

Project Name - Indian Restaurants

Project Type - EDA

Project Summary -

"The zomato capstone project aims to provide data-driven insights for improving customer experience and restaurant success.

By analyzing ratings, locations, cuisines, and delivery options, the project identifies factors that influence restaurant

popularity and customer engagement."

Project Goals

- Knowing basic composition of data
- Removing duplicates
- Dealing with missing values
- Understanding features
- Plotting horizontal bar charts (multicolor)
- Using groupby, apply, and unique functions
- Scatter plot
- Word Cloud
- Box plot
- Density plot
- Bar Charts
- Drawing insights and conclusions from data

Data:

The project would require access to Indian Restaurants data. This data might include information such as

- res_id
- name
- establishment
- url
- address
- city
- city_id
- locality
- latitude
- longitude
- zipcode
- country_id
- locality_verbose
- cuisines
- timings
- average_cost_for_two
- price_range
- currency
- highlights
- aggregate_rating
- rating_text
- votes
- photo_count
- opentable_support
- delivery

- takeaway

Objective

To analyze zomato restaurant data to uncover insights related to:

- *Customer preferences
- *Restaurant performance
- *Pricing trends
- *Location-based demand
- *Online delivery & rating impact

Data Loading:

- Reading the sales data from a CSV file, Excel sheet, or a database into a Pandas

```
DataFrame. import pandas as pd df = pd.read_csv('Downloads/Indian-Resturants.csv')
```

Let's begin !

Know your data

Import Libraries

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

Load Dataset

```
df=pd.read_csv("Downloads/Indian-Resturants.csv")
```

df

	res_id	name	establishment \
0	3400299	Bikanervala	['Quick Bites']
1	3400005	Mama Chicken Mama Franky House	['Quick Bites']
2	3401013	Bhagat Halwai	['Quick Bites']
3	3400290	Bhagat Halwai	['Quick Bites']
4	3401744	The Salt Cafe Kitchen & Bar	['Casual Dining']

211939	3202251	Kali Mirch Cafe And Restaurant	['Casual Dining']
211940	3200996	Raju Omlet	['Quick Bites']
211941	18984164	The Grand Thakar	['Casual Dining']
211942	3201138	Subway	['Quick Bites']
211943	18879846	Freshco's - The Health Cafe	['Café']

	url \
0	https://www.zomato.com/agra/bikanervala-khanda...
1	https://www.zomato.com/agra/mama-chicken-mama-...
2	https://www.zomato.com/agra/bhagat-halwai-2-sh...
3	https://www.zomato.com/agra/bhagat-halwai-civi...
4	https://www.zomato.com/agra/the-salt-cafe-kitc...
...	...
211939	https://www.zomato.com/vadodara/kali-mirch-caf...
211940	https://www.zomato.com/vadodara/raju-omlet-kar...
211941	https://www.zomato.com/vadodara/the-grand-thak...
211942	https://www.zomato.com/vadodara/subway-1-akota...
211943	https://www.zomato.com/vadodara/freshcos-the-h...

	address	city
city_id \		
0	Kalyani Point, Near Tulsi Cinema, Bypass Road,...	Agra
34		
1	Main Market, Sadar Bazaar, Agra Cantt, Agra	Agra
34		
2	62/1, Near Easy Day, West Shivaji Nagar, Goalp...	Agra
34		
3	Near Anjana Cinema, Nehru Nagar, Civil Lines, ...	Agra
34		
4	1C,3rd Floor, Fatehabad Road, Tajganj, Agra	Agra
34		
...
...		
211939	Manu Smriti Complex, Near Navrachna School, GI...	Vadodara
32		
211940	Mahalaxmi Apartment, Opposite B 0 B, Karoli Ba...	Vadodara
32		
211941	3rd Floor, Shreem Shalini Mall, Opposite Conqu...	Vadodara
32		
211942	G-2, Vedant Platina, Near Cosmos, Akota, Vadodara	Vadodara
32		
211943	Shop 7, Ground Floor, Opposite Natubhai Circle...	Vadodara
32		

	locality	latitude	longitude	...	price_range	
currency \						
0	Khandari	27.211450	78.002381	...	2	Rs.
1	Agra Cantt	27.160569	78.011583	...	2	Rs.

2	Shahganj	27.182938	77.979684	...	1	Rs.
3	Civil Lines	27.205668	78.004799	...	1	Rs.
4	Tajganj	27.157709	78.052421	...	3	Rs.
...
211939	Fatehgunj	22.336931	73.192356	...	2	Rs.
211940	Karelibaug	22.322455	73.197203	...	1	Rs.
211941	Alkapuri	22.310563	73.171163	...	2	Rs.
211942	Akota	22.270027	73.143068	...	2	Rs.
211943	Vadiwadi	22.309935	73.158768	...	2	Rs.

