

Milestone report

BUSINESS PROBLEM TO SOLVE/GOALS:

- Ratings and reviews play a very important role in attracting new and retaining customers.
- Our target would be improving ratings based on the insights and based on these factors predict ratings using predictive modelling for a prospect restaurant.
- Understand what people like the most in a highly rated restaurant, in a particular locality, which are related to ratings for a prospect restaurant.
- Have an insight of approx_cost (cost for two), which is based on many factors like neighborhood, restaurant type that can be related to ratings.
- Given a locality, a prospect restaurant can have an insight of the factors to get the best rating.
- Marketing strategies like personalized notifications, discounts etc. can be set up to attract an audience.

WHO CARES ABOUT THE PROBLEM WE TRYING TO FIX ?

- Potential clients would be existing restaurant owners and prospects restaurants.
- Having insights on such factors could help the decision makers take actions which would eventually increase the ratings and audience.

DATA COLLECTION AND WRANGLING:

The data is scraped from Zomato(<https://www.zomato.com/bangalore>) using the Python package 'Beautiful soup' as of Jan 2020.

Ref script: [Web scraping script \(Zomato\)](#)

- Most of the data is cleaned/formatted while scraping.
- Some columns are manipulated to tuples.
- Opening and closing timings are transformed to datetime formats.
- Missing values are transformed to np.NAN
- Duplicates rows, if any, are removed based on the restaurant_id.
- No outliers.

Data csv: [data csv](#)

EXPLORATORY DATA ANALYSIS SUMMARY:

Ref script :[Data cleaning and wrangling script](#)

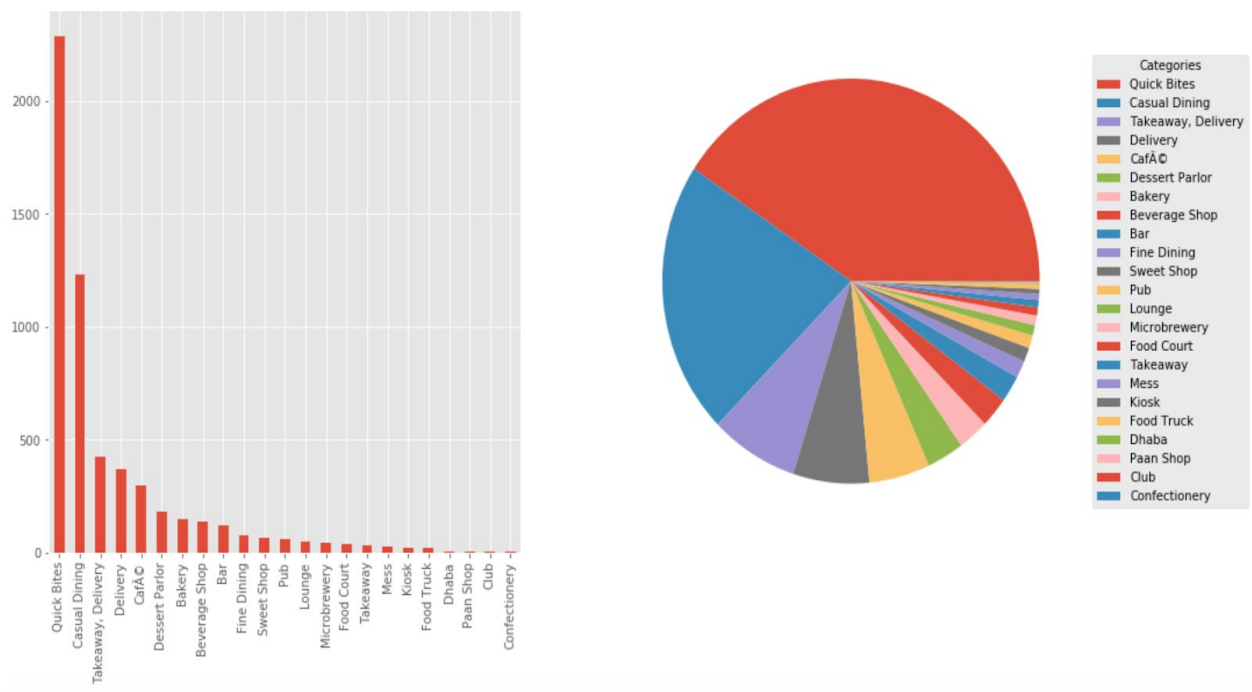
- This dataset is relatively small, having information of around 6k restaurants.
- Let's have a quick glance of the data first and start exploring,

```
df.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6147 entries, 0 to 6146
Data columns (total 23 columns):
restaurant_link      6147 non-null object
restaurant_ID        6147 non-null int64
restaurant_name      6147 non-null object
locality             6147 non-null object
restaurant_category  6142 non-null object
zomato_gold          347 non-null object
discounts            738 non-null object
photos_taken        6147 non-null int64
rating              5328 non-null float64
votes               5310 non-null float64
cuisines            6147 non-null object
approx_cost_for_2    6147 non-null int64
opening_timings     6143 non-null object
address             6041 non-null object
latitude            5682 non-null float64
longitude           5682 non-null float64
more_info           6147 non-null object
featured_in         761 non-null object
known_for           290 non-null object
most_liked_Food     2607 non-null object
most_liked_Service  1382 non-null object
most_liked_Look & Feel 1071 non-null object
reviews            6147 non-null object
dtypes: float64(4), int64(3), object(16)
memory usage: 1.1+ MB
```

