Text Mining and Search

Topic Modeling and Text Classification

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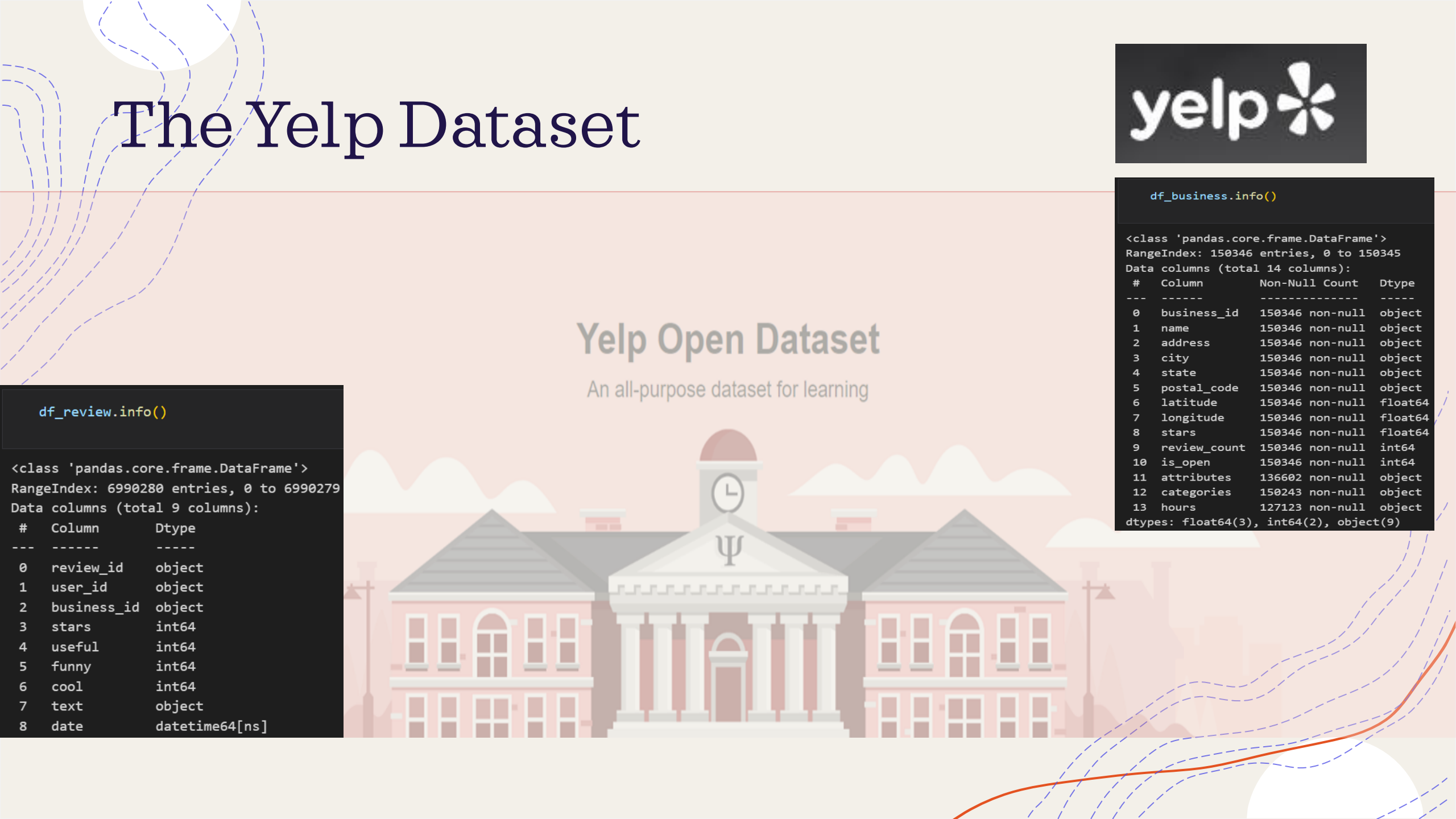
The Yelp Dataset




```
df_review.info()
```

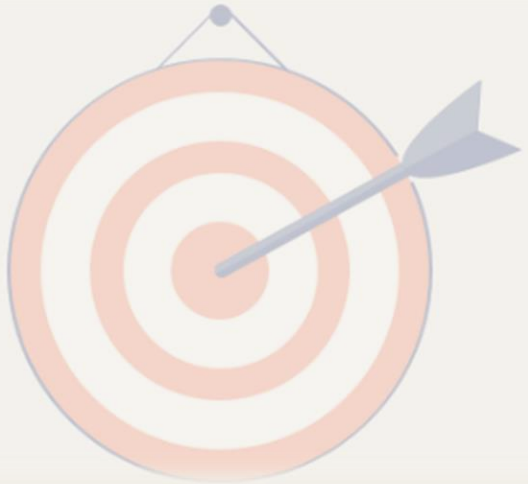
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6990280 entries, 0 to 6990279
Data columns (total 9 columns):
 #   Column       Dtype
---  ------       -----
 0   review_id    object
 1   user_id      object
 2   business_id  object
 3   stars        int64
 4   useful       int64
 5   funny        int64
 6   cool         int64
 7   text         object
 8   date         datetime64[ns]
```

```
df_business.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150346 entries, 0 to 150345
Data columns (total 14 columns):
 #   Column        Non-Null Count   Dtype
---  ------        --------------   -----
 0   business_id   150346 non-null  object
 1   name          150346 non-null  object
 2   address       150346 non-null  object
 3   city          150346 non-null  object
 4   state         150346 non-null  object
 5   postal_code   150346 non-null  object
 6   latitude      150346 non-null  float64
 7   longitude     150346 non-null  float64
 8   stars         150346 non-null  float64
 9   review_count  150346 non-null  int64
 10  is_open       150346 non-null  int64
 11  attributes    136602 non-null  object
 12  categories    150243 non-null  object
 13  hours         127123 non-null  object
dtypes: float64(3), int64(2), object(9)
```

Objectives

- Evaluate the performances of different text representations considering the classification task.