highlights

```

aggregate_rating \
0      ['Lunch', 'Takeaway Available', 'Credit Card',...
4.4
1      ['Delivery', 'No Alcohol Available', 'Dinner',...
4.4
2      ['No Alcohol Available', 'Dinner', 'Takeaway A...
4.2
3      ['Takeaway Available', 'Credit Card', 'Lunch',...
4.3
4      ['Lunch', 'Serves Alcohol', 'Cash', 'Credit Ca...
4.9
...
...
211939 ['Dinner', 'Cash', 'Lunch', 'Delivery', 'Indoo...
4.1
211940 ['Dinner', 'Cash', 'Takeaway Available', 'Debi...
4.1
211941 ['Dinner', 'Cash', 'Debit Card', 'Lunch', 'Tak...
4.0
211942 ['Dinner', 'Delivery', 'Credit Card', 'Lunch',...
3.7
211943 ['Dinner', 'Cash', 'Takeaway Available', 'Debi...
4.0

```

	rating_text	votes	photo_count	opentable_support	delivery
takeaway					
0	Very Good	814	154	0.0	-1
-1					
1	Very Good	1203	161	0.0	-1

```

-1
2      Very Good      801      107      0.0      1
-1
3      Very Good      693      157      0.0      1
-1
4      Excellent      470      291      0.0      1
-1
...      ...      ...      ...      ...      ...
...
211939  Very Good      243      40      0.0      -1
-1
211940  Very Good      187      40      0.0      1
-1
211941  Very Good      111      38      0.0      -1
-1
211942      Good      128      34      0.0      1
-1
211943  Very Good      93      53      0.0      1
-1

[211944 rows x 26 columns]

```

Use head function to look for first 10 rows

```
df.head(10)
```

```

   res_id      name      establishment \
0  3400299  Bikanervala  ['Quick Bites']
1  3400005  Mama Chicken Mama Franky House  ['Quick Bites']
2  3401013  Bhagat Halwai  ['Quick Bites']
3  3400290  Bhagat Halwai  ['Quick Bites']
4  3401744  The Salt Cafe Kitchen & Bar  ['Casual Dining']
5  3400275  Domino's Pizza  ['Quick Bites']
6  3400296  Honeydew Restaurant  ['Quick Bites']
7  3400368  Domino's Pizza  ['Quick Bites']
8  3401284  Cake House  ['Bakery']
9  3400838  Sugar N Thyme  ['Café']

      url \
0  https://www.zomato.com/agra/bikanervala-khanda...
1  https://www.zomato.com/agra/mama-chicken-mama-...
2  https://www.zomato.com/agra/bhagat-halwai-2-sh...
3  https://www.zomato.com/agra/bhagat-halwai-civi...
4  https://www.zomato.com/agra/the-salt-cafe-kitc...
5  https://www.zomato.com/agra/dominos-pizza-civi...
6  https://www.zomato.com/agra/honeydew-restauran...
7  https://www.zomato.com/agra/dominos-pizza-sika...
8  https://www.zomato.com/agra/cake-house-2-civil...

```

9 <https://www.zomato.com/agra/sugar-n-thyme-tajg...>

	address	city	city_id	\
0	Kalyani Point, Near Tulsi Cinema, Bypass Road,...	Agra	34	
1	Main Market, Sadar Bazaar, Agra Cantt, Agra	Agra	34	
2	62/1, Near Easy Day, West Shivaji Nagar, Goalp...	Agra	34	
3	Near Anjana Cinema, Nehru Nagar, Civil Lines, ...	Agra	34	
4	1C,3rd Floor, Fatehabad Road, Tajganj, Agra	Agra	34	
5	114/23 G, Deep Shikha Complex, Sanjay Place, C...	Agra	34	
6	Opposite Soami Bagh Temple, Dayal Bagh, Agra	Agra	34	
7	Plot C-1/6, Sector 13, Sikandra, Agra	Agra	34	
8	23/301, Wazirpura Rd, Judge Compound Chowraha,...	Agra	34	
9	1374 K/1375 K, Ground floor, Dinesh Nagar, Fat...	Agra	34	

	locality	latitude	longitude	...	price_range	currency	\
0	Khandari	27.211450	78.002381	...	2	Rs.	
1	Agra Cantt	27.160569	78.011583	...	2	Rs.	
2	Shahganj	27.182938	77.979684	...	1	Rs.	
3	Civil Lines	27.205668	78.004799	...	1	Rs.	
4	Tajganj	27.157709	78.052421	...	3	Rs.	
5	Civil Lines	27.201516	78.007556	...	2	Rs.	
6	Dayal Bagh	27.222175	78.010174	...	2	Rs.	
7	Sikandra	27.203930	77.954260	...	2	Rs.	
8	Civil Lines	27.204148	78.009025	...	2	Rs.	
9	Tajganj	27.158243	78.045591	...	3	Rs.	

	highlights	aggregate_rating
0	['Lunch', 'Takeaway Available', 'Credit Card',...]	4.4
1	['Delivery', 'No Alcohol Available', 'Dinner',...]	4.4
2	['No Alcohol Available', 'Dinner', 'Takeaway A...]	4.2
3	['Takeaway Available', 'Credit Card', 'Lunch',...]	4.3
4	['Lunch', 'Serves Alcohol', 'Cash', 'Credit Ca...]	4.9
5	['Credit Card', 'Lunch', 'Delivery', 'Dinner',...]	4.0
6	['Dinner', 'Delivery', 'Lunch', 'Cash', 'Takea...]	4.2
7	['Lunch', 'Delivery', 'Credit Card', 'No Alcoh...]	3.8
8	['Takeaway Available', 'Cash', 'Indoor Seating...]	3.4
9	['No Alcohol Available', 'Dinner', 'Delivery',...]	4.4

rating_text	votes	photo_count	opentable_support	delivery	takeaway
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0	Very Good	814	154	0.0	-1	-1
1	Very Good	1203	161	0.0	-1	-1
2	Very Good	801	107	0.0	1	-1
3	Very Good	693	157	0.0	1	-1
4	Excellent	470	291	0.0	1	-1
5	Very Good	707	62	0.0	-1	-1
6	Very Good	647	46	0.0	1	-1
7	Good	617	18	0.0	-1	-1
8	Average	322	14	0.0	1	-1
9	Very Good	289	324	0.0	1	-1

