zomato_EDA

June 13, 2020

1 Breakdown of this notebook:

1. **Loading the dataset:** Load the data and import the libraries.
2. **Data Cleaning:**

- Deleting redundant columns.
- Renaming the columns.
- Dropping duplicates.
- Cleaning individual columns.
- Remove the NaN values from the dataset
- #Some Transformations

3. **Regression Analysis**

- Linear Regression
- Decision Tree Regression
- Random Forest Regression

4. **Data Visualization:** Using plots to find relations between the features.

- Restaurants delivering Online or not
- Restaurants allowing table booking or not
- Table booking Rate vs Rate
- Best Location
- Relation between Location and Rating
- Restaurant Type
- Gaussian Rest type and Rating
- Types of Services
- Relation between Type and Rating
- Cost of Restuarant
- No. of restaurants in a Location
- Restaurant type
- Most famous restaurant chains in Bengaluru

The basic idea is analyzing the Buisness Problem of Zomato to get a fair idea about the factors affecting the establishment of different types of restaurant at different places in Bengaluru, aggregate rating of each restaurant and many more. I have provided the link to download the dataset at the end of this notebook.

[1]:
```
#Importing Libraries
import numpy as np
```

```
import pandas as pd
import seaborn as sb
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.linear_model import LogisticRegression
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
from sklearn.metrics import classification_report
from sklearn.metrics import confusion_matrix
from sklearn.metrics import r2_score
```

```
C:\Users\tejas\Anaconda3\lib\site-packages\statsmodels\tools\_testing.py:19:
FutureWarning: pandas.util.testing is deprecated. Use the functions in the
public API at pandas.testing instead.
  import pandas.util.testing as tm
```

[2]:
```
#reading the dataset
zomato_real=pd.read_csv("zomato.csv")
zomato_real.head() # prints the first 5 rows of a DataFrame
```

[2]:
```
                                                 url  \
0  https://www.zomato.com/bangalore/jalsa-banasha…
1  https://www.zomato.com/bangalore/spice-elephan…
2  https://www.zomato.com/SanchurroBangalore?cont…
3  https://www.zomato.com/bangalore/addhuri-udupi…
4  https://www.zomato.com/bangalore/grand-village…

                                             address                  name  \
0  942, 21st Main Road, 2nd Stage, Banashankari, …                 Jalsa
1  2nd Floor, 80 Feet Road, Near Big Bazaar, 6th …         Spice Elephant
2  1112, Next to KIMS Medical College, 17th Cross…        San Churro Cafe
3  1st Floor, Annakuteera, 3rd Stage, Banashankar…  Addhuri Udupi Bhojana
4  10, 3rd Floor, Lakshmi Associates, Gandhi Baza…          Grand Village

  online_order book_table   rate  votes                              phone  \
0          Yes        Yes  4.1/5    775    080 42297555\r\n+91 9743772233
1          Yes         No  4.1/5    787                      080 41714161
2          Yes         No  3.8/5    918                   +91 9663487993
3           No         No  3.7/5     88                   +91 9620009302
4           No         No  3.8/5    166  +91 8026612447\r\n+91 9901210005

       location            rest_type  \
0  Banashankari        Casual Dining
1  Banashankari        Casual Dining
2  Banashankari  Cafe, Casual Dining
3  Banashankari          Quick Bites
4  Basavanagudi        Casual Dining
```

```
                                          dish_liked  \
0  Pasta, Lunch Buffet, Masala Papad, Paneer Laja…
1  Momos, Lunch Buffet, Chocolate Nirvana, Thai G…
2  Churros, Cannelloni, Minestrone Soup, Hot Choc…
3                                        Masala Dosa
4                                Panipuri, Gol Gappe

                        cuisines approx_cost(for two people)  \
0  North Indian, Mughlai, Chinese                         800
1     Chinese, North Indian, Thai                         800
2          Cafe, Mexican, Italian                         800
3      South Indian, North Indian                         300
4        North Indian, Rajasthani                         600

                                       reviews_list menu_item  \
0  [('Rated 4.0', 'RATED\n  A beautiful place to …        []
1  [('Rated 4.0', 'RATED\n  Had been here for din…        []
2  [('Rated 3.0', "RATED\n  Ambience is not that …        []
3  [('Rated 4.0', "RATED\n  Great food and proper…        []
4  [('Rated 4.0', 'RATED\n  Very good restaurant …        []

  listed_in(type) listed_in(city)
0          Buffet    Banashankari
1          Buffet    Banashankari
2          Buffet    Banashankari
3          Buffet    Banashankari
4          Buffet    Banashankari
```

[3]:
```
zomato_real.info() # Looking at the information about the dataset, datatypes of␣
↪the coresponding columns and missing values
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 51717 entries, 0 to 51716
Data columns (total 17 columns):
 #   Column                       Non-Null Count  Dtype
---  ------                       --------------  -----
 0   url                          51717 non-null  object
 1   address                      51717 non-null  object
 2   name                         51717 non-null  object
 3   online_order                 51717 non-null  object
 4   book_table                   51717 non-null  object
 5   rate                         43942 non-null  object
 6   votes                        51717 non-null  int64
 7   phone                        50509 non-null  object
 8   location                     51696 non-null  object
 9   rest_type                    51490 non-null  object
```

```
 10  dish_liked                   23639 non-null  object
 11  cuisines                     51672 non-null  object
 12  approx_cost(for two people)  51371 non-null  object
 13  reviews_list                 51717 non-null  object
 14  menu_item                    51717 non-null  object
 15  listed_in(type)              51717 non-null  object
 16  listed_in(city)              51717 non-null  object
dtypes: int64(1), object(16)
memory usage: 6.7+ MB
```

[4]:
```
#Deleting Unnnecessary Columns
zomato=zomato_real.drop(['url','dish_liked','phone'],axis=1) #Dropping the␣
 ↪column "dish_liked", "phone", "url" and saving the new dataset as "zomato"
```

[5]:
```
zomato_real.head() # looking at the dataset after transformation
```

[5]:

	url	address	name	online_order	book_table	rate	votes	phone	location	rest_type	dish_liked
0	https://www.zomato.com/bangalore/jalsa-banasha…	942, 21st Main Road, 2nd Stage, Banashankari, …	Jalsa	Yes	Yes	4.1/5	775	080 42297555\r\n+91 9743772233	Banashankari	Casual Dining	Pasta, Lunch Buffet, Masala Papad, Paneer Laja…
1	https://www.zomato.com/bangalore/spice-elephan…	2nd Floor, 80 Feet Road, Near Big Bazaar, 6th …	Spice Elephant	Yes	No	4.1/5	787	080 41714161	Banashankari	Casual Dining	Momos, Lunch Buffet, Chocolate Nirvana, Thai G…
2	https://www.zomato.com/SanchurroBangalore?cont…	1112, Next to KIMS Medical College, 17th Cross…	San Churro Cafe	Yes	No	3.8/5	918	+91 9663487993	Banashankari	Cafe, Casual Dining	
3	https://www.zomato.com/bangalore/addhuri-udupi…	1st Floor, Annakuteera, 3rd Stage, Banashankar…	Addhuri Udupi Bhojana	No	No	3.7/5	88	+91 9620009302	Banashankari	Quick Bites	
4	https://www.zomato.com/bangalore/grand-village…	10, 3rd Floor, Lakshmi Associates, Gandhi Baza…	Grand Village	No	No	3.8/5	166	+91 8026612447\r\n+91 9901210005	Basavanagudi	Casual Dining	

```
2  Churros, Cannelloni, Minestrone Soup, Hot Choc…
3                                        Masala Dosa
4                                Panipuri, Gol Gappe

                         cuisines approx_cost(for two people)  \
0  North Indian, Mughlai, Chinese                          800
1     Chinese, North Indian, Thai                          800
2          Cafe, Mexican, Italian                          800
3      South Indian, North Indian                          300
4        North Indian, Rajasthani                          600

                                       reviews_list menu_item  \
0  [('Rated 4.0', 'RATED\n  A beautiful place to …        []
1  [('Rated 4.0', 'RATED\n  Had been here for din…        []
2  [('Rated 3.0', "RATED\n  Ambience is not that …        []
3  [('Rated 4.0', "RATED\n  Great food and proper…        []
4  [('Rated 4.0', 'RATED\n  Very good restaurant …        []

  listed_in(type) listed_in(city)
0         Buffet    Banashankari
1         Buffet    Banashankari
2         Buffet    Banashankari
3         Buffet    Banashankari
4         Buffet    Banashankari
```

[6]:
```
#Removing the Duplicates
zomato.duplicated().sum()
zomato.drop_duplicates(inplace=True)
zomato_real.head() # looking at the dataset after transformation
```

