name	Country Code	City	Address		
Locality \						
0	False	False	False	False		
False						
1	False	False	False	False		
False						
2	False	False	False	False		
False						
3	False	False	False	False		
False						
4	False	False	False	False		
False						
...		
...						
9546	False	False	False	False		
False						
9547	False	False	False	False		
False						
9548	False	False	False	False		
False						
9549	False	False	False	False		
False						
9550	False	False	False	False		
False						
Locality Verbose	Longitude	Latitude	Cuisines	...		
Currency \						
0	False	False	False	False	...	False
1	False	False	False	False	...	False
2	False	False	False	False	...	False
3	False	False	False	False	...	False
4	False	False	False	False	...	False
...
9546	False	False	False	False	...	False
9547	False	False	False	False	...	False
9548	False	False	False	False	...	False
9549	False	False	False	False	...	False
9550	False	False	False	False	...	False
Has Table booking	Has Online delivery	Is delivering now	\			

0	False	False	False
1	False	False	False
2	False	False	False
3	False	False	False
4	False	False	False
...
9546	False	False	False
9547	False	False	False
9548	False	False	False
9549	False	False	False
9550	False	False	False

	Switch to order menu	Price range	Aggregate rating	Rating
color \				
0	False	False	False	
False				
1	False	False	False	
False				
2	False	False	False	
False				
3	False	False	False	
False				
4	False	False	False	
False				
...
.				
9546	False	False	False	
False				
9547	False	False	False	
False				
9548	False	False	False	
False				
9549	False	False	False	
False				
9550	False	False	False	
False				

	Rating text	Votes
0	False	False
1	False	False
2	False	False
3	False	False
4	False	False
...
9546	False	False
9547	False	False
9548	False	False
9549	False	False
9550	False	False

```
[9551 rows x 21 columns]
```

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

```
Restaurant ID      0
Restaurant Name     0
Country Code       0
City               0
Address            0
Locality           0
Locality Verbose   0
Longitude          0
Latitude           0
Cuisines           9
Average Cost for two 0
Currency           0
Has Table booking  0
Has Online delivery 0
Is delivering now  0
Switch to order menu 0
Price range        0
Aggregate rating   0
Rating color       0
Rating text        0
Votes              0
dtype: int64
```

There are no missing values

```
df_cleaned = df.dropna()
```

```
print(df_cleaned)
```

	Restaurant ID	Restaurant Name	Country Code
City \			
0	6317637	Le Petit Souffle	162
Makati City			
1	6304287	Izakaya Kikufuji	162
Makati City			
2	6300002	Heat - Edsa Shangri-La	162
Mandaluyong City			
3	6318506	Ooma	162
Mandaluyong City			
4	6314302	Sambo Kojin	162
Mandaluyong City			
...
...			
9546	5915730	Naml \ Gurme	208
00istanbul			

9547	5908749	Ceviz A00ac \	208
00istanbul			
9548	5915807	Huqqa	208
00istanbul			
9549	5916112	A000k Kahve	208
00istanbul			
9550	5927402	Walter's Coffee Roastery	208
00istanbul			
Address \			
0	Third Floor, Century City Mall, Kalayaan Avenu...		
1	Little Tokyo, 2277 Chino Roces Avenue, Legaspi...		
2	Edsa Shangri-La, 1 Garden Way, Ortigas, Mandal...		
3	Third Floor, Mega Fashion Hall, SM Megamall, O...		
4	Third Floor, Mega Atrium, SM Megamall, Ortigas...		
...	...		
9546	Kemanke00 Karamustafa Pa00a Mahallesi, R\ht\m ...		
9547	Ko00uyolu Mahallesi, Muhittin 00st0_nda00 Cadd...		
9548	Kuru0_e00me Mahallesi, Muallim Naci Caddesi, N...		
9549	Kuru0_e00me Mahallesi, Muallim Naci Caddesi, N...		
9550	Cafea00a Mahallesi, Bademalt\ Sokak, No 21/B, ...		
Locality \			
0	Century City Mall, Poblacion, Makati City		
1	Little Tokyo, Legaspi Village, Makati City		
2	Edsa Shangri-La, Ortigas, Mandaluyong City		
3	SM Megamall, Ortigas, Mandaluyong City		
4	SM Megamall, Ortigas, Mandaluyong City		
...	...		
9546	Karak0_y		
9547	Ko00uyolu		
9548	Kuru0_e00me		
9549	Kuru0_e00me		
9550	Moda		
Locality Verbose Longitude \			
0	Century City Mall, Poblacion, Makati City, Mak...		121.027535
1	Little Tokyo, Legaspi Village, Makati City, Ma...		121.014101
2	Edsa Shangri-La, Ortigas, Mandaluyong City, Ma...		121.056831
3	SM Megamall, Ortigas, Mandaluyong City, Mandal...		121.056475
4	SM Megamall, Ortigas, Mandaluyong City, Mandal...		121.057508
...
9546	Karak0_y, 00istanbul		28.977392
9547	Ko00uyolu, 00istanbul		29.041297
9548	Kuru0_e00me, 00istanbul		29.034640
9549	Kuru0_e00me, 00istanbul		29.036019
9550	Moda, 00istanbul		29.026016
Latitude		Cuisines ...	