[10 rows x 26 columns]

Dataset Rows and Columns count

```
df.shape
```

```
(211944, 26)
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
```

```
RangeIndex: 211944 entries, 0 to 211943
```

```
Data columns (total 26 columns):
```

#	Column	Non-Null Count	Dtype
0	res_id	211944 non-null	int64
1	name	211944 non-null	object
2	establishment	211944 non-null	object
3	url	211944 non-null	object
4	address	211810 non-null	object
5	city	211944 non-null	object
6	city_id	211944 non-null	int64
7	locality	211944 non-null	object
8	latitude	211944 non-null	float64
9	longitude	211944 non-null	float64
10	zipcode	48757 non-null	object
11	country_id	211944 non-null	int64


```

12 locality_verbose      211944 non-null object
13 cuisines              210553 non-null object
14 timings               208070 non-null object
15 average_cost_for_two  211944 non-null int64
16 price_range           211944 non-null int64
17 currency              211944 non-null object
18 highlights            211944 non-null object
19 aggregate_rating      211944 non-null float64
20 rating_text           211944 non-null object
21 votes                 211944 non-null int64
22 photo_count           211944 non-null int64
23 opentable_support     211896 non-null float64
24 delivery              211944 non-null int64
25 takeaway              211944 non-null int64
dtypes: float64(4), int64(9), object(13)
memory usage: 42.0+ MB

```

```
df.describe()
```

	res_id	city_id	latitude	longitude
country_id \				
count	2.119440e+05	211944.000000	211944.000000	211944.000000
mean	1.349411e+07	4746.785434	21.499758	77.615276
std	7.883722e+06	5568.766386	22.781331	7.500104
min	5.000000e+01	1.000000	0.000000	0.000000
25%	3.301027e+06	11.000000	15.496071	74.877961
50%	1.869573e+07	34.000000	22.514494	77.425971
75%	1.881297e+07	11306.000000	26.841667	80.219323
max	1.915979e+07	11354.000000	10000.000000	91.832769

	average_cost_for_two	price_range	aggregate_rating
votes \			
count	211944.000000	211944.000000	211944.000000
mean	595.812229	1.882535	3.395937
std	606.239363	0.892989	1.283642
min	0.000000	1.000000	0.000000

25%	250.000000	1.000000	3.300000
16.000000			
50%	400.000000	2.000000	3.800000
100.000000			
75%	700.000000	2.000000	4.100000
362.000000			
max	30000.000000	4.000000	4.900000
42539.000000			

	photo_count	opentable_support	delivery	takeaway
count	211944.000000	211896.0	211944.000000	211944.0
mean	256.971224	0.0	-0.255907	-1.0
std	867.668940	0.0	0.964172	0.0
min	0.000000	0.0	-1.000000	-1.0
25%	3.000000	0.0	-1.000000	-1.0
50%	18.000000	0.0	-1.000000	-1.0
75%	128.000000	0.0	1.000000	-1.0
max	17702.000000	0.0	1.000000	-1.0

Removing duplicates

Identify Duplicates

```
df.duplicated() #Returns a boolean series (True/False) for each row
```

```
0      False
1      False
2      False
3      False
4      False
...
211939   True
211940  False
211941   True
211942  False
211943   True
Length: 211944, dtype: bool
```

```
df.duplicated().sum() #Gives you the total count of duplicate row.
151527
```

```
df[df.duplicated()] #View the actual duplicate rows
```