[6]:
```
                                              url  \
0  https://www.zomato.com/bangalore/jalsa-banasha…
1  https://www.zomato.com/bangalore/spice-elephan…
2  https://www.zomato.com/SanchurroBangalore?cont…
3  https://www.zomato.com/bangalore/addhuri-udupi…
4  https://www.zomato.com/bangalore/grand-village…

                                             address                  name  \
0  942, 21st Main Road, 2nd Stage, Banashankari, …                 Jalsa
1  2nd Floor, 80 Feet Road, Near Big Bazaar, 6th …         Spice Elephant
2  1112, Next to KIMS Medical College, 17th Cross…        San Churro Cafe
3  1st Floor, Annakuteera, 3rd Stage, Banashankar…  Addhuri Udupi Bhojana
4  10, 3rd Floor, Lakshmi Associates, Gandhi Baza…          Grand Village

  online_order book_table   rate  votes                           phone  \
0          Yes        Yes  4.1/5    775    080 42297555\r\n+91 9743772233
1          Yes         No  4.1/5    787                      080 41714161
```

```
2          Yes         No  3.8/5    918                   +91 9663487993
3           No         No  3.7/5     88                   +91 9620009302
4           No         No  3.8/5    166  +91 8026612447\r\n+91 9901210005

       location           rest_type  \
0  Banashankari        Casual Dining
1  Banashankari        Casual Dining
2  Banashankari  Cafe, Casual Dining
3  Banashankari          Quick Bites
4  Basavanagudi        Casual Dining

                                        dish_liked  \
0  Pasta, Lunch Buffet, Masala Papad, Paneer Laja…
1  Momos, Lunch Buffet, Chocolate Nirvana, Thai G…
2  Churros, Cannelloni, Minestrone Soup, Hot Choc…
3                                       Masala Dosa
4                              Panipuri, Gol Gappe

                        cuisines approx_cost(for two people)  \
0  North Indian, Mughlai, Chinese                         800
1     Chinese, North Indian, Thai                         800
2          Cafe, Mexican, Italian                         800
3      South Indian, North Indian                         300
4        North Indian, Rajasthani                         600

                                      reviews_list menu_item  \
0  [('Rated 4.0', 'RATED\n  A beautiful place to …        []
1  [('Rated 4.0', 'RATED\n  Had been here for din…        []
2  [('Rated 3.0', "RATED\n  Ambience is not that …        []
3  [('Rated 4.0', "RATED\n  Great food and proper…        []
4  [('Rated 4.0', 'RATED\n  Very good restaurant …        []

  listed_in(type) listed_in(city)
0         Buffet    Banashankari
1         Buffet    Banashankari
2         Buffet    Banashankari
3         Buffet    Banashankari
4         Buffet    Banashankari
```

[7]:
```
#Remove the NaN values from the dataset
zomato.isnull().sum()
zomato.dropna(how='any',inplace=True)
zomato.info() #.info() function is used to get a concise summary of the␣
 ↪dataframe
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 43499 entries, 0 to 51716
```

```
Data columns (total 14 columns):
 #   Column                        Non-Null Count  Dtype
---  ------                        --------------  -----
 0   address                       43499 non-null  object
 1   name                          43499 non-null  object
 2   online_order                  43499 non-null  object
 3   book_table                    43499 non-null  object
 4   rate                          43499 non-null  object
 5   votes                         43499 non-null  int64
 6   location                      43499 non-null  object
 7   rest_type                     43499 non-null  object
 8   cuisines                      43499 non-null  object
 9   approx_cost(for two people)   43499 non-null  object
 10  reviews_list                  43499 non-null  object
 11  menu_item                     43499 non-null  object
 12  listed_in(type)               43499 non-null  object
 13  listed_in(city)               43499 non-null  object
dtypes: int64(1), object(13)
memory usage: 5.0+ MB
```

[8]:
```
#Reading Column Names
zomato.columns
```

[8]:
```
Index(['address', 'name', 'online_order', 'book_table', 'rate', 'votes',
       'location', 'rest_type', 'cuisines', 'approx_cost(for two people)',
       'reviews_list', 'menu_item', 'listed_in(type)', 'listed_in(city)'],
      dtype='object')
```

[9]:
```
#Changing the column names
zomato = zomato.rename(columns={'approx_cost(for two people)':
 ↪'cost','listed_in(type)':'type',
                                'listed_in(city)':'city'})
zomato.columns
```

[9]:
```
Index(['address', 'name', 'online_order', 'book_table', 'rate', 'votes',
       'location', 'rest_type', 'cuisines', 'cost', 'reviews_list',
       'menu_item', 'type', 'city'],
      dtype='object')
```

[10]:
```
#Some Transformations
zomato['cost'] = zomato['cost'].astype(str) #Changing the cost to string
zomato['cost'] = zomato['cost'].apply(lambda x: x.replace(',','.')) #Using␣
 ↪lambda function to replace ',' from cost
zomato['cost'] = zomato['cost'].astype(float) # Changing the cost to Float
zomato.info() # looking at the dataset information after transformation
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 43499 entries, 0 to 51716
```

```
Data columns (total 14 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   address       43499 non-null  object
 1   name          43499 non-null  object
 2   online_order  43499 non-null  object
 3   book_table    43499 non-null  object
 4   rate          43499 non-null  object
 5   votes         43499 non-null  int64
 6   location      43499 non-null  object
 7   rest_type     43499 non-null  object
 8   cuisines      43499 non-null  object
 9   cost          43499 non-null  float64
 10  reviews_list  43499 non-null  object
 11  menu_item     43499 non-null  object
 12  type          43499 non-null  object
 13  city          43499 non-null  object
dtypes: float64(1), int64(1), object(12)
memory usage: 5.0+ MB
```

[11]:
```
#Reading uninque values from the Rate column
zomato['rate'].unique()
```

[11]:
```
array(['4.1/5', '3.8/5', '3.7/5', '3.6/5', '4.6/5', '4.0/5', '4.2/5',
       '3.9/5', '3.1/5', '3.0/5', '3.2/5', '3.3/5', '2.8/5', '4.4/5',
       '4.3/5', 'NEW', '2.9/5', '3.5/5', '2.6/5', '3.8 /5', '3.4/5',
       '4.5/5', '2.5/5', '2.7/5', '4.7/5', '2.4/5', '2.2/5', '2.3/5',
       '3.4 /5', '-', '3.6 /5', '4.8/5', '3.9 /5', '4.2 /5', '4.0 /5',
       '4.1 /5', '3.7 /5', '3.1 /5', '2.9 /5', '3.3 /5', '2.8 /5',
       '3.5 /5', '2.7 /5', '2.5 /5', '3.2 /5', '2.6 /5', '4.5 /5',
       '4.3 /5', '4.4 /5', '4.9/5', '2.1/5', '2.0/5', '1.8/5', '4.6 /5',
       '4.9 /5', '3.0 /5', '4.8 /5', '2.3 /5', '4.7 /5', '2.4 /5',
       '2.1 /5', '2.2 /5', '2.0 /5', '1.8 /5'], dtype=object)
```

[12]:
```
zomato.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 43499 entries, 0 to 51716
Data columns (total 14 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   address       43499 non-null  object
 1   name          43499 non-null  object
 2   online_order  43499 non-null  object
 3   book_table    43499 non-null  object
 4   rate          43499 non-null  object
 5   votes         43499 non-null  int64
 6   location      43499 non-null  object
```

```
 7   rest_type     43499 non-null  object
 8   cuisines      43499 non-null  object
 9   cost          43499 non-null  float64
 10  reviews_list  43499 non-null  object
 11  menu_item     43499 non-null  object
 12  type          43499 non-null  object
 13  city          43499 non-null  object
dtypes: float64(1), int64(1), object(12)
memory usage: 5.0+ MB
```

[13]:
```
#Removing '/5' from Rates
zomato = zomato.loc[zomato.rate !='NEW']
zomato = zomato.loc[zomato.rate !='-'].reset_index(drop=True)
remove_slash = lambda x: x.replace('/5', '') if type(x) == np.str else x
zomato.rate = zomato.rate.apply(remove_slash).str.strip().astype('float')
zomato['rate'].head() # looking at the dataset after transformation
```

[13]:
```
0    4.1
1    4.1
2    3.8
3    3.7
4    3.8
Name: rate, dtype: float64
```

[14]:
```
# Adjust the column names
zomato.name = zomato.name.apply(lambda x:x.title())
zomato.online_order.replace(('Yes','No'),(True, False),inplace=True)
zomato.book_table.replace(('Yes','No'),(True, False),inplace=True)
zomato_real.head() # looking at the dataset after transformation
```

[14]:

	url	address	name	online_order	book_table	rate	votes	phone
0	https://www.zomato.com/bangalore/jalsa-banasha…	942, 21st Main Road, 2nd Stage, Banashankari, …	Jalsa	Yes	Yes	4.1/5	775	080 42297555\r\n+91 9743772233
1	https://www.zomato.com/bangalore/spice-elephan…	2nd Floor, 80 Feet Road, Near Big Bazaar, 6th …	Spice Elephant	Yes	No	4.1/5	787	080 41714161
2	https://www.zomato.com/SanchurroBangalore?cont…	1112, Next to KIMS Medical College, 17th Cross…	San Churro Cafe					
3	https://www.zomato.com/bangalore/addhuri-udupi…	1st Floor, Annakuteera, 3rd Stage, Banashankar…	Addhuri Udupi Bhojana					
4	https://www.zomato.com/bangalore/grand-village…	10, 3rd Floor, Lakshmi Associates, Gandhi Baza…	Grand Village					

```
2          Yes         No  3.8/5    918                   +91 9663487993
3           No         No  3.7/5     88                   +91 9620009302
4           No         No  3.8/5    166  +91 8026612447\r\n+91 9901210005

       location           rest_type  \
0  Banashankari        Casual Dining
1  Banashankari        Casual Dining
2  Banashankari  Cafe, Casual Dining
3  Banashankari          Quick Bites
4  Basavanagudi        Casual Dining

                                        dish_liked  \
0  Pasta, Lunch Buffet, Masala Papad, Paneer Laja…
1  Momos, Lunch Buffet, Chocolate Nirvana, Thai G…
2  Churros, Cannelloni, Minestrone Soup, Hot Choc…
3                                     Masala Dosa
4                              Panipuri, Gol Gappe

                        cuisines approx_cost(for two people)  \
0  North Indian, Mughlai, Chinese                         800
1     Chinese, North Indian, Thai                         800
2          Cafe, Mexican, Italian                         800
3      South Indian, North Indian                         300
4        North Indian, Rajasthani                         600

                                      reviews_list menu_item  \
0  [('Rated 4.0', 'RATED\n  A beautiful place to …        []
1  [('Rated 4.0', 'RATED\n  Had been here for din…        []
2  [('Rated 3.0', "RATED\n  Ambience is not that …        []
3  [('Rated 4.0', "RATED\n  Great food and proper…        []
4  [('Rated 4.0', 'RATED\n  Very good restaurant …        []

  listed_in(type) listed_in(city)
0         Buffet    Banashankari
1         Buffet    Banashankari
2         Buffet    Banashankari
3         Buffet    Banashankari
4         Buffet    Banashankari
```