- Perform topic modelling techniques, to find some of the most discussed topics in the Yelp reviews.
- Predicting the review stars considering the text of the reviews with classification.



Data Preparation

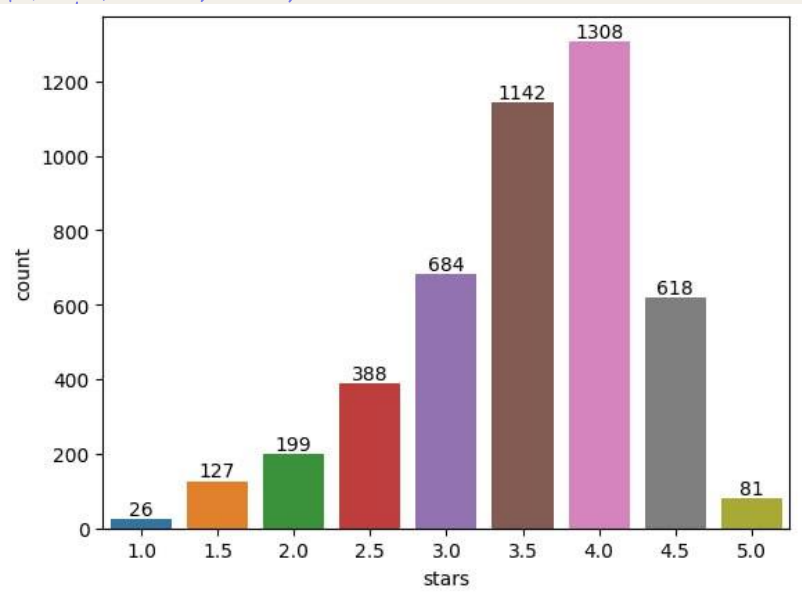
```
df_ita.info()
```

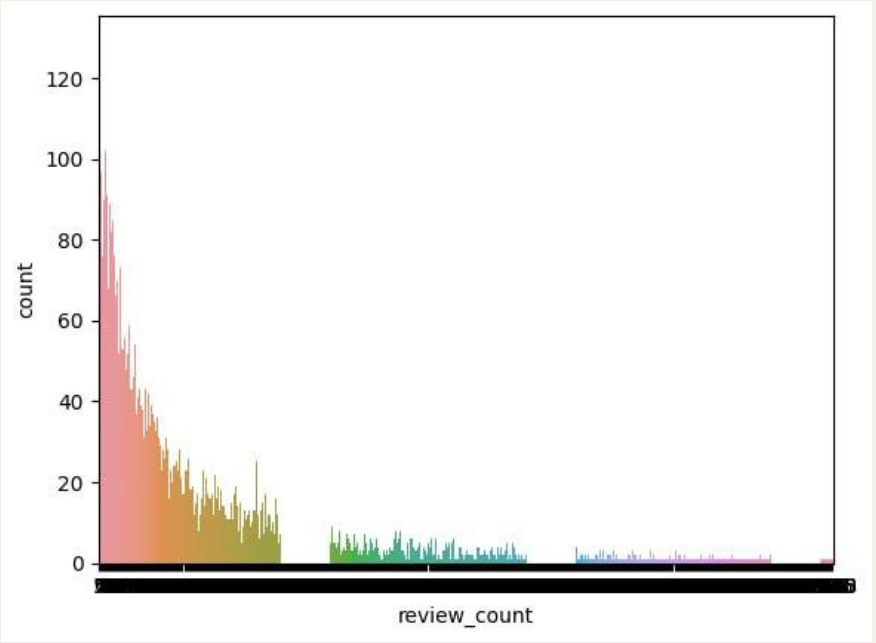
```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 439358 entries, 3306 to 6989409
Data columns (total 15 columns):
 #   Column        Non-Null Count   Dtype
---  ------        --------------   -----
 0   review_id     439358 non-null  object
 1   user_id       439358 non-null  object
 2   business_id   439358 non-null  object
 3   review_stars  439358 non-null  int64
 4   useful        439358 non-null  int64
 5   funny         439358 non-null  int64
 6   cool          439358 non-null  int64
 7   text          439358 non-null  object
 8   date          439358 non-null  datetime64[ns]
 9   name          439358 non-null  object
 10  city          439358 non-null  object
 11  stars         439358 non-null  float64
 12  review_count  439358 non-null  int64
 13  attributes    439063 non-null  object
 14  categories    439358 non-null  object
```

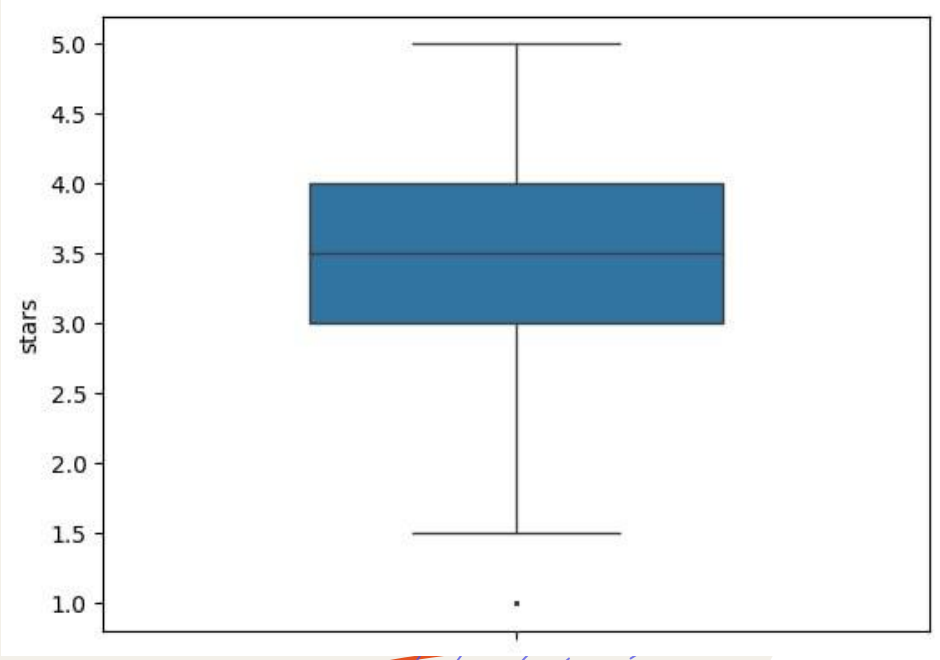
Text Preprocessing

- Case folding
- No numbers
- No empty lines
- No URL/links
- No whitespace
- No emoji
- No repeated characters
- No punctuation
- Tokenization and stopword removing
- Lemmetization

Exploratory Analysis





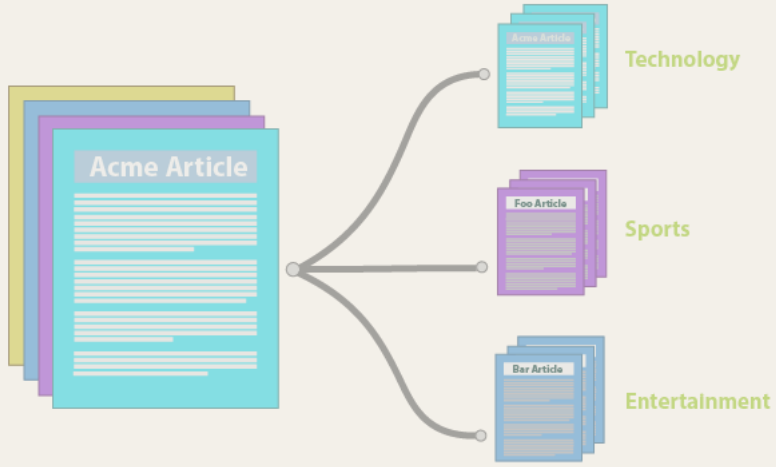


variables	mean	min	max	std	25%	50%	75%
Stars	3.51	1.0	5.0	0.78	3.0	3.5	4.0
Review count	92.39	5	4250	156.77	18	44	108

Topic Modeling

Text Classification

Class method countvectorizer()	Accuracy Score	F1 Score	Recall Score
DT	0.77	0.82	0.83
SVM	0.88	0.92	0.93
RF	0.86	0.90	0.96



Class method TFTDF	Accuracy Score	F1 Score	Recall Score
DT	0.77	0.84	0.84
SVM	0.90	0.92	0.95
RF	0.87	0.91	0.96

Results and conclusion

+ Topic Modeling: big presence of words related to Italian restaurants and food (‘pizza’, ‘pasta’…); in general, positive words and feedbacks.

+ Text Classification: among the two representation method and the three classification models, Support Vector Machine with TFIDF were the best; Decision Trees classifier was the worst (in particular with countvectorizer()).

Thanks for your attention!