	res_id	name	establishment	\
101	3400059	Peshawri - ITC Mughal	['Fine Dining']	
116	3400060	Taj Bano - ITC Mughal	['Fine Dining']	
140	3400017	Pinch Of Spice	['Casual Dining']	
141	3400018	Pinch Of Spice	['Casual Dining']	
142	3400850	Urban Deck	['Casual Dining']	
...
211937	18855810	Biryani aur Baatein	['Casual Dining']	
211938	18662583	Wok On Fire	['Casual Dining']	
211939	3202251	Kali Mirch Cafe And Restaurant	['Casual Dining']	
211941	18984164	The Grand Thakar	['Casual Dining']	
211943	18879846	Freshco's - The Health Cafe	['Café']	
			url	\
101			https://www.zomato.com/agra/peshawri-itc-mugha...	
116			https://www.zomato.com/agra/taj-bano-itc-mugha...	
140			https://www.zomato.com/agra/pinch-of-spice-civ...	
141			https://www.zomato.com/agra/pinch-of-spice-taj...	
142			https://www.zomato.com/agra/urban-deck-2-civil...	
...		
211937			https://www.zomato.com/vadodara/biryani-aur-ba...	
211938			https://www.zomato.com/vadodara/wok-on-fire-fa...	
211939			https://www.zomato.com/vadodara/kali-mirch-caf...	
211941			https://www.zomato.com/vadodara/the-grand-thak...	
211943			https://www.zomato.com/vadodara/freshcos-the-h...	
		address	city	
city_id	\			
101		ITC Mughal, Fatehabad Road, Tajganj, Agra	Agra	
34				
116		ITC Mughal, Fatehabad Road, Tajganj, Agra	Agra	
34				
140		23/453, Opposite Sanjay Cinema, Wazipura Road,...	Agra	
34				
141		1076/2, Fatehabad Road, Tajganj, Agra	Agra	
34				
142		5th Floor, The P L Palace Hotel, MG Road, Sanj...	Agra	
34				
...		
...				
211937		Shop 14, Atlantis K-10, A Wing, Genda Circle R...	Vadodara	
32				
211938		Ground Floor 1, Rossette Building, Opposite Se...	Vadodara	
32				
211939		Manu Smriti Complex, Near Navrachna School, GI...	Vadodara	
32				
211941		3rd Floor, Shreem Shalini Mall, Opposite Conqu...	Vadodara	
32				
211943		Shop 7, Ground Floor, Opposite Natubhai Circle...	Vadodara	
32				

	locality	latitude	longitude	...	price_range
currency \					
101	ITC Mughal, Tajganj	27.161150	78.043993	...	4
Rs.					
116	ITC Mughal, Tajganj	27.161132	78.044022	...	4
Rs.					
140	Civil Lines	27.201735	78.007625	...	4
Rs.					
141	Tajganj	27.159649	78.043304	...	4
Rs.					
142	Civil Lines	27.199573	78.003699	...	4
Rs.					
...
...					
211937	Alkapuri	22.317746	73.168043	...	2
Rs.					
211938	Fatehgunj	22.323357	73.187461	...	3
Rs.					
211939	Fatehgunj	22.336931	73.192356	...	2
Rs.					
211941	Alkapuri	22.310563	73.171163	...	2
Rs.					
211943	Vadiwadi	22.309935	73.158768	...	2
Rs.					

	aggregate_rating \	highlights
101	['Lunch', 'Cash', 'Credit Card', 'Dinner', 'De...]	
4.4		
116	['Credit Card', 'Lunch', 'Cash', 'Debit Card', ...]	
4.3		
140	['Lunch', 'Delivery', 'Credit Card', 'Dinner', ...]	
4.6		
141	['Delivery', 'Dinner', 'Cash', 'Credit Card', ...]	
4.6		
142	['Dinner', 'Cash', 'Debit Card', 'Takeaway Ava...]	
4.3		
...		
...		
211937	['Dinner', 'Cash', 'Takeaway Available', 'Debi...]	
4.1		
211938	['Dinner', 'Cash', 'Debit Card', 'Lunch', 'Tak...]	
4.0		
211939	['Dinner', 'Cash', 'Lunch', 'Delivery', 'Indoo...]	
4.1		
211941	['Dinner', 'Cash', 'Debit Card', 'Lunch', 'Tak...]	
4.0		
211943	['Dinner', 'Cash', 'Takeaway Available', 'Debi...]	
4.0		

	rating_text	votes	photo_count	opentable_support	delivery
takeaway					
101	Very Good	353	154	0.0	-1
-1					
116	Very Good	96	205	0.0	-1
-1					
140	Excellent	915	105	0.0	1
-1					
141	Excellent	965	690	0.0	1
-1					
142	Very Good	672	192	0.0	1
-1					
...
...					
211937	Very Good	154	96	0.0	-1
-1					
211938	Very Good	301	126	0.0	1
-1					
211939	Very Good	243	40	0.0	-1
-1					
211941	Very Good	111	38	0.0	-1
-1					
211943	Very Good	93	53	0.0	1
-1					

[151527 rows x 26 columns]

```
df.drop_duplicates()
```

	res_id	name	establishment
0	3400299	Bikanervala	['Quick Bites']
1	3400005	Mama Chicken Mama Franky House	['Quick Bites']
2	3401013	Bhagat Halwai	['Quick Bites']
3	3400290	Bhagat Halwai	['Quick Bites']
4	3401744	The Salt Cafe Kitchen & Bar	['Casual Dining']
...
211882	19142822	Shree Janta Ice Cream	['Dessert Parlour']
211925	18984164	The Grand Thakar	['Casual Dining']
211926	18019952	Geeta lodge	['Casual Dining']

211940	3200996	Raju Omlet	['Quick Bites']
211942	3201138	Subway	['Quick Bites']

	url \
0	https://www.zomato.com/agra/bikanervala-khanda...
1	https://www.zomato.com/agra/mama-chicken-mama-...
2	https://www.zomato.com/agra/bhagat-halwai-2-sh...
3	https://www.zomato.com/agra/bhagat-halwai-civi...
4	https://www.zomato.com/agra/the-salt-cafe-kitc...
...	...
211882	https://www.zomato.com/vadodara/shree-janta-ic...
211925	https://www.zomato.com/vadodara/the-grand-thak...
211926	https://www.zomato.com/vadodara/geeta-lodge-al...
211940	https://www.zomato.com/vadodara/raju-omlet-kar...
211942	https://www.zomato.com/vadodara/subway-1-akota...