[15]:
```
zomato.cost.unique() # cheking the unique costs
```

[15]:
```
array([800.  , 300.  , 600.  , 700.  , 550.  , 500.  , 450.  , 650.  ,
       400.  , 900.  , 200.  , 750.  , 150.  , 850.  , 100.  ,   1.2 ,
       350.  , 250.  , 950.  ,   1.  ,   1.5 ,   1.3 , 199.  ,   1.1 ,
         1.6 , 230.  , 130.  ,   1.7 ,   1.35,   2.2 ,   1.4 ,   2.  ,
         1.8 ,   1.9 , 180.  , 330.  ,   2.5 ,   2.1 ,   3.  ,   2.8 ,
         3.4 ,  50.  ,  40.  ,   1.25,   3.5 ,   4.  ,   2.4 ,   2.6 ,
```

```
         1.45,  70.  ,   3.2 , 240.  ,   6.  ,   1.05,   2.3 ,   4.1 ,
        120.  ,   5.  ,   3.7 ,   1.65,   2.7 ,   4.5 ,  80.  ])
```

[16]:
```
#Encode the input Variables
def Encode(zomato):
    for column in zomato.columns[~zomato.columns.isin(['rate', 'cost',␣
 ↪'votes'])]:
        zomato[column] = zomato[column].factorize()[0]
    return zomato

zomato_en = Encode(zomato.copy())
zomato_en # looking at the dataset after transformation
```

[16]:

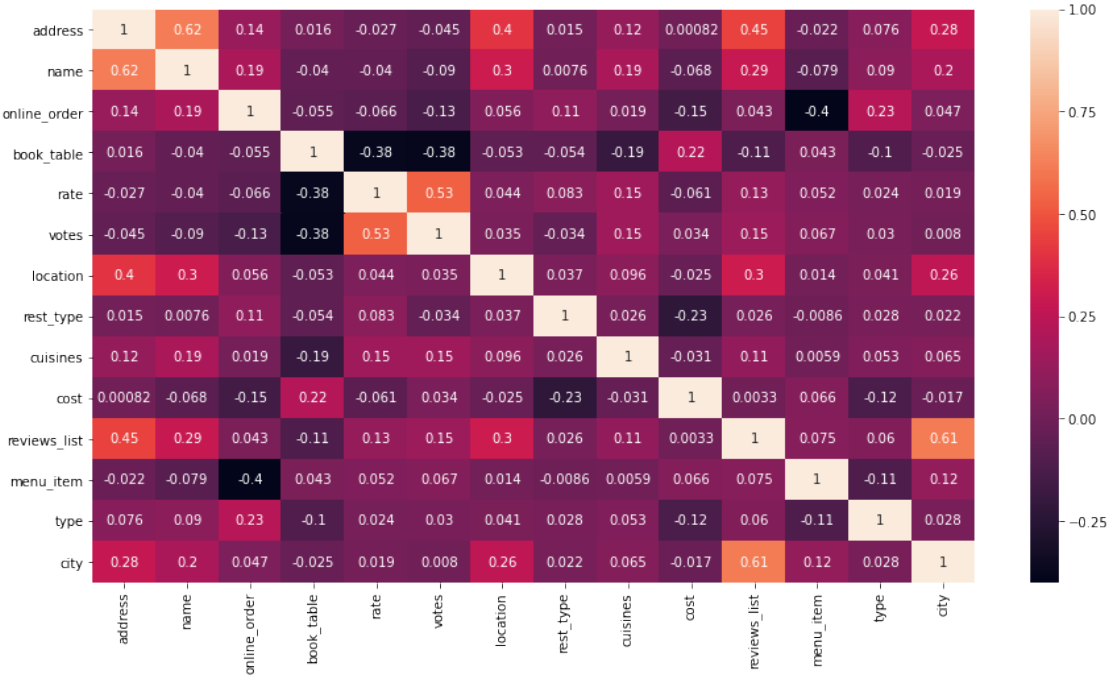
	address	name	online_order	book_table	rate	votes	location
0	0	0	0	0	4.1	775	0
1	1	1	0	1	4.1	787	0
2	2	2	0	1	3.8	918	0
3	3	3	1	1	3.7	88	0
4	4	4	1	1	3.8	166	1
…	…	…	…	…	…	…	…
41232	3137	2699	1	1	3.7	34	25
41233	8791	1716	1	1	2.5	81	25
41234	8725	6532	1	1	3.6	27	25
41235	8786	6568	1	0	4.3	236	56
41236	3444	6569	1	1	3.4	13	56

	rest_type	cuisines	cost	reviews_list	menu_item	type	city
0	0	0	800.0	0	0	0	0
1	0	1	800.0	1	0	0	0
2	1	2	800.0	2	0	0	0
3	2	3	300.0	3	0	0	0
4	0	4	600.0	4	0	0	0
…	…	…	…	…	…	…	…
41232	28	204	800.0	4028	0	6	29
41233	28	761	800.0	21082	0	6	29
41234	17	240	1.5	20956	0	6	29
41235	17	237	2.5	21054	0	6	29
41236	33	1870	1.5	21055	0	6	29

[41237 rows x 14 columns]

[17]:
```
#Get Correlation between different variables
corr = zomato_en.corr(method='kendall')
plt.figure(figsize=(15,8))
sns.heatmap(corr, annot=True)
zomato_en.columns
```

[17]:
```
Index(['address', 'name', 'online_order', 'book_table', 'rate', 'votes',
       'location', 'rest_type', 'cuisines', 'cost', 'reviews_list',
       'menu_item', 'type', 'city'],
      dtype='object')
```



The highest correlation is between name and address which is 0.62 which is not of very much concern

2 Regression Analysis

2.0.1 Splitting the Dataset

[18]:
```
#Defining the independent variables and dependent variables
x = zomato_en.iloc[:,[2,3,5,6,7,8,9,11]]
y = zomato_en['rate']
#Getting Test and Training Set
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=.
 ↪1,random_state=353)
x_train.head()
```

[18]:

	online_order	book_table	votes	location	rest_type	cuisines	cost	\
16950	0	1	0	8	2	5	250.0	
767	0	1	131	8	4	278	400.0	
6750	0	1	137	45	2	1295	250.0	

```
9471              0           1     74        16          0       537    1.0
25162             0           1     61        12          2      1860  350.0
```

```
       menu_item
16950          0
767          190
6750           0
9471           0
25162          0
```

[19]:
```
y_train.head()
```

[19]:
```
16950    3.9
767      3.7
6750     4.0
9471     3.8
25162    3.7
Name: rate, dtype: float64
```

[20]:
```
zomato_en['menu_item'].unique() # seeing the unique values in 'menu_item'
```

[20]:
```
array([   0,    1,    2, …, 8240, 8241, 8242], dtype=int64)
```

[21]:
```
zomato_en['location'].unique() # seeing the unique values in 'location'
```

[21]:
```
array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
       17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33,
       34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50,
       51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67,
       68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84,
       85, 86, 87, 88, 89, 90, 91], dtype=int64)
```

[22]:
```
zomato_en['cuisines'].unique() # seeing the unique values in 'cusines'
```

[22]:
```
array([   0,    1,    2, …, 2364, 2365, 2366], dtype=int64)
```

[23]:
```
zomato_en['rest_type'].unique() # seeing the unique values in 'rest_type'
```

[23]:
```
array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
       17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33,
       34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50,
       51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67,
       68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84,
       85, 86], dtype=int64)
```

[24]:
```
x.head()
```

[24]:
```
   online_order  book_table  votes  location  rest_type  cuisines   cost  \
0             0           0    775         0          0         0  800.0
1             0           1    787         0          0         1  800.0
2             0           1    918         0          1         2  800.0
3             1           1     88         0          2         3  300.0
4             1           1    166         1          0         4  600.0

   menu_item
0          0
1          0
2          0
3          0
4          0
```

