```
import pandas as pd
```

```
df = pd.read_csv('-Resturants (1).csv')
df
```

	res_id	name	establishment	url	address	city	city_id	locality	latitude	longitude	...	price_range	currency	highlights	aggregate_rating	rating_text	votes	photo_count	opentable_support	delivery	takeaway
0	3400299	Bikanervala	['Quick Bites']	https://www.zomato.com/agra/bikanervala-khanda...	Kalyani Point, Near Tulsi Cinema, Bypass Road,...	Agra	34	Khandari	27.211450	78.002381	...	2.0	Rs.	['Lunch', 'Takeaway Available', 'Credit Card',...	4.4	Very Good	814.0	154.0	0.0	-1.0	-1.0
1	3400005	Mama Chicken Mama Franky House	['Quick Bites']	https://www.zomato.com/agra/mama-chicken-mama-...	Main Market, Sadar Bazaar, Agra Cantt, Agra	Agra	34	Agra Cantt	27.160569	78.011583	...	2.0	Rs.	['Delivery', 'No Alcohol Available', 'Dinner',...	4.4	Very Good	1203.0	161.0	0.0	-1.0	-1.0
2	3401013	Bhagat Halwai	['Quick Bites']	https://www.zomato.com/agra/bhagat-halwai-2-sh...	62/1, Near Easy Day, West Shivaji Nagar, Goalp...	Agra	34	Shahganj	27.182938	77.979684	...	1.0	Rs.	['No Alcohol Available', 'Dinner', 'Takeaway A...	4.2	Very Good	801.0	107.0	0.0	1.0	-1.0
3	3400290	Bhagat Halwai	['Quick Bites']	https://www.zomato.com/agra/bhagat-halwai-civi...	Near Anjana Cinema, Nehru Nagar, Civil Lines, ...	Agra	34	Civil Lines	27.205668	78.004799	...	1.0	Rs.	['Takeaway Available', 'Credit Card', 'Lunch',...	4.3	Very Good	693.0	157.0	0.0	1.0	-1.0
4	3401744	The Salt Cafe Kitchen & Bar	['Casual Dining']	https://www.zomato.com/agra/the-salt-cafe-kitc...	1C,3rd Floor, Fatehabad Road, Tajganj, Agra	Agra	34	Tajganj	27.157709	78.052421	...	3.0	Rs.	['Lunch', 'Serves Alcohol', 'Cash', 'Credit Ca...	4.9	Excellent	470.0	291.0	0.0	1.0	-1.0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
124674	15432	Roche Restaurant	['Casual Dining']	https://www.zomato.com/ludhiana/roche-restaura...	SCF 13, I Block, Sarabha Nagar, Ludhiana	Ludhiana	20	Sarabha Nagar	30.893644	75.817281	...	3.0	Rs.	['Credit Card', 'Takeaway Available', 'Deliver...	3.8	Good	440.0	120.0	0.0	1.0	-1.0
124675	18681373	Bansi Veg	['Casual Dining']	https://www.zomato.com/ludhiana/bansi-veg-brs-...	SCF- 6F, Near Orient Cinema, BRS Nagar, Ludhiana	Ludhiana	20	BRS Nagar	30.886601	75.804864	...	2.0	Rs.	['Credit Card', 'Lunch', 'Delivery', 'Debit Ca...	3.0	Average	628.0	3.0	0.0	1.0	-1.0
124676	18712054	Tikka Junction	['Casual Dining']	https://www.zomato.com/ludhiana/tikka-junction...	SCO 32, Feroze Gandhi Market, Near Park Plaza,...	Ludhiana	20	Gurdev Nagar	30.901219	75.833357	...	2.0	Rs.	['Delivery', 'Lunch', 'No Alcohol Available', ...	4.0	Very Good	304.0	84.0	0.0	-1.0	-1.0
124677	15674	Dawat-E-Khaas	['Quick Bites']	https://www.zomato.com/ludhiana/dawat-e-khaas-...	Suhani Building Road, Ludhiana Junction, Ludhiana	Ludhiana	20	Ludhiana Junction	30.911675	75.854000	...	1.0	Rs.	['Delivery', 'Takeaway Available', 'Breakfast'...	3.9	Good	599.0	7.0	0.0	-1.0	-1.0
124678	15570	Refreshment Veg & Non Veg	['Quick Bites']	https://www.zomato.com/ludhiana/refreshment-ve...	Shop 8, Near Krishna Mandir, Model Town Extens...	Ludhiana	20	Model Town	30.886010	75.830655	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN

124679 rows × 26 columns

```
# Get basic information about the DataFrame
print(df.head())  # Display the first few rows
print(df.info())  # Get information about columns, data types, and missing values
print(df.describe())  # Get summary statistics for numerical columns
```

```
    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']

                                         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...