	address	city
city_id \		
0	Kalyani Point, Near Tulsi Cinema, Bypass Road,...	Agra
34		
1	Main Market, Sadar Bazaar, Agra Cantt, Agra	Agra
34		
2	62/1, Near Easy Day, West Shivaji Nagar, Goalp...	Agra
34		
3	Near Anjana Cinema, Nehru Nagar, Civil Lines, ...	Agra
34		
4	1C,3rd Floor, Fatehabad Road, Tajganj, Agra	Agra
34		
...
...		
211882	Ground Floor, 5 Ronak Plaza, Tulsidham Char Ra...	Vadodara
32		
211925	3rd Floor, Shreem Shalini Mall, Opposite Conqu...	Vadodara
32		
211926	Shop 11, Ground Floor, Atlantis K-10, Tower A,...	Vadodara
32		
211940	Mahalaxmi Apartment, Opposite B 0 B, Karoli Ba...	Vadodara
32		
211942	G-2, Vedant Platina, Near Cosmos, Akota, Vadodara	Vadodara
32		

	locality	latitude	longitude	...	price_range	
currency \						
0	Khandari	27.211450	78.002381	...	2	Rs.
1	Agra Cantt	27.160569	78.011583	...	2	Rs.

2	Shahganj	27.182938	77.979684	...	1	Rs.
3	Civil Lines	27.205668	78.004799	...	1	Rs.
4	Tajganj	27.157709	78.052421	...	3	Rs.
...
211882	Manjalpur	22.270516	73.196408	...	1	Rs.
211925	Alkapuri	22.310563	73.171163	...	2	Rs.
211926	Alkapuri	22.317731	73.168107	...	1	Rs.
211940	Karelibaug	22.322455	73.197203	...	1	Rs.
211942	Akota	22.270027	73.143068	...	2	Rs.

highlights

```
aggregate rating \
```

```
0      ['Lunch', 'Takeaway Available', 'Credit Card', ...
```

4.4

```
1      ['Delivery', 'No Alcohol Available', 'Dinner',...
```

4.4

```
2      ['No Alcohol Available', 'Dinner', 'Takeaway A...]
```

4.2

```
3      ['Takeaway Available', 'Credit Card', 'Lunch',...
```

4.3

```
4      ['Lunch', 'Serves Alcohol', 'Cash', 'Credit Ca...
```

4.9

4.9			
1.1			1.1

■ ■ ■

```
211882 ['Cash', 'Takeaway Available', 'Delivery', 'In...]
```

2.9

```
211925  ['Dinner', 'Cash', 'Debit Card', 'Lunch', 'Tak...
```

4.0

```
211926 ['Dinner', 'Cash', 'Credit Card', 'Lunch', 'Ta...
```

3 9

```
211940 ['Dinner', 'Cash', 'Takeaway Available', 'Debi...
```

4 1

```
211942 ['Dinner', 'Delivery', 'Credit Card', 'Lunch', ...]
```

211
3 7

rating text votes photo count opentable support delivery

takeaway

0	Very Good	814	154	0.0	-1
---	-----------	-----	-----	-----	----

-1

Rank	Category	Count	Percentage	Score
1	Very Good	1203	161	0.0

-1

2	Very Good	801	107	0.0	1
-1					
3	Very Good	693	157	0.0	1
-1					
4	Excellent	470	291	0.0	1
-1					
...
...					
211882	Average	4	1	0.0	1
-1					
211925	Very Good	111	38	0.0	-1
-1					
211926	Good	207	14	0.0	-1
-1					
211940	Very Good	187	40	0.0	1
-1					
211942	Good	128	34	0.0	1
-1					

[60417 rows x 26 columns]

```
df_cleaned = df.drop_duplicates()      #Remove rows where all columns
are identical
```

Verification : After dropping the rows, always check the shape of your dataframe to ensure the operation worked as expected.

```
print(f"Original shape:{df.shape}")
Original shape:(211944, 26)
print(f"New shape:{df_cleaned.shape}")
New shape:(60417, 26)
```

Dealing with missing values

```
print(df.isnull().sum())      #Check total missing values per column
```

res_id	0
name	0
establishment	0
url	0
address	134
city	0
city_id	0
locality	0
latitude	0
longitude	0

zipcode	163187
country_id	0
locality_verbose	0
cuisines	1391
timings	3874
average_cost_for_two	0
price_range	0
currency	0
highlights	0
aggregate_rating	0
rating_text	0
votes	0
photo_count	0
opentable_support	48
delivery	0
takeaway	0
dtype:	int64

```
missing_pct = (df.isnull().sum() / len(df)) * 100      #Calculate the
percentage of missing values
```

```
print(missing_pct)
```

res_id	0.000000
name	0.000000
establishment	0.000000
url	0.000000
address	0.063224
city	0.000000
city_id	0.000000
locality	0.000000
latitude	0.000000
longitude	0.000000
zipcode	76.995338
country_id	0.000000
locality_verbose	0.000000
cuisines	0.656305
timings	1.827841
average_cost_for_two	0.000000
price_range	0.000000
currency	0.000000
highlights	0.000000
aggregate_rating	0.000000
rating_text	0.000000
votes	0.000000
photo_count	0.000000
opentable_support	0.022647
delivery	0.000000

```
takeaway          0.000000
dtype: float64
```

```
df.drop(columns=['zipcode'],inplace=True)      #Drop Zipcode because it has over 160k missing values
```

```
df['cuisines'] = df['cuisines'].fillna('Unknown')      #Fill cuisines with 'Unknown'
```

```
df['timings'] = df['timings'].fillna(df['timings'].mode()[0])      #Fill timings with the most common timing (Mode)
```

```
df.dropna(subset=['address','opentable_support'],inplace=True)      #Drop rows where address or opentable_support is missing
```