	restaurant_link	restaurant_ID	restaurant_name	locality	restaurant_category	zomato_gold	discounts	photos_taken	rating	vote
0	https://www.zomato.com/bangalore/abs-absolute-...	56618	AB's - Absolute Barbecues	Marathahalli	Casual Dining	zomato gold	NaN	4665	4.8	14700.
1	https://www.zomato.com/bangalore/uru-brewpark-...	19122613	URU Brewpark	JP Nagar	Microbrewery	NaN	NaN	776	4.3	1421.
2	https://www.zomato.com/bangalore/the-big-barbe-...	19203051	The Big Barbeque	Marathahalli	Casual Dining	NaN	NaN	609	4.7	1744.

• *Different Restaurant categories*



Quick bites and Casual dining are the most common of all restaurant categories.

• *Cuisines*

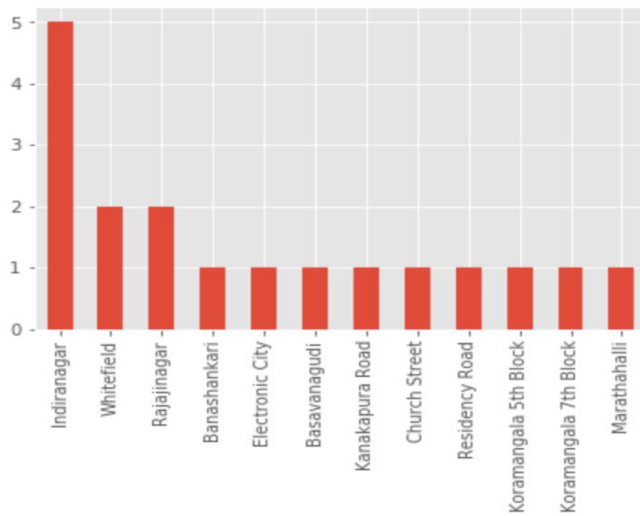
North Indian and Chinese are the most popular whereas Belgium, Portuguese are some of the rare cuisines.

• *Average Restaurant rating in a locality:*

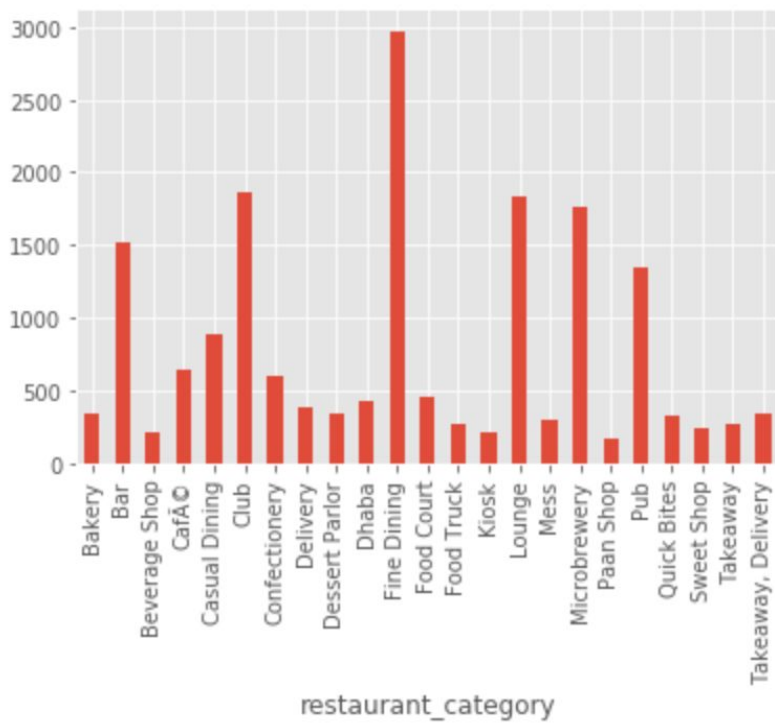
Sankey road, Lavelle road and Church street have highest average ratings. There is definitely locality playing a part in Restaurant rating.