                                        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

      locality   latitude  longitude  ... price_range  currency  \
0     Khandari  27.211450  78.002381  ...         2.0       Rs.
1   Agra Cantt  27.160569  78.011583  ...         2.0       Rs.
2     Shahganj  27.182938  77.979684  ...         1.0       Rs.
3  Civil Lines  27.205668  78.004799  ...         1.0       Rs.
4      Tajganj  27.157709  78.052421  ...         3.0       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

  rating_text   votes  photo_count opentable_support delivery  takeaway
0   Very Good   814.0        154.0               0.0     -1.0      -1.0
1   Very Good  1203.0        161.0               0.0     -1.0      -1.0
2   Very Good   801.0        107.0               0.0      1.0      -1.0
3   Very Good   693.0        157.0               0.0      1.0      -1.0
4   Excellent   470.0        291.0               0.0      1.0      -1.0

[5 rows x 26 columns]
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 124679 entries, 0 to 124678
Data columns (total 26 columns):
 #   Column                Non-Null Count   Dtype
---  ------                --------------   -----
 0   res_id                124679 non-null  int64
 1   name                  124679 non-null  object
 2   establishment         124679 non-null  object
 3   url                   124679 non-null  object
 4   address               124551 non-null  object
 5   city                  124679 non-null  object
 6   city_id               124679 non-null  int64
 7   locality              124679 non-null  object
 8   latitude              124679 non-null  float64
 9   longitude             124679 non-null  float64
```

```
# removing duplicates
df.drop_duplicates(inplace=True)
print(df)
```

```
          res_id                            name      establishment  \
1        3400005  Mama Chicken Mama Franky House    ['Quick Bites']
2        3401013                  Bhagat Halwai    ['Quick Bites']
3        3400290                  Bhagat Halwai    ['Quick Bites']
6        3400296             Honeydew Restaurant    ['Quick Bites']
9        3400838                   Sugar N Thyme           ['Café']
...          ...                             ...                ...
123987     15338     Pahwa Ice Cream & Fast Food    ['Quick Bites']
124094  18536835                     Bake My Day         ['Bakery']
124229     15276             Lucky Vaishno Dhaba          ['Dhaba']
124390     15925                       Keventers  ['Beverage Shop']
124476  18635725                 House of Candy          ['Kiosk']

                                                   url  \
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...
6       https://www.zomato.com/agra/honeydew-restauran...
9       https://www.zomato.com/agra/sugar-n-thyme-tajg...
...                                                   ...
123987  https://www.zomato.com/ludhiana/pahwa-ice-crea...
124094  https://www.zomato.com/ludhiana/bake-my-day-ag...
124229  https://www.zomato.com/ludhiana/lucky-vaishno-...
124390  https://www.zomato.com/ludhiana/keventers-sara...
124476  https://www.zomato.com/ludhiana/house-of-candy...

                                             address      city  city_id  \
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
6            Opposite Soami Bagh Temple, Dayal Bagh, Agra      Agra       34
9       1374 K/1375 K, Ground floor, Dinesh Nagar, Fat...      Agra       34
...                                                   ...       ...      ...