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

```
res_id          0
name            0
establishment    0
url             0
address         0
city            0
city_id         0
locality        0
latitude        0
longitude       0
country_id      0
locality_verbose 0
cuisines        0
timings         0
average_cost_for_two 0
price_range     0
currency        0
highlights      0
aggregate_rating 0
rating_text     0
votes           0
photo_count     0
opentable_support 0
delivery        0
takeaway        0
dtype: int64
```

Create Plots or visualizations

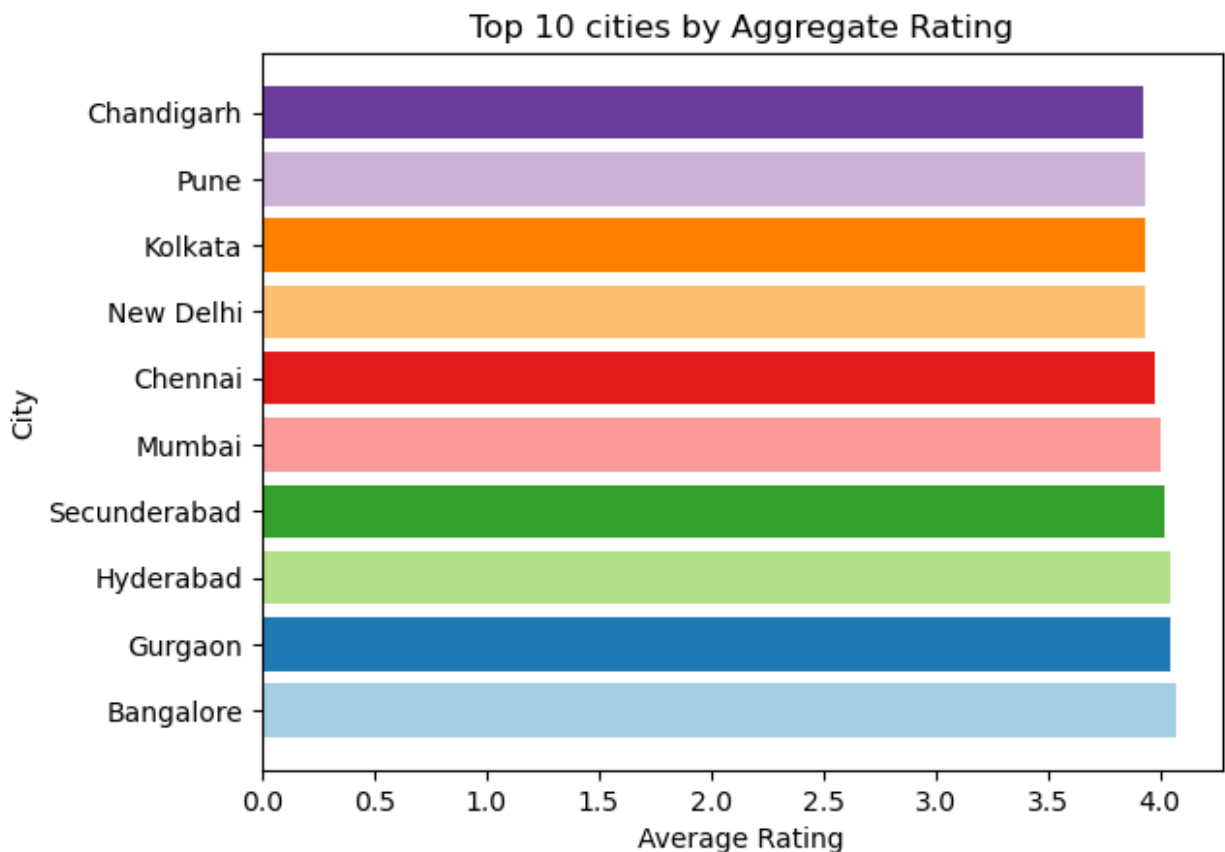
Plotting horizontal bar charts (multicolor)

Group by city, calculate mean rating, and take the top 10

```
top_cities = df.groupby('city')  
['aggregate_rating'].mean().sort_values(ascending=False).head(10)
```