[25]:
```
y.head()
```

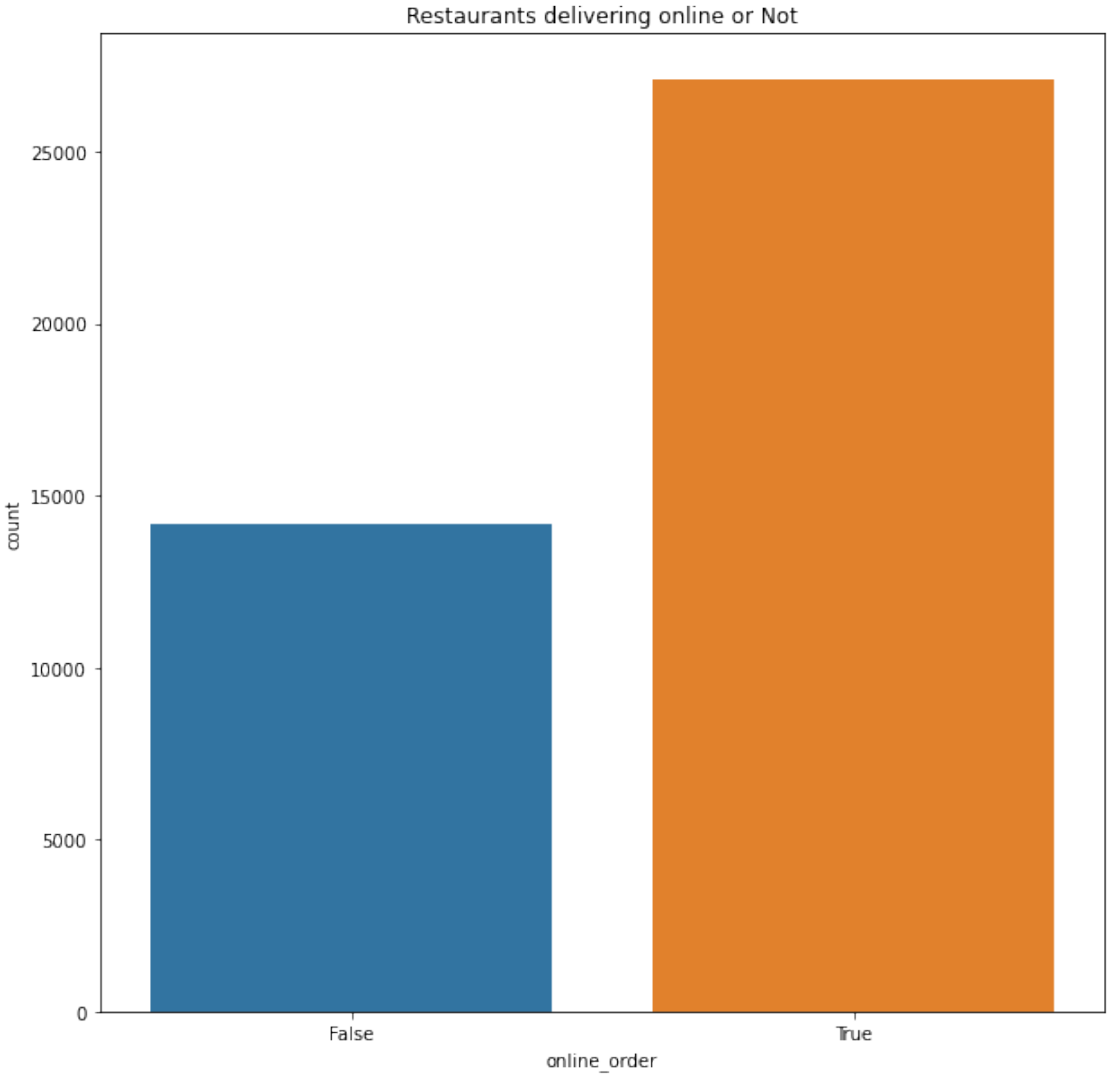
[25]:
```
0    4.1
1    4.1
2    3.8
3    3.7
4    3.8
Name: rate, dtype: float64
```

3 Data Visualization

Restaurants delivering Online or not

[26]:
```
#Restaurants delivering Online or not
sns.countplot(zomato['online_order'])
fig = plt.gcf()
fig.set_size_inches(10,10)
plt.title('Restaurants delivering online or Not')
```

[26]:
```
Text(0.5, 1.0, 'Restaurants delivering online or Not')
```



Restaurants allowing table booking or not

[27]:
```
sns.countplot(zomato['book_table'])
fig = plt.gcf()
fig.set_size_inches(10,10)
plt.title('Restaurants allowing table booking or not')
```

[27]:
```
Text(0.5, 1.0, 'Restaurants allowing table booking or not')
```

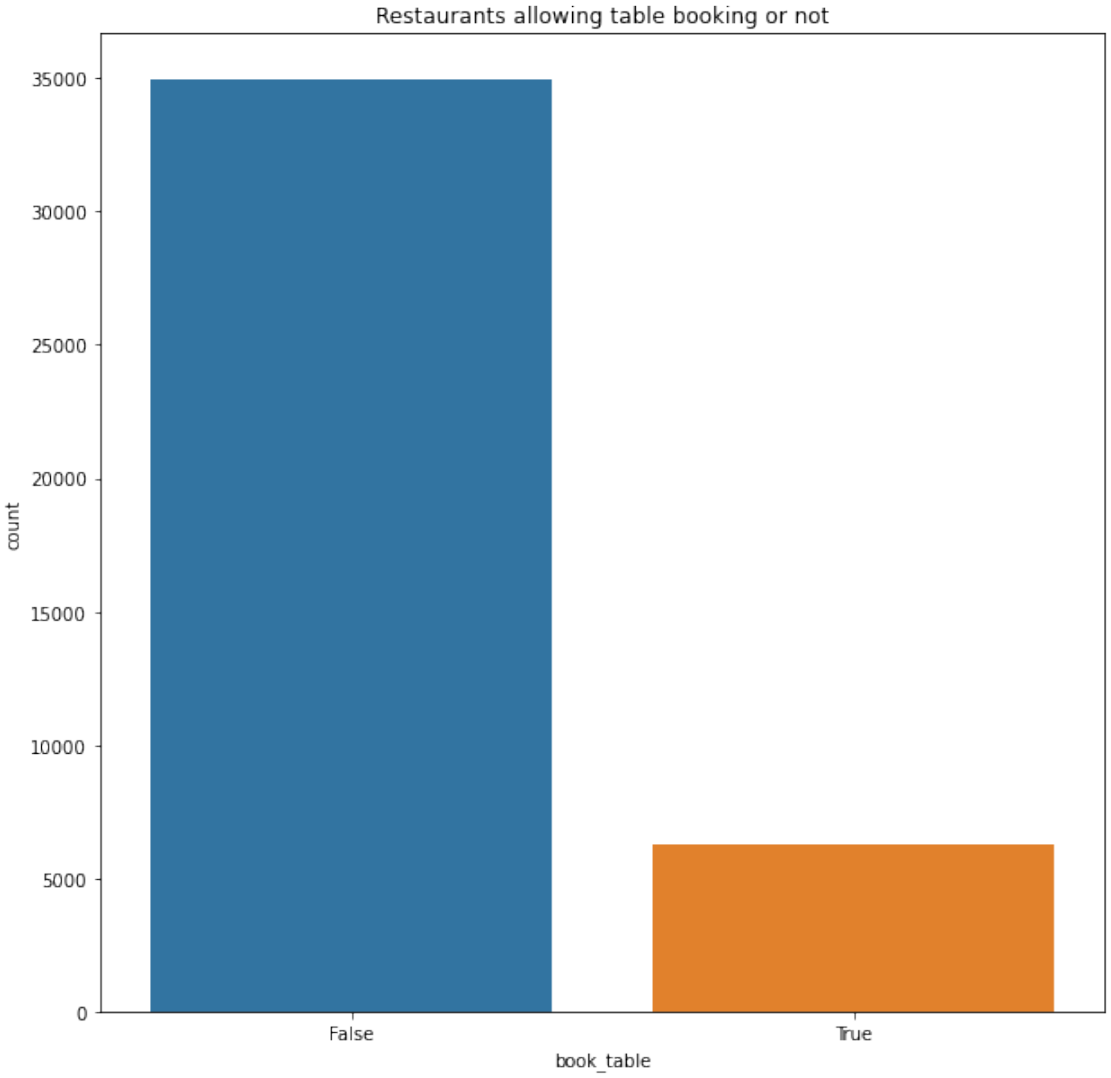
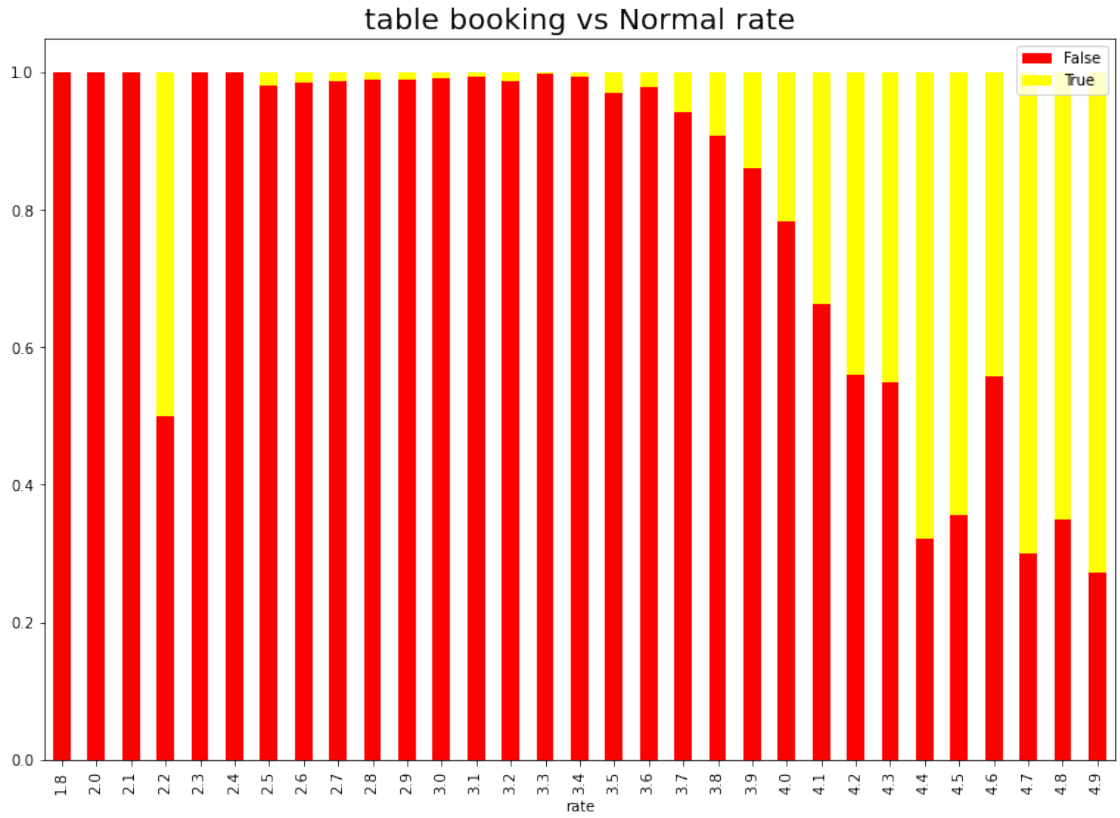