123987  Near Neela Jhanda Gurdwara, New Hargobind Naga...  Ludhiana       20
124094  South City, Canal Road, Near Carry Home Depart...  Ludhiana       20
124229           Clock Tower, Ludhiana Junction, Ludhiana  Ludhiana       20
124390  SCF-22/23-C, Kipps Market, Sarabha Nagar, Ludh...  Ludhiana       20
124476  House of Candy 1st Floor, MBD Ludhiana Mall Be...  Ludhiana       20

                            locality   latitude  longitude  ...  \
1                         Agra Cantt  27.160569  78.011583  ...
2                           Shahganj  27.182938  77.979684  ...
3                         Civil Lines  27.205668  78.004799  ...
6                          Dayal Bagh  27.222175  78.010174  ...
9                             Tajganj  27.158243  78.045591  ...
...                               ...        ...        ...  ...
123987                Hargobind Nagar  30.909669  75.870891  ...
124094                   Aggar Nagar  30.898631  75.790682  ...
124229              Ludhiana Junction  30.916651  75.848434  ...
124390                  Sarabha Nagar  30.892795  75.822187  ...
124476  MBD Neopolis Mall, Rajguru Nagar  30.882875  75.781534  ...
```

```
       price_range  currency  \
1              2.0       Rs.
2              1.0       Rs.
3              1.0       Rs.
6              2.0       Rs.
```

```
# Dealing with Missing Values
# Fill missing values with a specific value (e.g., 0)
df.fillna(0, inplace=True)

print(df)
```

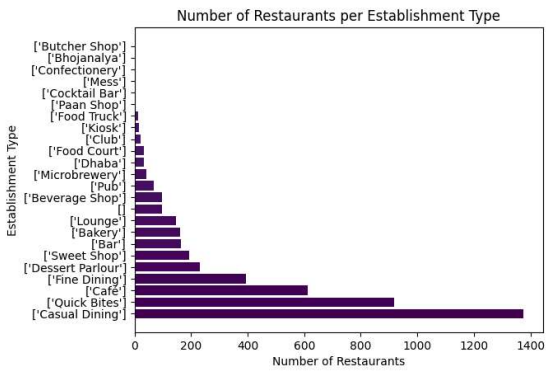
```
         res_id                          name      establishment  \
1       3400005  Mama Chicken Mama Franky House    ['Quick Bites']
2       3401013                  Bhagat Halwai    ['Quick Bites']
3       3400290                  Bhagat Halwai    ['Quick Bites']
6       3400296            Honeydew Restaurant    ['Quick Bites']
9       3400838                  Sugar N Thyme           ['Café']
...         ...                            ...                ...
123987    15338    Pahwa Ice Cream & Fast Food    ['Quick Bites']
124094 18536835                    Bake My Day         ['Bakery']
124229    15276            Lucky Vaishno Dhaba          ['Dhaba']
124390    15925                     Keventers  ['Beverage Shop']
124476 18635725                 House of Candy          ['Kiosk']

                                                   url  \
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...
6       https://www.zomato.com/agra/honeydew-restauran...
9       https://www.zomato.com/agra/sugar-n-thyme-tajg...
...                                                   ...
123987  https://www.zomato.com/ludhiana/pahwa-ice-crea...
124094  https://www.zomato.com/ludhiana/bake-my-day-ag...
124229  https://www.zomato.com/ludhiana/lucky-vaishno-...
124390  https://www.zomato.com/ludhiana/keventers-sara...
124476  https://www.zomato.com/ludhiana/house-of-candy...

                                                  address      city  city_id  \
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
6            Opposite Soami Bagh Temple, Dayal Bagh, Agra      Agra       34
9       1374 K/1375 K, Ground floor, Dinesh Nagar, Fat...      Agra       34
...                                                   ...       ...      ...
123987  Near Neela Jhanda Gurdwara, New Hargobind Naga...  Ludhiana       20
124094  South City, Canal Road, Near Carry Home Depart...  Ludhiana       20
124229            Clock Tower, Ludhiana Junction, Ludhiana  Ludhiana       20
124390  SCF-22/23-C, Kipps Market, Sarabha Nagar, Ludh...  Ludhiana       20
124476  House of Candy 1st Floor, MBD Ludhiana Mall Be...  Ludhiana       20

                              locality   latitude  longitude  ...  \
1                           Agra Cantt  27.160569  78.011583  ...
2                             Shahganj  27.182938  77.979684  ...
3                           Civil Lines  27.205668  78.004799  ...
6                            Dayal Bagh  27.222175  78.010174  ...
9                               Tajganj  27.158243  78.045591  ...
...                                 ...        ...        ...  ...