Plotting

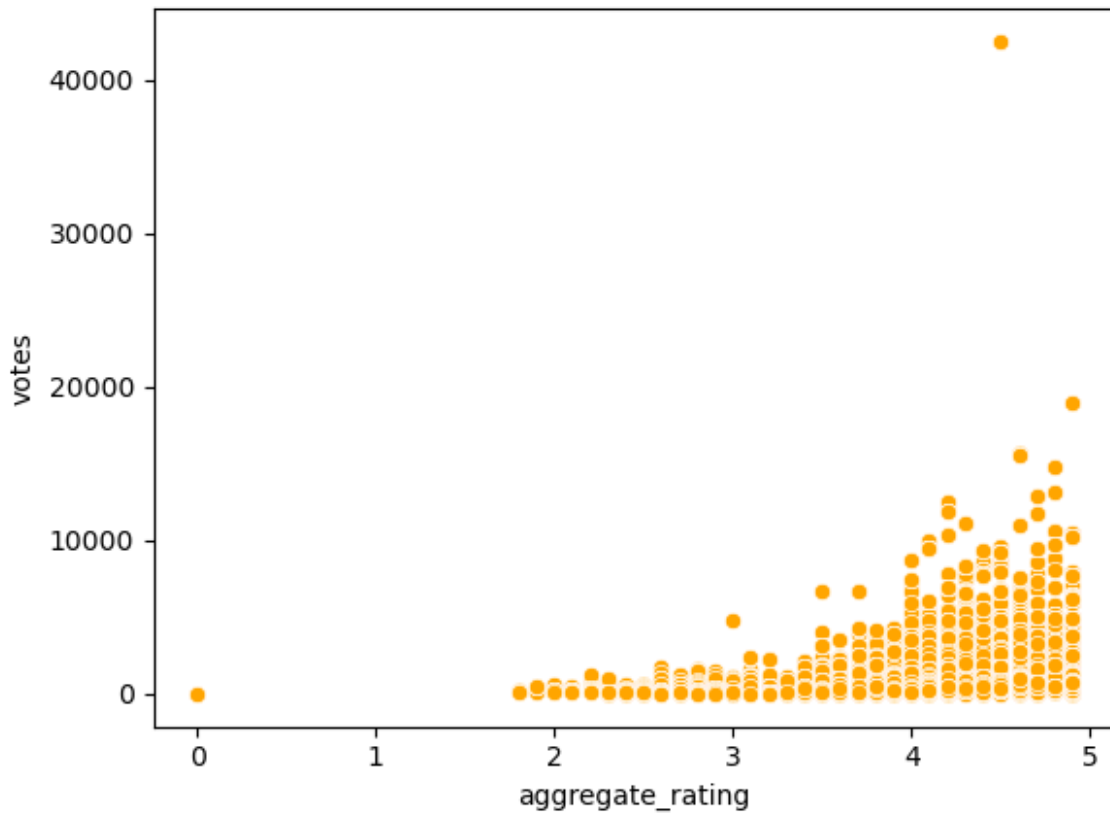
```
plt.barh(y=top_cities.index, width=top_cities.values,  
color=plt.cm.Paired(np.arange(len(top_cities))))  
plt.xlabel('Average Rating')  
plt.ylabel('City')  
plt.title('Top 10 cities by Aggregate Rating')  
plt.show()
```



Scatter plot

```
sns.scatterplot(x=df['aggregate_rating'], y=df['votes'],  
color='orange')
```

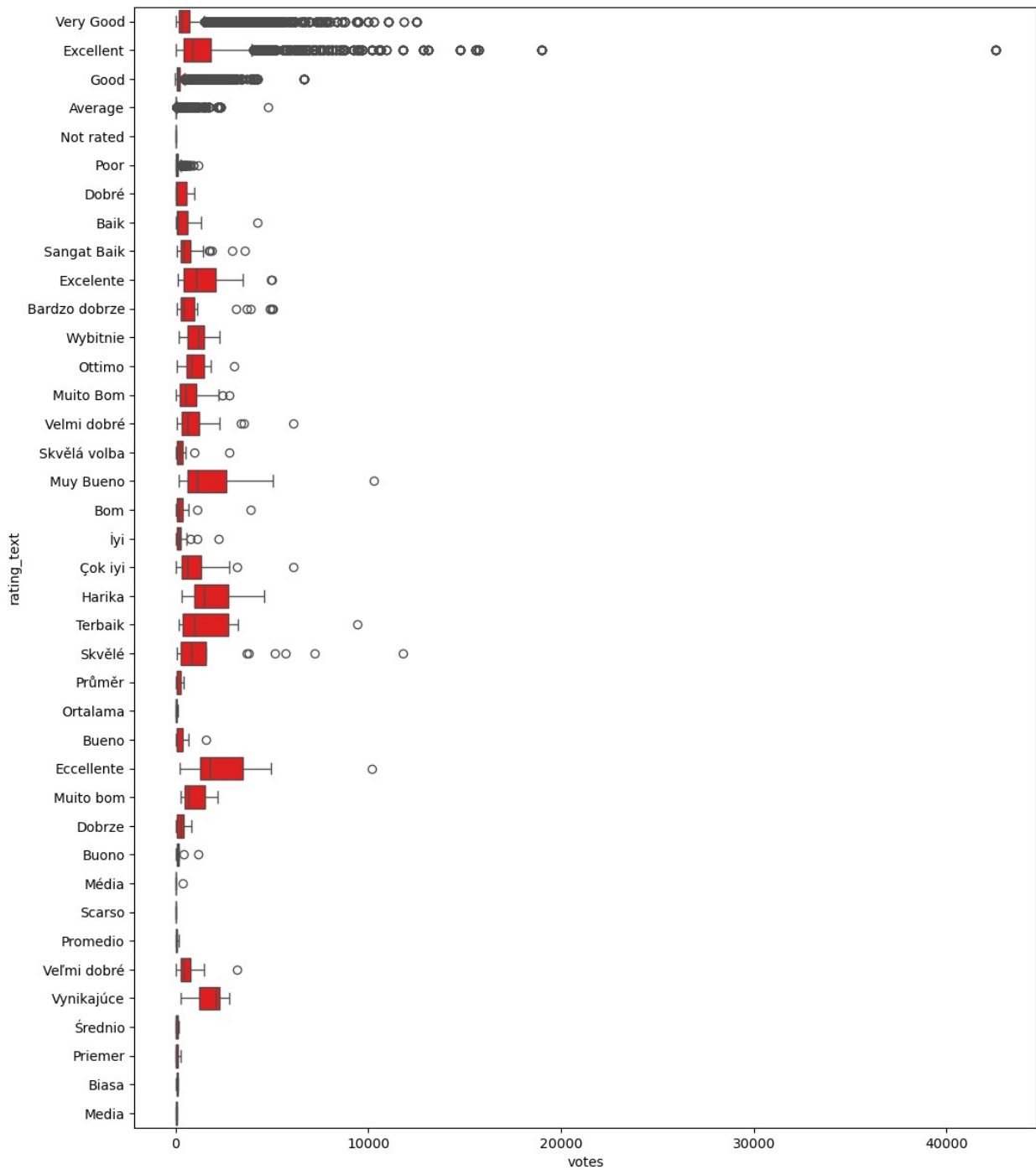
```
<Axes: xlabel='aggregate_rating', ylabel='votes'>
```