Currency \					
0	14.565443	French, Japanese, Desserts	...	Botswana	
Pula(P)					
1	14.553708	Japanese	...	Botswana	
Pula(P)					
2	14.581404	Seafood, Asian, Filipino, Indian	...	Botswana	
Pula(P)					
3	14.585318	Japanese, Sushi	...	Botswana	
Pula(P)					
4	14.584450	Japanese, Korean	...	Botswana	
Pula(P)					
...
..					
9546	41.022793	Turkish	...	Turkish	
Lira(TL)					
9547	41.009847	World Cuisine, Patisserie, Cafe	...	Turkish	
Lira(TL)					
9548	41.055817	Italian, World Cuisine	...	Turkish	
Lira(TL)					
9549	41.057979	Restaurant Cafe	...	Turkish	
Lira(TL)					
9550	40.984776	Cafe	...	Turkish	
Lira(TL)					
	Has Table booking	Has Online delivery	Is delivering now	\	
0	Yes	No	No		
1	Yes	No	No		
2	Yes	No	No		
3	No	No	No		
4	Yes	No	No		
...		
9546	No	No	No		
9547	No	No	No		
9548	No	No	No		
9549	No	No	No		
9550	No	No	No		
	Switch to order menu	Price range	Aggregate rating	Rating color	
\					
0	No	3	4.8	Dark Green	
1	No	3	4.5	Dark Green	
2	No	4	4.4	Green	
3	No	4	4.9	Dark Green	
4	No	4	4.8	Dark Green	
...	

9546	No	3	4.1	Green
9547	No	3	4.2	Green
9548	No	4	3.7	Yellow
9549	No	4	4.0	Green
9550	No	2	4.0	Green

	Rating text	Votes
0	Excellent	314
1	Excellent	591
2	Very Good	270
3	Excellent	365
4	Excellent	229
...
9546	Very Good	788
9547	Very Good	1034
9548	Good	661
9549	Very Good	901
9550	Very Good	591

[9542 rows x 21 columns]

```
df_cleaned.isnull().sum()
```

```

Restaurant ID      0
Restaurant Name     0
Country Code       0
City               0
Address            0
Locality           0
Locality Verbose   0
Longitude          0
Latitude           0
Cuisines           0
Average Cost for two 0
Currency           0
Has Table booking  0
Has Online delivery 0
Is delivering now   0
Switch to order menu 0
Price range        0
Aggregate rating    0
Rating color        0
Rating text         0

```

```
Votes          0
dtype: int64
```

Label Encoding

Installing the Label Encoding

```
from sklearn import preprocessing

label_encoder = preprocessing.LabelEncoder()

encoded_data = pd.get_dummies(df_cleaned, columns=['Cuisines'])

df_cleaned['Cuisines']=
label_encoder.fit_transform(df_cleaned['Cuisines'])

<ipython-input-22-e27eaf236f61>:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation:
https://pandas.pydata.org/pandas-docs/stable/user\_guide/indexing.html#returning-a-view-versus-a-copy
df_cleaned['Cuisines']=
label_encoder.fit_transform(df_cleaned['Cuisines'])

df_cleaned['Cuisines'].unique()

array([ 920, 1111, 1671, ..., 319, 1824, 1110])

from sklearn import preprocessing

encoded_data = pd.get_dummies(df_cleaned, columns=['Restaurant Name'])

df_cleaned['Restaurant Name']=
label_encoder.fit_transform(df_cleaned['Restaurant Name'])

<ipython-input-26-ff076fcd1971>:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation:
https://pandas.pydata.org/pandas-docs/stable/user\_guide/indexing.html#returning-a-view-versus-a-copy
df_cleaned['Restaurant Name']=
label_encoder.fit_transform(df_cleaned['Restaurant Name'])

df_cleaned['Restaurant Name'].unique()

array([3742, 3167, 2892, ..., 3063, 512, 7231])

from sklearn import preprocessing
```



```

encoded_data = pd.get_dummies(df_cleaned, columns=['Address'])

df_cleaned['Address']=
label_encoder.fit_transform(df_cleaned['Address'])

<ipython-input-30-59dd01b8c0fe>:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation:
https://pandas.pydata.org/pandas-docs/stable/user\_guide/indexing.html#returning-a-view-versus-a-copy
df_cleaned['Address']=
label_encoder.fit_transform(df_cleaned['Address'])

df_cleaned['Address'].unique()

array([8677, 6047, 4676, ..., 5958, 5959, 4250])

categorical_vars = df.select_dtypes(include='object')

numerical_vars = df.select_dtypes(exclude='object')

```

Normalizing Numerical Features

```

from sklearn.preprocessing import MinMaxScaler

scaler = MinMaxScaler()

normalized_numerical_vars = scaler.fit_transform(numerical_vars)

normalized_df = pd.DataFrame(normalized_numerical_vars,
columns=numerical_vars.columns)

print(normalized_df.columns)

Index(['Restaurant ID', 'Country Code', 'Longitude', 'Latitude',
      'Average Cost for two', 'Price range', 'Aggregate rating',
      'Votes'],
      dtype='object')

```

Splitting the Training and testing the Data

```

x = normalized_df.drop('Aggregate rating', axis=1)
y = normalized_df['Aggregate rating']

from sklearn.model_selection import train_test_split

x_train, x_test, y_train, y_test = train_test_split(x, y,
test_size=0.2, random_state=42)

```

Training the Linear Regression

```
from sklearn.linear_model import LinearRegression
model = LinearRegression()
model.fit(x_train, y_train)
LinearRegression()
```

Evaluating the Model

Mean Squared Error

```
from sklearn.metrics import mean_squared_error
y_pred = model.predict(x_train)
mse = mean_squared_error(y_train, y_pred)
print(f"Train Mean Squared Error: {mse}")
Train Mean Squared Error: 0.0626671037783661
y_pred = model.predict(x_test)
mse = mean_squared_error(y_pred, y_test)
print(f"Test Mean Squared Error: {mse}")
Test Mean Squared Error: 0.06563531055788792
```

R Squared

```
from sklearn.metrics import r2_score
y_pred = model.predict(x_train)
r2 = r2_score(y_train, y_pred)
print("R-squared:", r2)
R-squared: 0.3471503297302301
```

End of the code