123987                  Hargobind Nagar  30.909669  75.870891  ...
124094                      Aggar Nagar  30.898631  75.790682  ...
124229                Ludhiana Junction  30.916651  75.848434  ...
124390                     Sarabha Nagar  30.892795  75.822187  ...
124476  MBD Neopolis Mall, Rajguru Nagar  30.882875  75.781534  ...

       price_range  currency  \
1              2.0       Rs.
2              1.0       Rs.
3              1.0       Rs.
6              2.0       Rs.
9              3.0       Rs.
```

```
# Understanding Features
# Get information about the DataFrame
print(df.info())

# Get summary statistics for numerical columns
print(df.describe())
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 4642 entries, 1 to 124476
Data columns (total 26 columns):
 #   Column               Non-Null Count  Dtype
---  ------               --------------  -----
 0   res_id               4642 non-null   int64
 1   name                 4642 non-null   object
 2   establishment        4642 non-null   object
 3   url                  4642 non-null   object
 4   address              4642 non-null   object
 5   city                 4642 non-null   object
 6   city_id              4642 non-null   int64
 7   locality             4642 non-null   object
 8   latitude             4642 non-null   float64
 9   longitude            4642 non-null   float64
 10  zipcode              4642 non-null   object
 11  country_id           4642 non-null   float64
 12  locality_verbose     4642 non-null   object
 13  cuisines             4642 non-null   object
 14  timings              4642 non-null   object
 15  average_cost_for_two  4642 non-null   float64
```

```
 16  price_range           4642 non-null   float64
 17  currency              4642 non-null   object
 18  highlights            4642 non-null   object
 19  aggregate_rating      4642 non-null   float64
 20  rating_text           4642 non-null   object
 21  votes                 4642 non-null   float64
 22  photo_count           4642 non-null   float64
 23  opentable_support     4642 non-null   float64
 24  delivery              4642 non-null   float64
 25  takeaway              4642 non-null   float64
dtypes: float64(11), int64(2), object(13)
memory usage: 979.2+ KB
None
             res_id       city_id     latitude    longitude  country_id  \
count  4.642000e+03   4642.000000  4642.000000  4642.000000      4642.0
mean   8.153782e+06   1501.396812    22.122496    78.472558         1.0
std    8.915068e+06   3826.437942     6.934232     4.994201         0.0
min    5.500000e+01      1.000000     0.000000     0.000000         1.0
25%    7.157200e+04      6.000000    13.070772    75.891991         1.0
50%    2.200655e+06      9.000000    23.153791    77.598560         1.0
75%    1.864688e+07     21.000000    27.207533    80.245731         1.0
max    1.914880e+07  11354.000000    75.791315    91.811354         1.0

       average_cost_for_two  price_range  aggregate_rating         votes  \
count           4642.000000  4642.000000       4642.000000  4642.000000
mean             924.338432     2.233089          3.931495   717.813012
std              916.928109     1.017600          0.592944  1470.007271