Table booking Rate vs Normal Rate

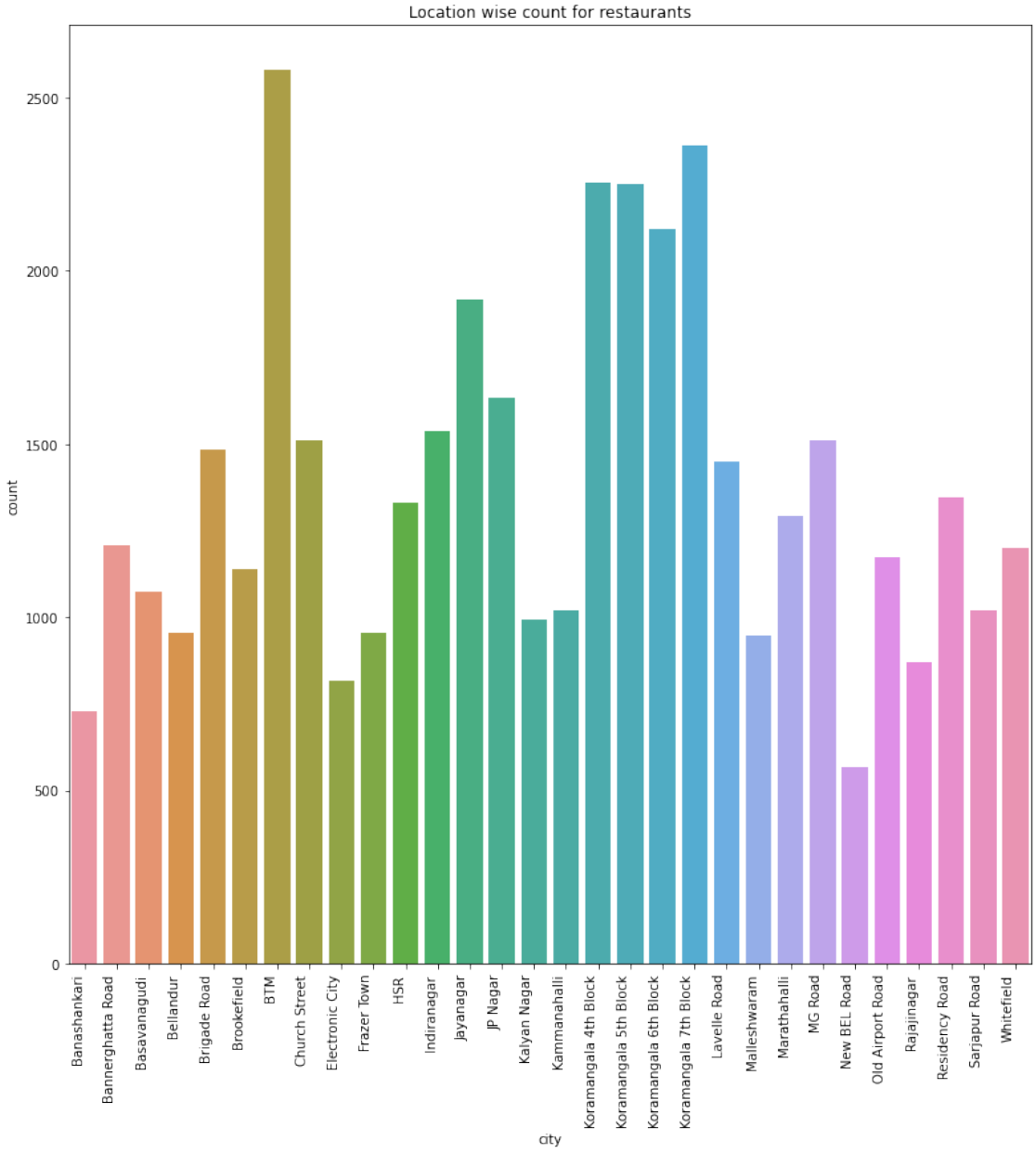
[28]:
```
plt.rcParams['figure.figsize'] = (13, 9)
Y = pd.crosstab(zomato['rate'], zomato['book_table'])
Y.div(Y.sum(1).astype(float), axis = 0).plot(kind = 'bar', stacked =␣
 ↪True,color=['red','yellow'])
plt.title('table booking vs Normal rate', fontweight = 30, fontsize = 20)
plt.legend(loc="upper right")
plt.show()
```



Location

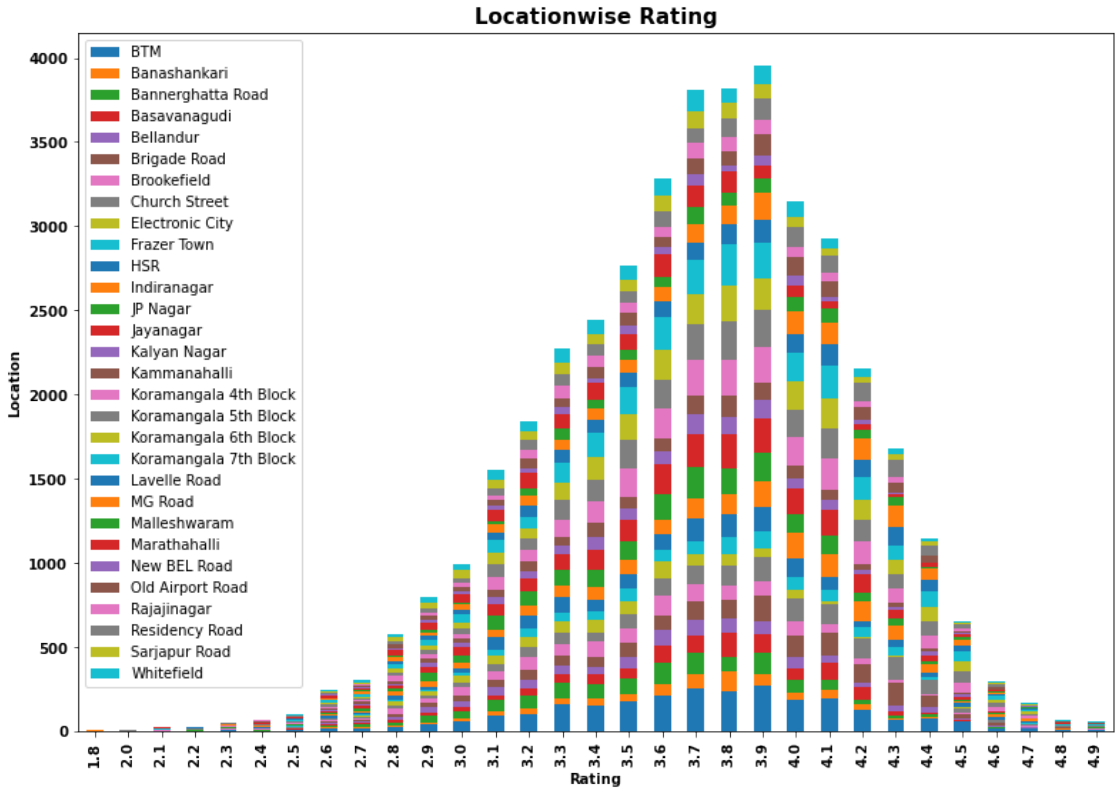
[29]:
```
sns.countplot(zomato['city'])
sns.countplot(zomato['city']).set_xticklabels(sns.countplot(zomato['city']).
 ↪get_xticklabels(), rotation=90, ha="right")
fig = plt.gcf()
fig.set_size_inches(13,13)
plt.title('Location wise count for restaurants')
```