Word Cloud

Box plot

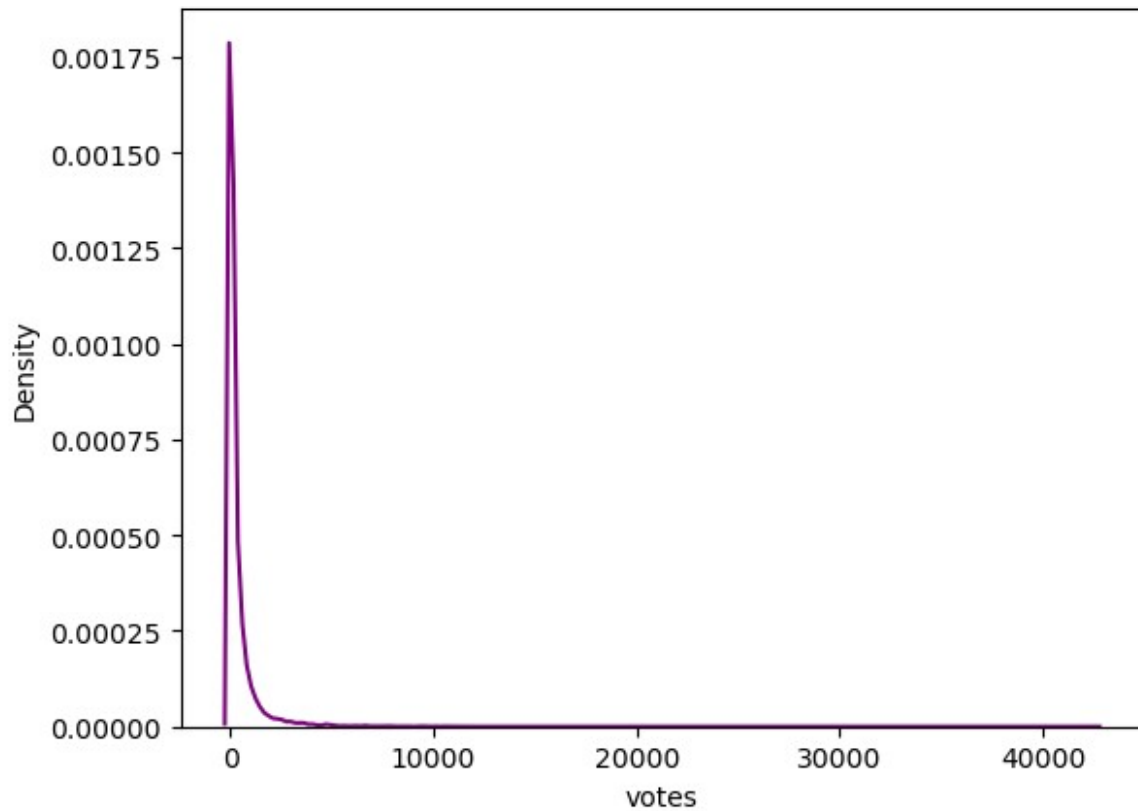
```
plt.figure(figsize=(12,15))  
sns.boxplot(x=df['votes'], y=df['rating_text'], color='red')  
plt.show()
```



Density plot

```
sns.kdeplot(x=df['votes'], color='purple')
```

```
<Axes: xlabel='votes', ylabel='Density'>
```



Conclusion

Improve restaurant recommendations

Optimize pricing strategy

Focus marketing on high-demand cuisines

Identify high-performing locations