- ***Highest number of newly opened restaurants in a locality***

Indiranagar has the highest number of 'Newly opened' restaurants.

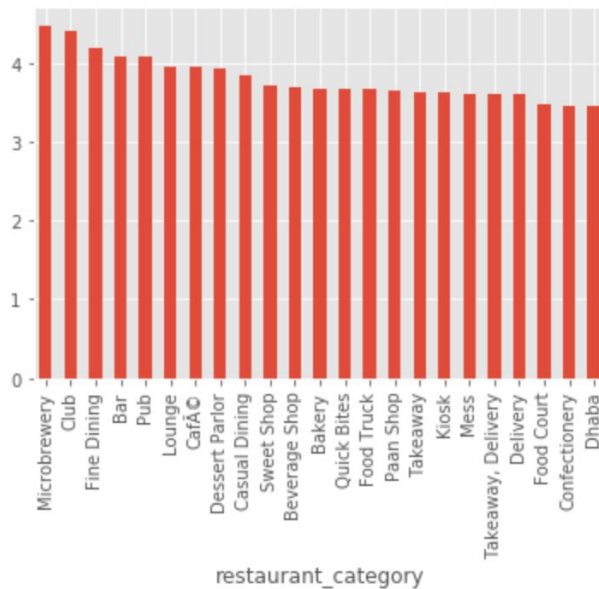


- ***Restaurant category having highest 'Cost for 2'***



Fine Dining being the highest, followed by Club and Lounge have the highest 'Cost for 2'.

- ***Highest and lowest rated restaurant categories :***



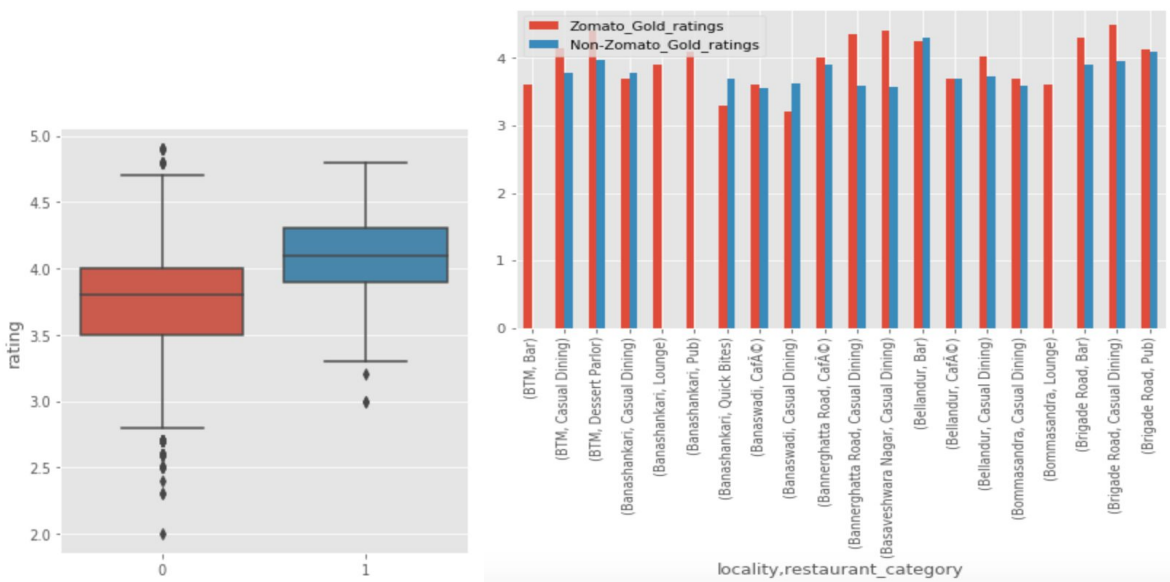
Microbrewery and Club are highest average ratings whereas Confectionery and Dhaba have the lowest average rating.