[29]:
```
Text(0.5, 1.0, 'Location wise count for restaurants')
```



Location and Rating

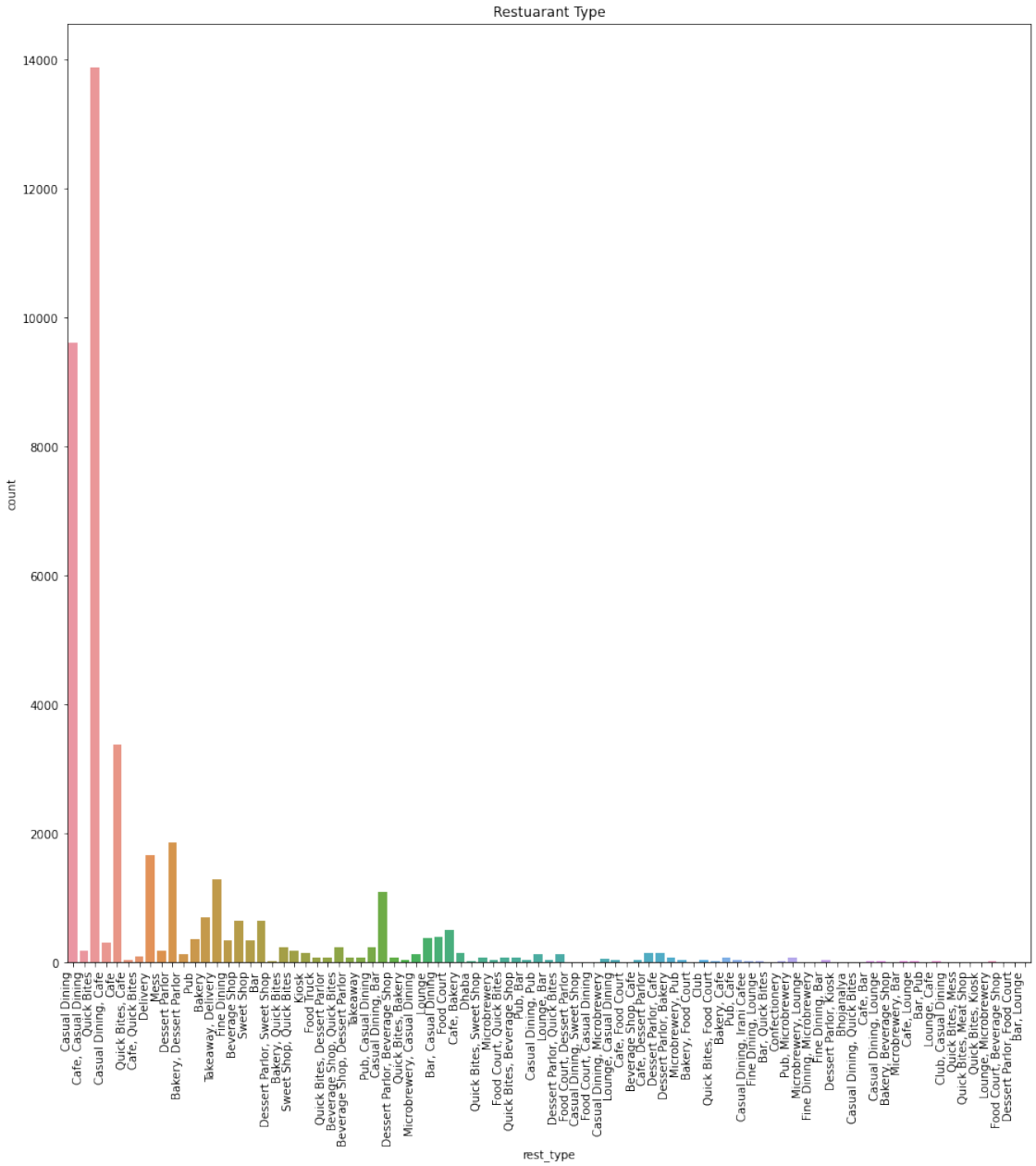
[30]:
```
loc_plt=pd.crosstab(zomato['rate'],zomato['city'])
loc_plt.plot(kind='bar',stacked=True);
plt.title('Locationwise Rating',fontsize=15,fontweight='bold')
plt.ylabel('Location',fontsize=10,fontweight='bold')
plt.xlabel('Rating',fontsize=10,fontweight='bold')
plt.xticks(fontsize=10,fontweight='bold')
plt.yticks(fontsize=10,fontweight='bold');
plt.legend();
```



Restaurant Type

[31]:
```
sns.countplot(zomato['rest_type'])
sns.countplot(zomato['rest_type']).set_xticklabels(sns.
 ↪countplot(zomato['rest_type']).get_xticklabels(), rotation=90, ha="right")
fig = plt.gcf()
fig.set_size_inches(15,15)
plt.title('Restuarant Type')
```

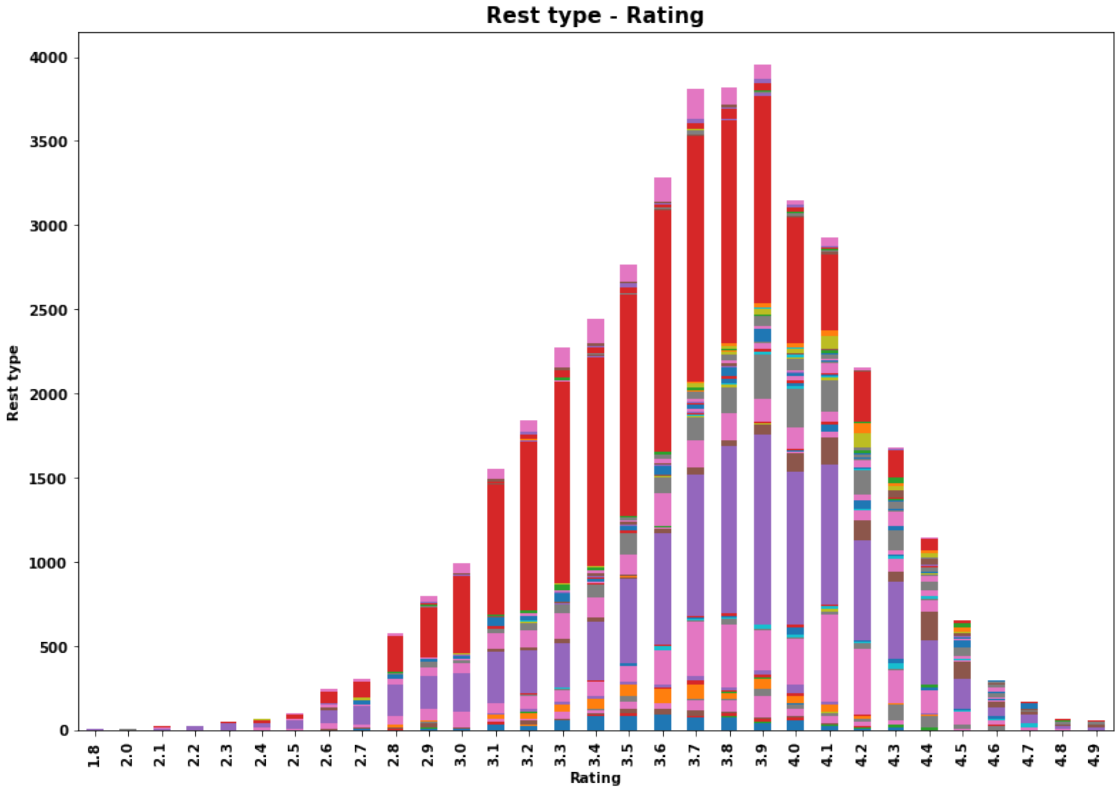
[31]:
```
Text(0.5, 1.0, 'Restuarant Type')
```



Gaussian Rest type and Rating

[32]:
```
loc_plt=pd.crosstab(zomato['rate'],zomato['rest_type'])
loc_plt.plot(kind='bar',stacked=True);
plt.title('Rest type - Rating',fontsize=15,fontweight='bold')
plt.ylabel('Rest type',fontsize=10,fontweight='bold')
plt.xlabel('Rating',fontsize=10,fontweight='bold')
plt.xticks(fontsize=10,fontweight='bold')
plt.yticks(fontsize=10,fontweight='bold');
```