min                0.000000     1.000000          0.000000    -3.000000
25%              350.000000     1.000000          3.800000    99.250000
50%              600.000000     2.000000          4.000000   317.000000
75%             1200.000000     3.000000          4.300000   795.000000
max            14000.000000     4.000000          4.900000  42539.000000

        photo_count  opentable_support     delivery  takeaway
count   4642.000000             4642.0  4642.000000    4642.0
mean     521.278328                0.0    -0.252262      -1.0
```

```
# Horizontal bar graphs
import matplotlib.pyplot as plt
# Assuming the DataFrame is named df
establishment_counts = df['establishment'].explode().value_counts()

# Create a horizontal bar chart with multicolor
plt.barh(establishment_counts.index, establishment_counts.values, color=plt.cm.viridis(range(len(establishment_counts))))
plt.xlabel('Number of Restaurants')
plt.ylabel('Establishment Type')
plt.title('Number of Restaurants per Establishment Type')
plt.show()
```

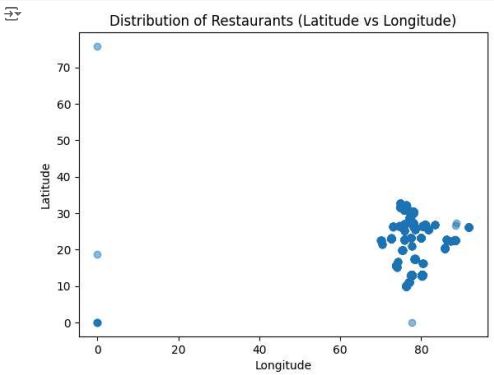



```
# 2. Using Groupby, Apply, and Unique Functions
# You can group the data by city or establishment to get insights. For instance, let's group the data by city and find out the average rating for each city:


# Grouping by city and calculating the average rating
city_avg_rating = df.groupby('city')['aggregate_rating'].mean()

# Display the cities and their average ratings
print(city_avg_rating)
# Apply function to group by 'city' and calculate the average of 'aggregate_rating'
city_avg_rating = df.groupby('city')['aggregate_rating'].apply(lambda x: x.mean())

# Display the result
print(city_avg_rating)


# Get unique establishment types for a specific city (e.g., Agra)
unique_establishments_agra = df[df['city'] == 'Agra']['establishment'].explode().unique()
print(unique_establishments_agra)
```

```
city
Agra              4.070588
Ahmedabad         4.134595
```

```
Ajmer            3.637255
Allahabad        3.537255
Amravati         3.400000
Amritsar         3.583673
Aurangabad       3.850000
Bangalore        4.241250
Bhopal           3.811111
Bhubaneshwar     3.928000
Chandigarh       3.980000
Chennai          3.982887
Coimbatore       3.924194
Cuttack          3.625926
Darjeeling       1.800000
Dehradun         3.872603
Dharamshala      3.000000
Faridabad        3.280000
Gandhinagar      3.833333
Gangtok          3.400000
Ghaziabad        3.966667
Goa              3.963115
Gorakhpur        3.831250
Greater Noida    2.300000
Guntur           3.465000
Gurgaon          4.163636
Guwahati         3.975000
Gwalior          3.795652
Haridwar         3.453571
Howrah           3.875000
Hyderabad        4.265138
Indore           3.922059
Jabalpur         3.338750
Jaipur           3.897426
Jalandhar        3.802041
Jammu            3.652857
Jamnagar         3.447368
Jamshedpur       3.443333
Jhansi           3.926667
Jodhpur          3.650000
Junagadh         3.375000
Kanpur           3.923729
Kharagpur        3.466667
Kochi            3.820769
Kolhapur         2.554545
Kolkata          4.139726
Kota             3.506667
Lucknow          3.971111
Ludhiana         3.711364
Mohali           3.910256
New Delhi        4.044205
Noida            3.954167
Panchkula        3.710345
Secunderabad     4.242857
Zirakpur         3.855556
Name: aggregate_rating, dtype: float64
city
```

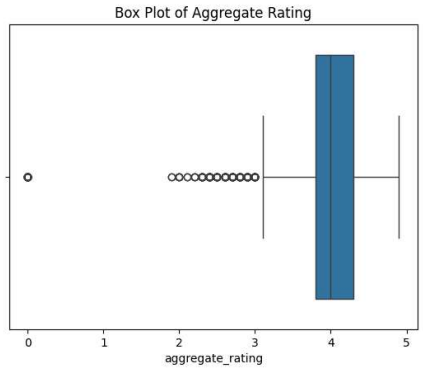
```
# Scatter Plot
# Let's visualize the relationship between latitude and longitude to check the distribution of restaurants:
plt.scatter(df['longitude'], df['latitude'], alpha=0.5)
plt.xlabel('Longitude')
plt.ylabel('Latitude')
plt.title('Distribution of Restaurants (Latitude vs Longitude)')
plt.show()
```




```
# Word Cloud
# A Word Cloud can be created from the highlights column, which may contain important tags about the restaurants (like "Delivery", "Takeaway", etc.):


from wordcloud import WordCloud

# Combine all the highlights into a single string
highlights_text = ' '.join(df['highlights'].explode().dropna())

# Generate and display the Word Cloud
```

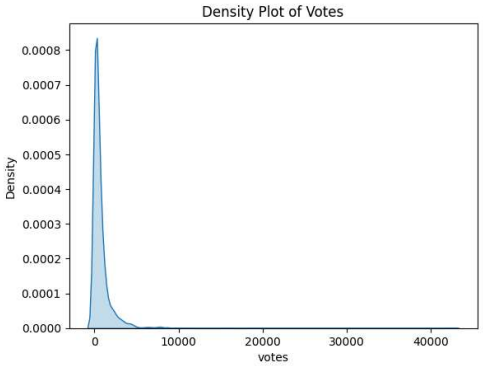
```
wordcloud = WordCloud(width=800, height=400, background_color='white').generate(highlights_text)

plt.imshow(wordcloud, interpolation='bilinear')
plt.axis('off')
plt.title('Word Cloud of Restaurant Highlights')
plt.show()
```


```
# Box Plot
# You can create a box plot to visualize the distribution of votes or aggregate_rating:
import seaborn as sns
# Box plot for aggregate rating
sns.boxplot(x=df['aggregate_rating'])
plt.title('Box Plot of Aggregate Rating')
plt.show()
```

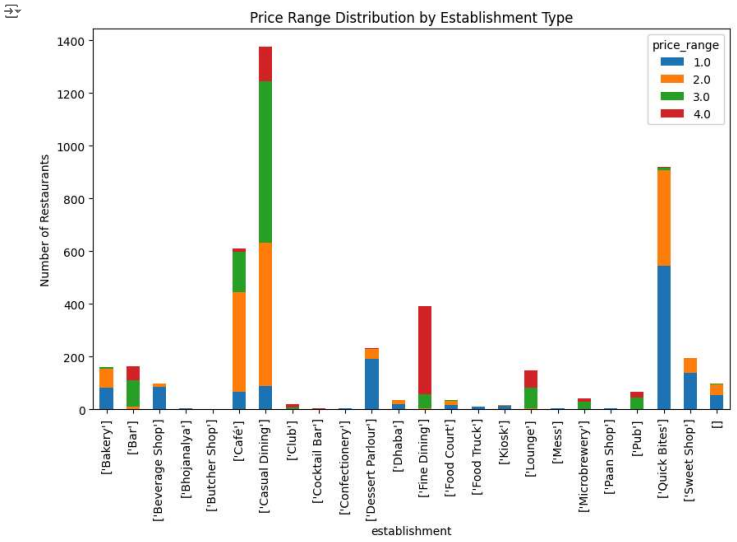



```
# Density Plot
# A density plot can show the distribution of votes across all restaurants:
sns.kdeplot(df['votes'].dropna(), shade=True)
plt.title('Density Plot of Votes')
plt.show()
```

```
<ipython-input-30-1401569fa964>:3: FutureWarning:

`shade` is now deprecated in favor of `fill`; setting `fill=True`.
This will become an error in seaborn v0.14.0; please update your code.

  sns.kdeplot(df['votes'].dropna(), shade=True)
```



```
# Bar Charts
# You can create a bar chart to visualize the distribution of price_range across different establishment types:
# Count the number of restaurants in each price range for each establishment type
price_range_counts = df.groupby(['establishment', 'price_range']).size().unstack().fillna(0)

# Plot a bar chart
price_range_counts.plot(kind='bar', stacked=True, figsize=(10, 6))
plt.title('Price Range Distribution by Establishment Type')
plt.ylabel('Number of Restaurants')
plt.show()
```




```
'''Drawing Insights and Conclusions from Data
By analyzing the visualizations, you can draw several insights:
Horizontal bar chart: You can determine the most common types of establishments (e.g., Quick Bites or Casual Dining).
Scatter plot: The distribution of restaurants across different geographical locations (latitude and longitude) may reveal if some cities are densely populated with restaurants.
Word Cloud: Frequently used tags like "Delivery" or "Takeaway Available" can give you insight into customer preferences.
Box plot and Density plot: The ratings and votes distributions can tell you which restaurants are performing well based on customer feedback.
Bar charts: The distribution of price ranges can help understand whether most restaurants are affordable or higher-end.'''
```