- *The following figure summarises the Most liked features in the top rated restaurant categories(microbrewery and club respectively) :*



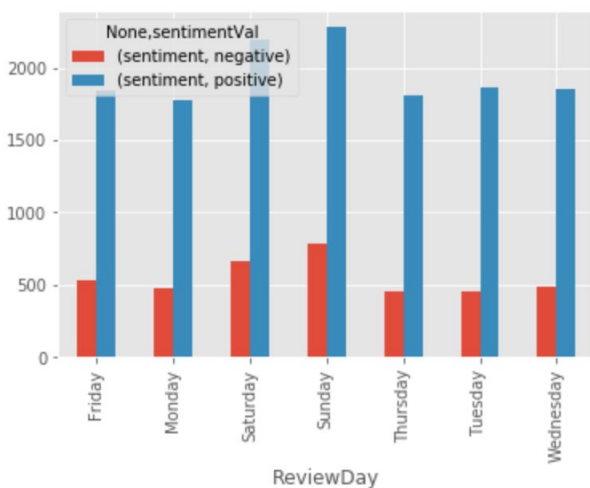
Staff, Chicken, Friendly, Courteous, Beer are some important features for these categories.

- *Average rating of a Zomato Gold and a Non Zomato Gold restaurant in a locality:*



Majority of the times Zomato gold restaurants have higher ratings compared to a Non Zomato restaurant.