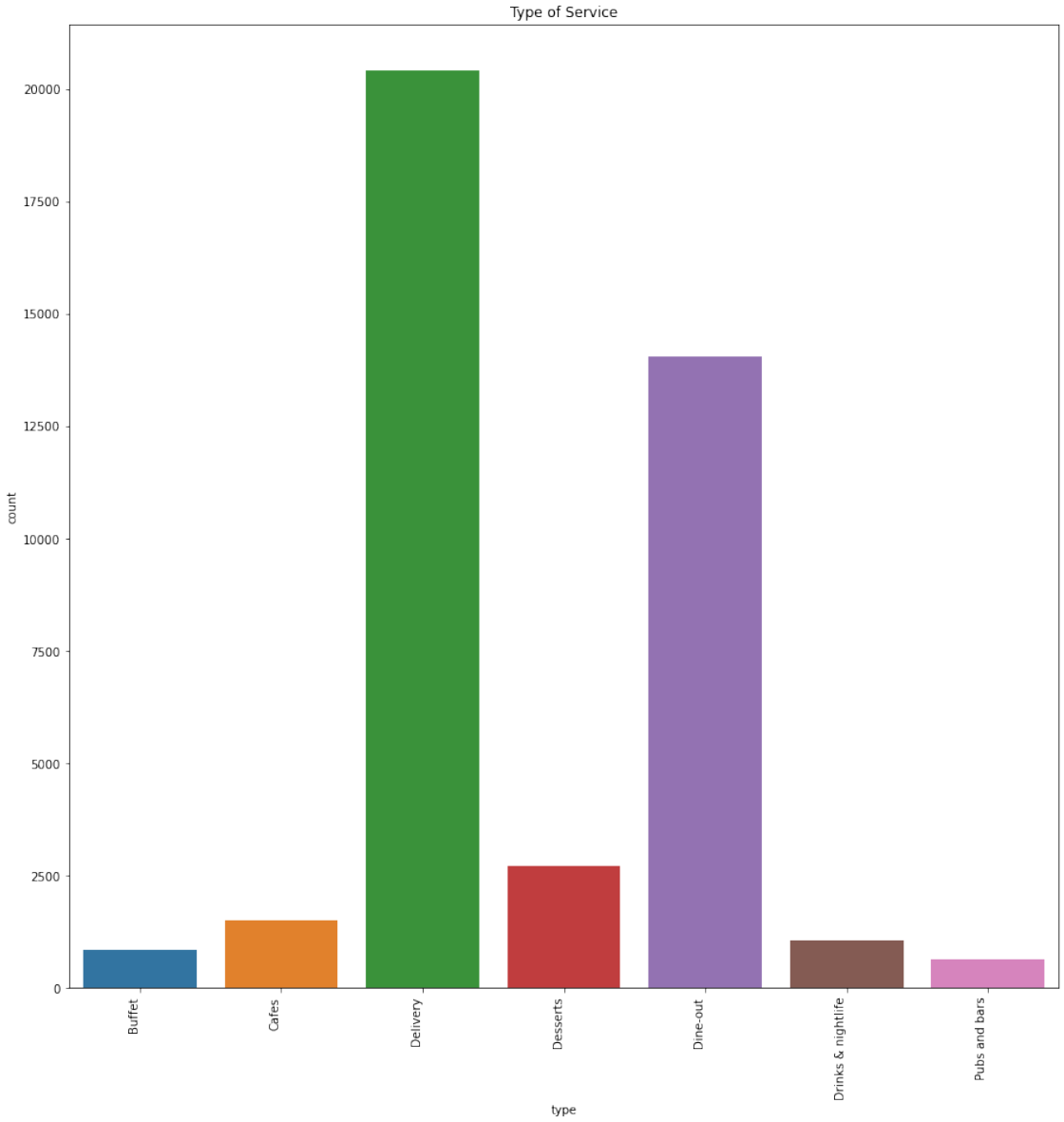
```
plt.legend().remove();
```



Types of Services

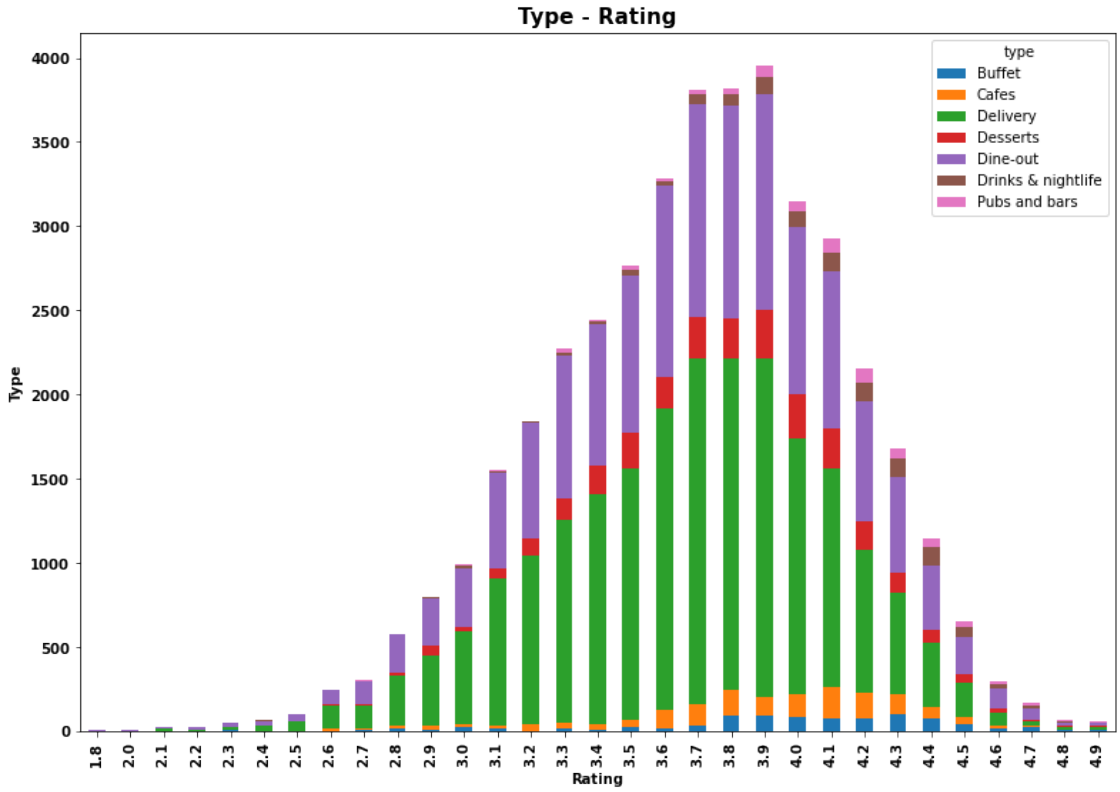
[33]:
```
sns.countplot(zomato['type'])
sns.countplot(zomato['type']).set_xticklabels(sns.countplot(zomato['type']).
 ↪get_xticklabels(), rotation=90, ha="right")
fig = plt.gcf()
fig.set_size_inches(15,15)
plt.title('Type of Service')
```

[33]:
```
Text(0.5, 1.0, 'Type of Service')
```



Type and Rating

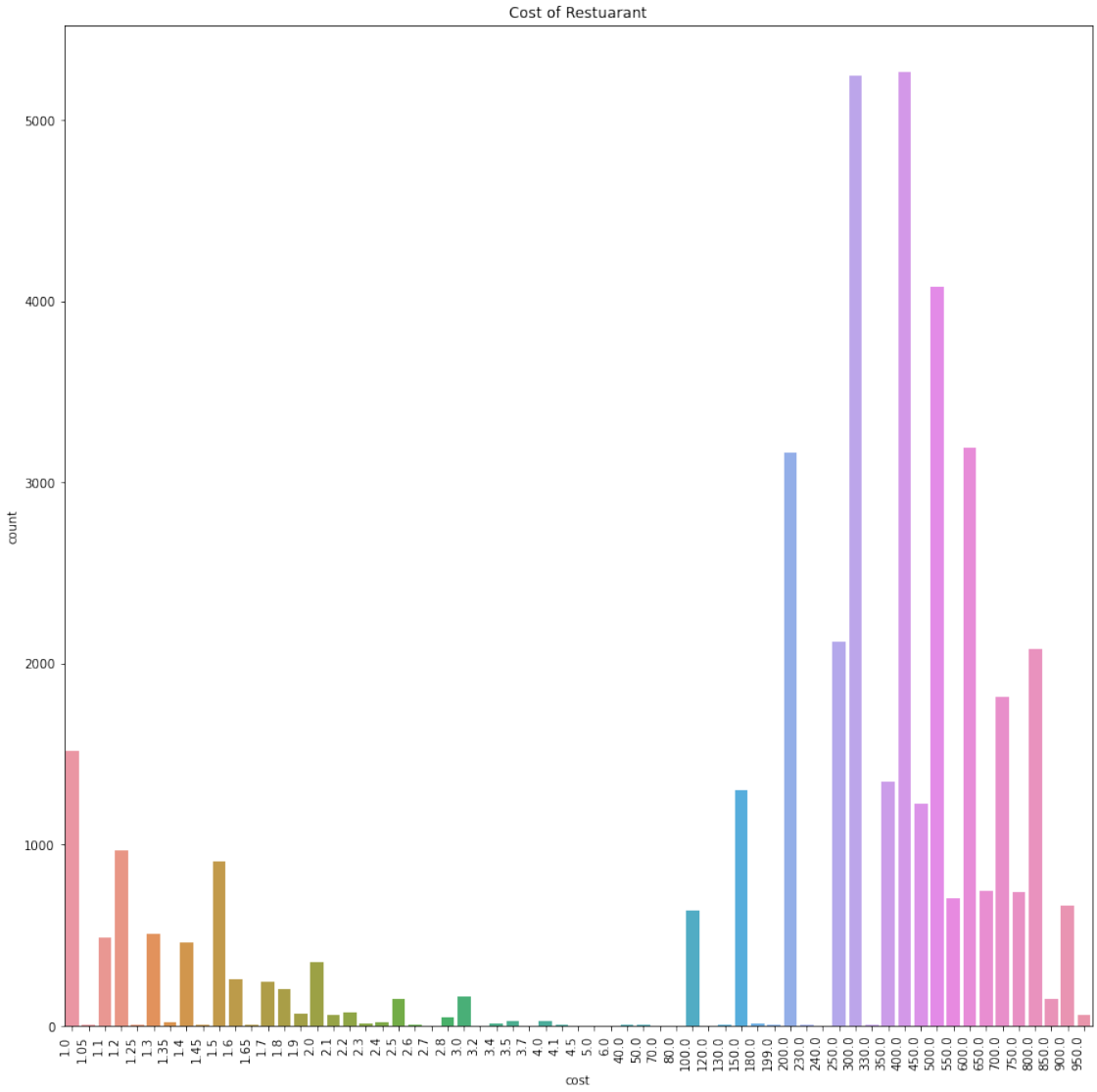
[34]:
```
type_plt=pd.crosstab(zomato['rate'],zomato['type'])
type_plt.plot(kind='bar',stacked=True);
plt.title('Type - Rating',fontsize=15,fontweight='bold')
plt.ylabel('Type',fontsize=10,fontweight='bold')
plt.xlabel('Rating',fontsize=10,fontweight='bold')
plt.xticks(fontsize=10,fontweight='bold')
plt.yticks(fontsize=10,fontweight='bold');
```



Cost of Restuarant

[35]:
```
sns.countplot(zomato['cost'])
sns.countplot(zomato['cost']).set_xticklabels(sns.countplot(zomato['cost']).
 ↪get_xticklabels(), rotation=90, ha="right")
fig = plt.gcf()
fig.set_size_inches(15,15)
plt.title('Cost of Restuarant')
```