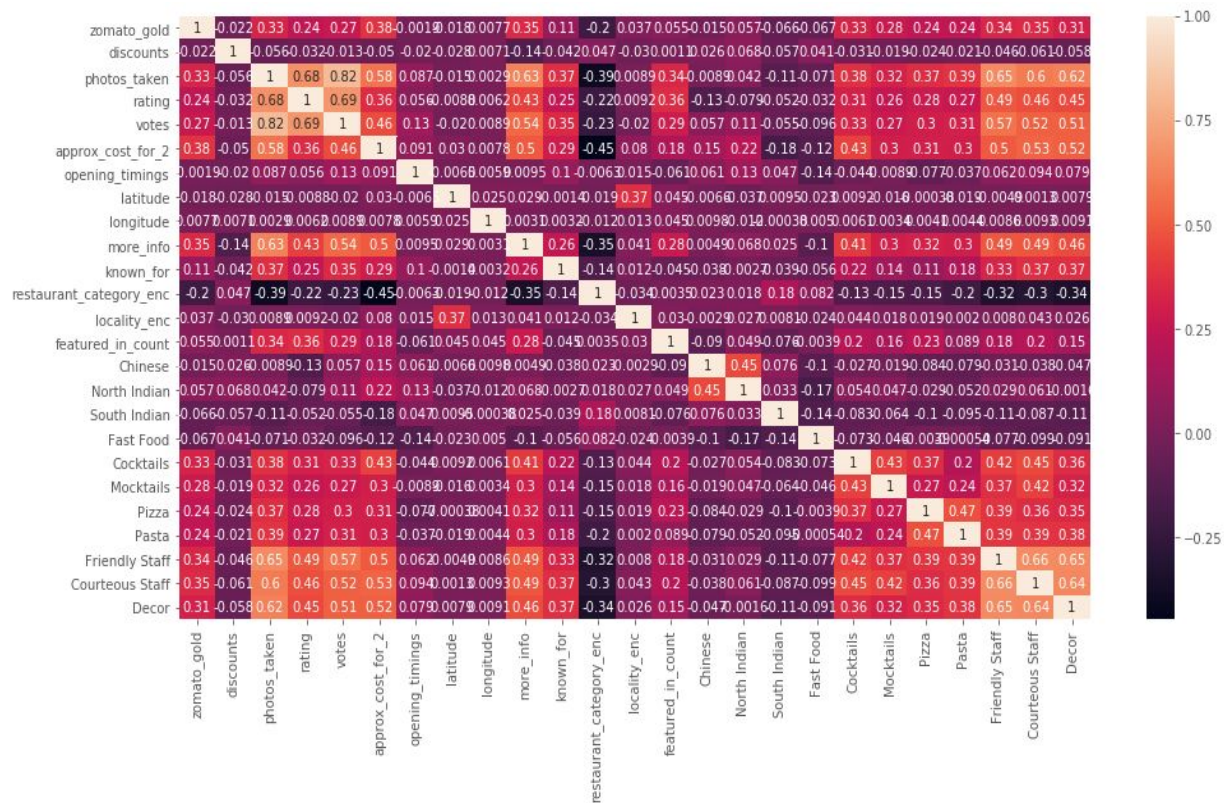
- *Sentiments over a week:*



Looking at sentiments from latest user reviews, we see relatively high positive sentiments, also on weekends have high sentiment responses.

EXPLORING CORRELATIONS AND TRENDS:

To explore correlation and trends between variables we use the pandas correlation and seaborn pairplot visual representations.



- *Photos_taken* are positively correlated with *ratings* and *votes*, and negatively correlated with *approx_cost_for_2*.
- Features like *photos_taken*, *votes*, *approx_cost_for_2*, *featured_in_count*, *zomato_gold* tend to have positive correlation with restaurant *rating*.
- *Discounts* have a negative correlation with *ratings*.
- Few localities have high *approx_cost_for_2*.
- From the above restaurant_category distribution, we see that a very few categories are very popular.
- Few certain restaurant categories have high *approx_cost_for_2*.
- From the distribution of *zomato_gold*, we see that relatively few restaurants have *zomato_gold*.

- From the distribution of discounts, we see that relatively few restaurants have discounts.



- Localities seem not correlated with *rating*.
- *Featured_in_count* looks positively correlated with *rating*.

FEATURE ENGINEERING:

Keeping in mind getting the best from model learnings, some feature engineering is required on the data. These are some of the techniques performed.

Imputation:

- Missing values replaced with NaN.
- *Restaurant_id* considered as a unique identifier, duplicates removed.
- In some cases, Numeric imputation i.e replacing NaN with a number say '0' made more sense like in case *Zomato_gold*, etc.
- Some *Restaurant_categories* were very low in number, Categorical imputation i.e replacing such categories with 'Others' made more sense.

Log Transform:

- Log transformation helps to handle highly skewed data. On transforming the distribution is approximated to a normal.
- Log transformation helps to decrease the effect of outliers.
- Referring to the pairplots, we can see the *photos_taken*, *votes*, *approx_cost_for_2* are highly right skewed which should be log transformed.

Encoding:

Encoding converts non-numeric categorical data to numeric data, so as to convert it into a machine-readable form .

- *Label Encoding*: Encodes categories to unique numbers. *Locality* and *Restaurant_categories* are Label Encoded.
- *MultilabelBinarizer*: Encodes in a binary matrix indicating presence of class. We used this to encode *cuisines*, then expanded this to new features having only most prominent cuisines, most liked features.

mato_gold	discounts	photos_taken	rating	votes	cuisines	...	North Indian	South Indian	Fast Food	Cocktails	Mocktails	Pizza	Pasta	Friendly Staff	Courteous Staff	Decor
0	0	0.693147	3.2	2.079442	[North Indian]	...	1	0	0	0	0	0	0	0	0	0
0	0	4.521789	4.2	4.779123	[Cafe, Italian, Continental]	...	0	0	0	0	0	0	0	1	1	1
0	0	1.386294	3.5	2.197225	[South Indian]	...	0	1	0	0	0	0	0	0	0	0

Here, we have expanded to new features like 'North indian', 'Cocktails', etc which are most prominent.

- *Target Encoding*: In this encoding technique, we map or encode the variable, to mean of the target variable. Here, we generally split the data first, encode the variable in the train data then map respectively on the test data. Any unseen category in the test data can be filled with mean target variable. In this dataset, we have encoded *Restaurant_category* using target encoding.

Statistical inferences:

Ref script: [Statistical inference script](#)

We have performed some statistical tests using Bootstrap techniques to verify or have confidence of certain observations seen in Exploratory data analysis.

1. Null hypothesis test resulted in positive correlation between approx_cost_for_2 and rating.
2. Null hypothesis test resulted in Zomato Gold have high ratings compared to Non Zomato Gold restaurants.