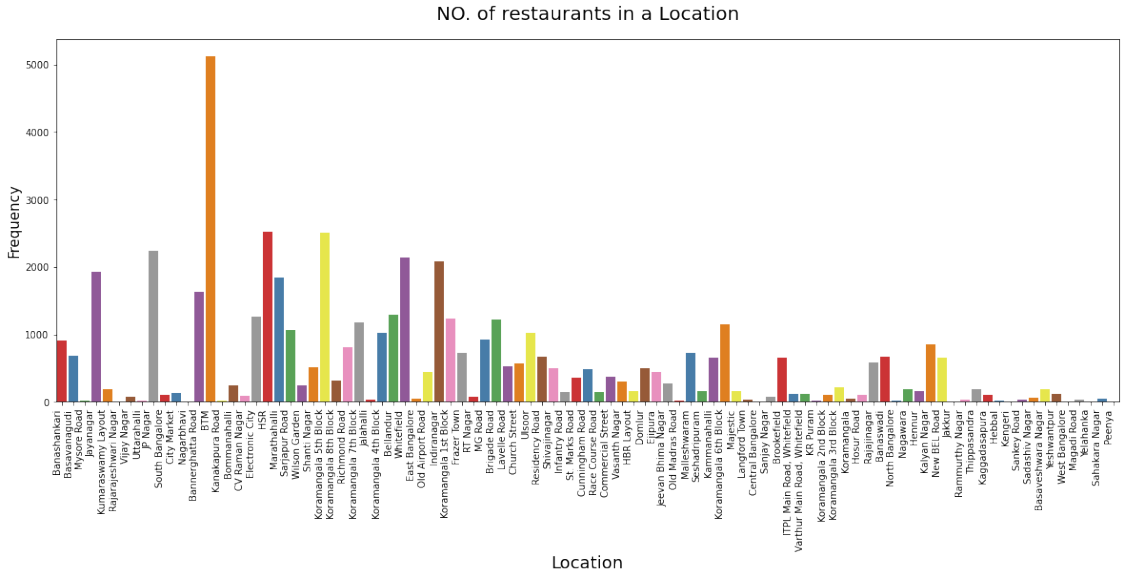
[35]:
```
Text(0.5, 1.0, 'Cost of Restuarant')
```



No. of Restaurants in a Location

[36]:
```
fig = plt.figure(figsize=(20,7))
loc = sns.countplot(x="location",data=zomato_real, palette = "Set1")
loc.set_xticklabels(loc.get_xticklabels(), rotation=90, ha="right")
plt.ylabel("Frequency",size=15)
plt.xlabel("Location",size=18)
loc
plt.title('NO. of restaurants in a Location',size = 20,pad=20)
```

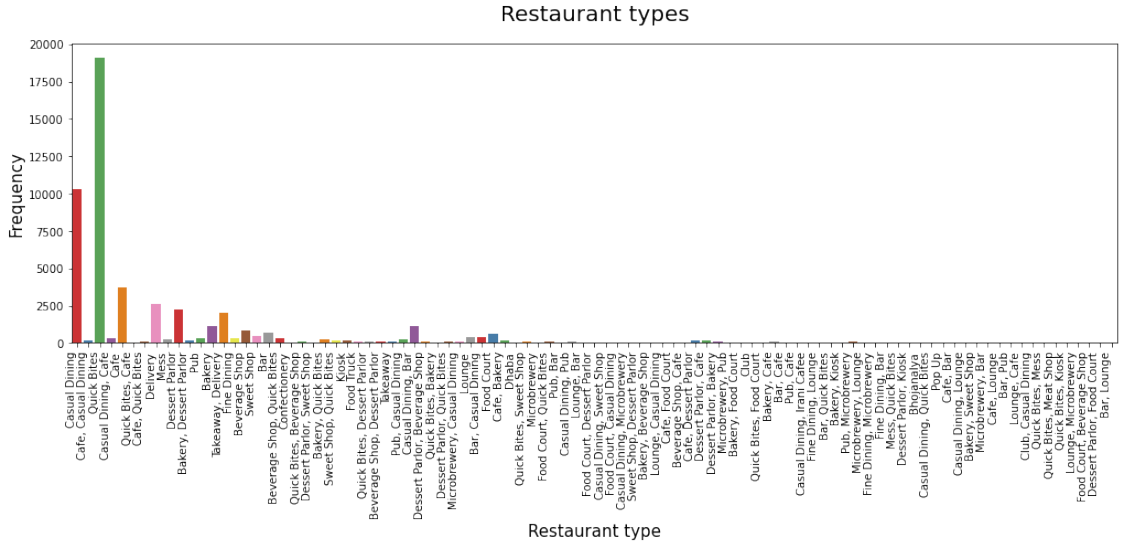
[36]:
```
Text(0.5, 1.0, 'NO. of restaurants in a Location')
```



Restaurant type

[37]:
```
fig = plt.figure(figsize=(17,5))
rest = sns.countplot(x="rest_type",data=zomato_real, palette = "Set1")
rest.set_xticklabels(rest.get_xticklabels(), rotation=90, ha="right")
plt.ylabel("Frequency",size=15)
plt.xlabel("Restaurant type",size=15)
rest
plt.title('Restaurant types',fontsize = 20 ,pad=20)
```

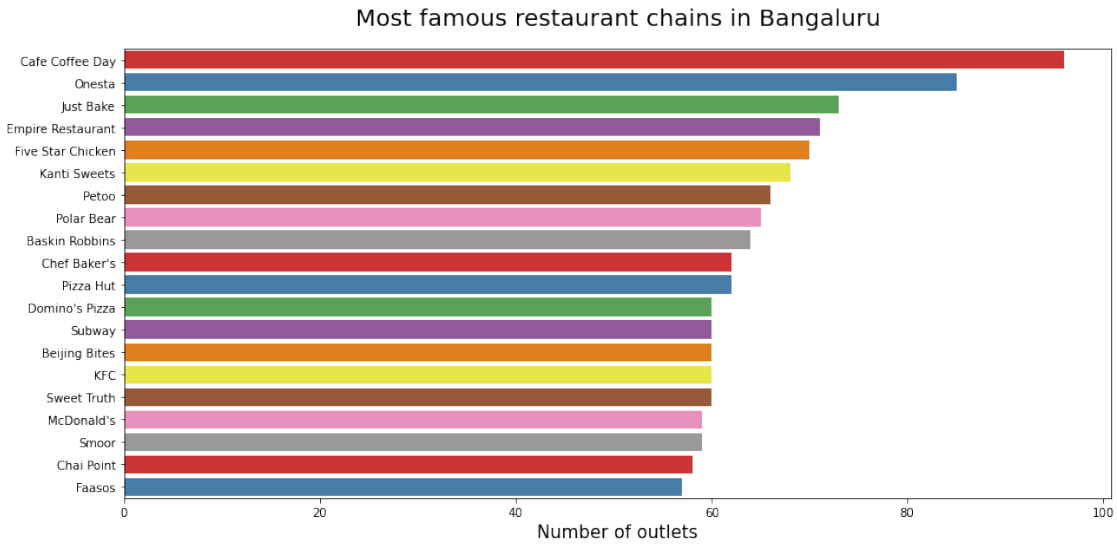
[37]: Text(0.5, 1.0, 'Restaurant types')



Most famous Restaurant chains in Bengaluru

[38]:
```
plt.figure(figsize=(15,7))
chains=zomato_real['name'].value_counts()[:20]
sns.barplot(x=chains,y=chains.index,palette='Set1')
plt.title("Most famous restaurant chains in Bangaluru",size=20,pad=20)
plt.xlabel("Number of outlets",size=15)
```

[38]:
```
Text(0.5, 0, 'Number of outlets')
```



3.0.1 Linear Regression

[39]:
```
#Prepare a Linear Regression Model
reg=LinearRegression()
reg.fit(x_train,y_train)
y_pred=reg.predict(x_test)
from sklearn.metrics import r2_score
r2_score(y_test,y_pred)
```

[39]:
```
0.27362337221038613
```

3.0.2 Decision Tree Regression

[40]:
```
#Prepairng a Decision Tree Regression
from sklearn.tree import DecisionTreeRegressor
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=.
↪1,random_state=105)
```

```
DTree=DecisionTreeRegressor(min_samples_leaf=.0001)
DTree.fit(x_train,y_train)
y_predict=DTree.predict(x_test)
from sklearn.metrics import r2_score
r2_score(y_test,y_predict)
```

[40]: 0.8537219726521353

3.0.3 Random Forest Regression

[41]:
```
#Preparing Random Forest REgression
from sklearn.ensemble import RandomForestRegressor
RForest=RandomForestRegressor(n_estimators=500,random_state=329,min_samples_leaf=.
↪0001)
RForest.fit(x_train,y_train)
y_predict=RForest.predict(x_test)
from sklearn.metrics import r2_score
r2_score(y_test,y_predict)
```

[41]: 0.8773808619238765

3.0.4 Extra Tree Regressor

[42]:
```
#Preparing Extra Tree Regression
from sklearn.ensemble import  ExtraTreesRegressor
ETree=ExtraTreesRegressor(n_estimators = 100)
ETree.fit(x_train,y_train)
y_predict=ETree.predict(x_test)


from sklearn.metrics import r2_score
r2_score(y_test,y_predict)
```

[42]: 0.9394102356092272

[43]:
```
import pickle
# Saving model to disk
pickle.dump(ETree, open('model.pkl','wb'))
```

It can be observed that we have got the best accuracy for Extra tree regressor

[ ]: