AirBnB

Group 10

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Introduction

Company Overview

- $3.4 billion in revenue in 2020
- 193 million bookings in Airbnb in 2020
- Over 7 million listings in Airbnb, run by 4 million hosts

Objective

Predict if a property will receive a good or bad rating based on sentiment analysis and average rating score.

Value Proposition of Project

Small Airbnb Managers:

Determine most important attributes

Compare property to competition

Large Airbnb Managers:

Clarify user rating drivers

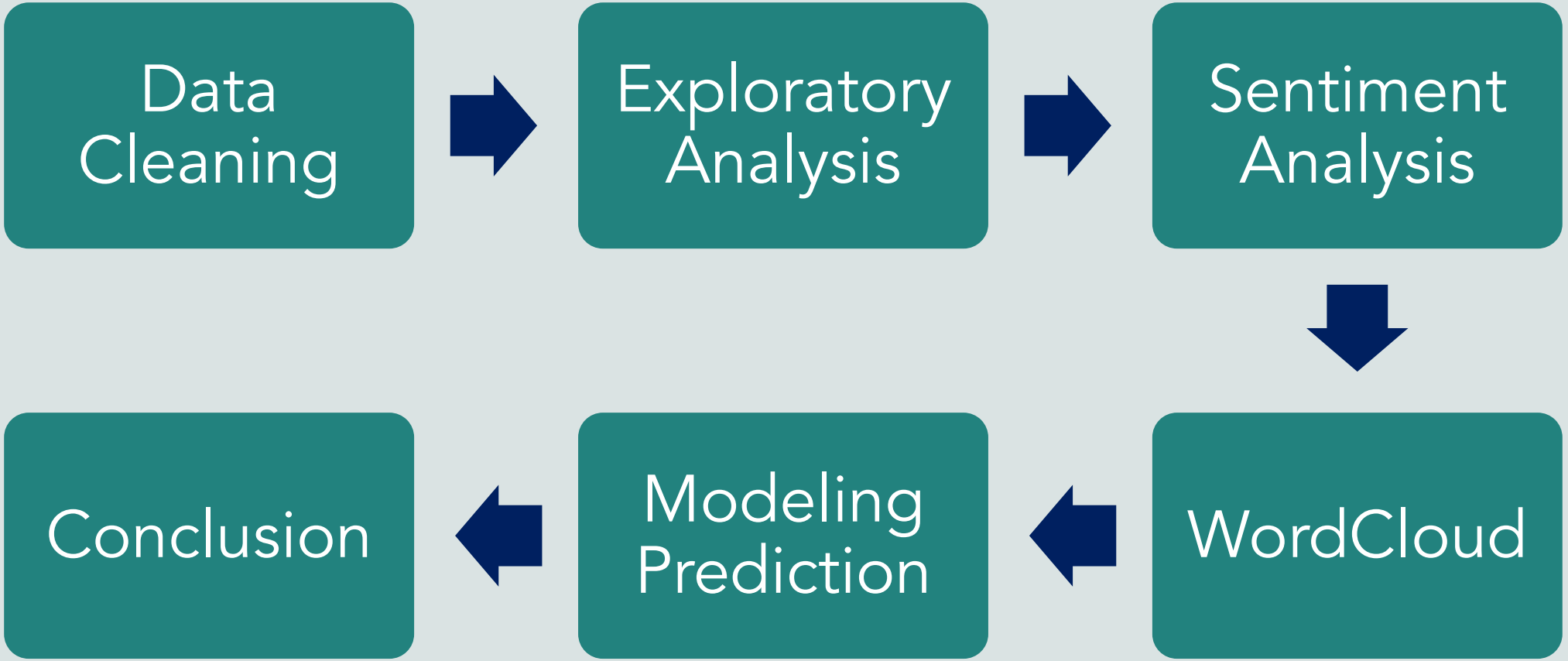
Guide purchasing decisions

Airbnb Corporate:

Vet aspiring Airbnb hosts

Improve recommendation algorithm

Process Overview



Data Cleaning

Original Dataset

- Two datasets - ‘Listings’ and ‘Reviews’
  - Combined into one
  - Reviews - 876,200 entries
  - Listings - 37,713 properties
- 43+ columns/attributes in combined dataset
- Reviews in multiple languages
- “Corrupted” reviews containing non-character symbols like ™, ®, ﷺ etc

Dataset Pre-processing

1

Remove all non strings, digits and symbols

2

Remove punctuation, white spaces and converting upper case to lower case

3

Remove Stopwords using nltk stopwords

4

Remove null values

Cleaned Dataset

- 15,722 rows and two columns in ‘Reviews’
- 12,876 properties in ‘Listings’
- 42 columns in ‘Listings’

10 variables included from 2 different datasets, namely Listings and Reviews, such as:

Cleanliness

Subjectivity

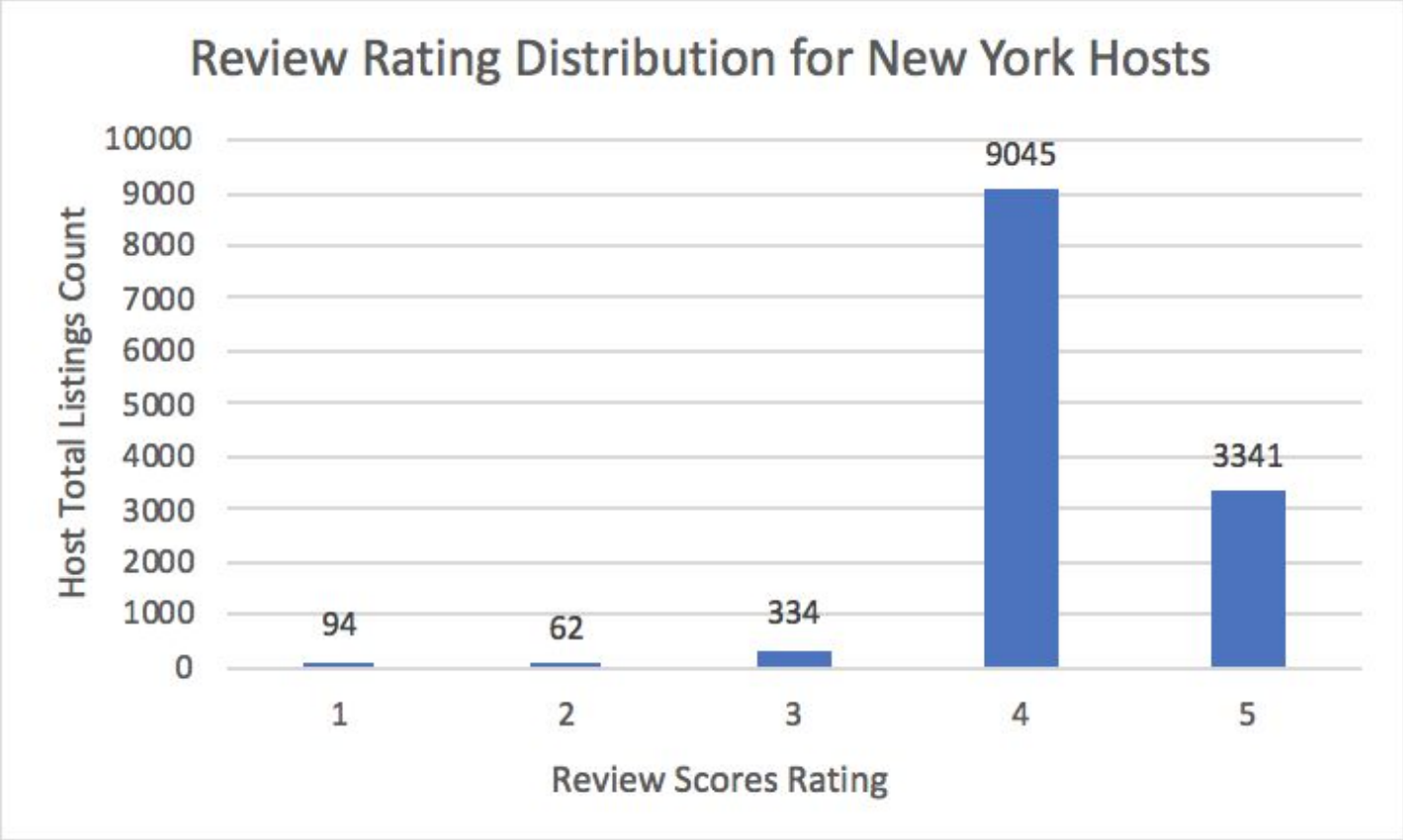
Polarity

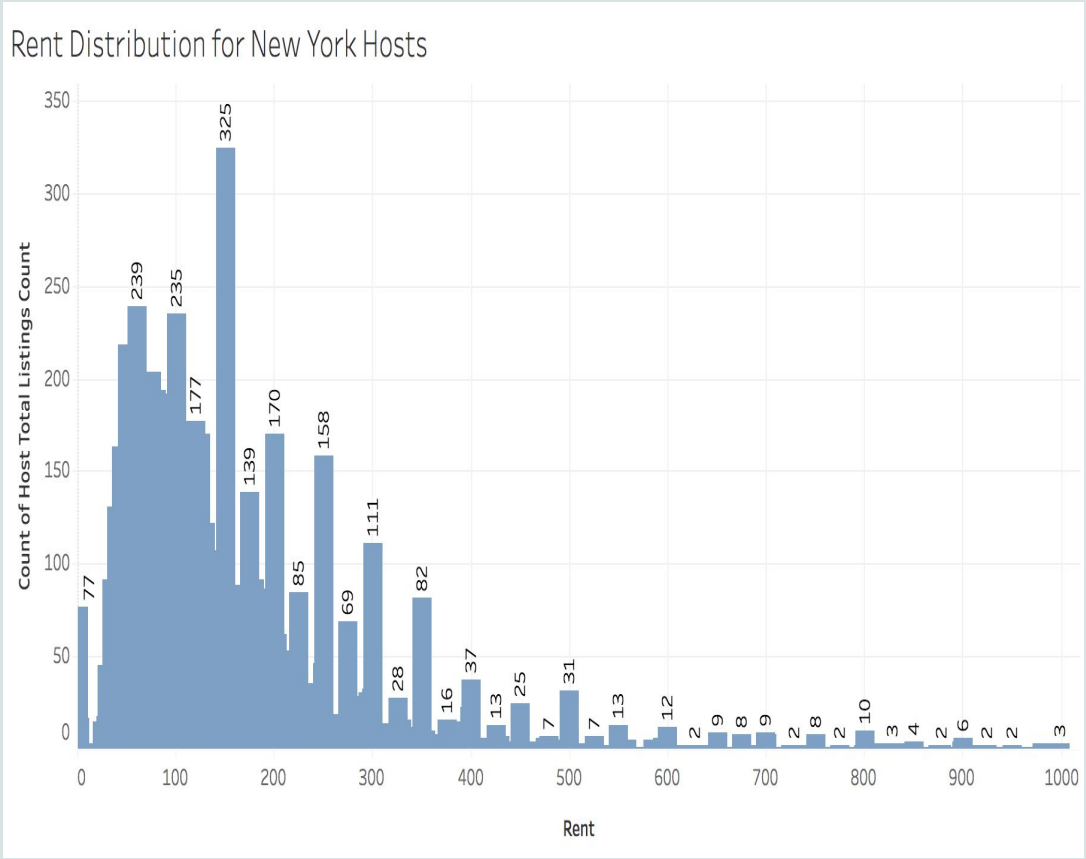
Value

Rent

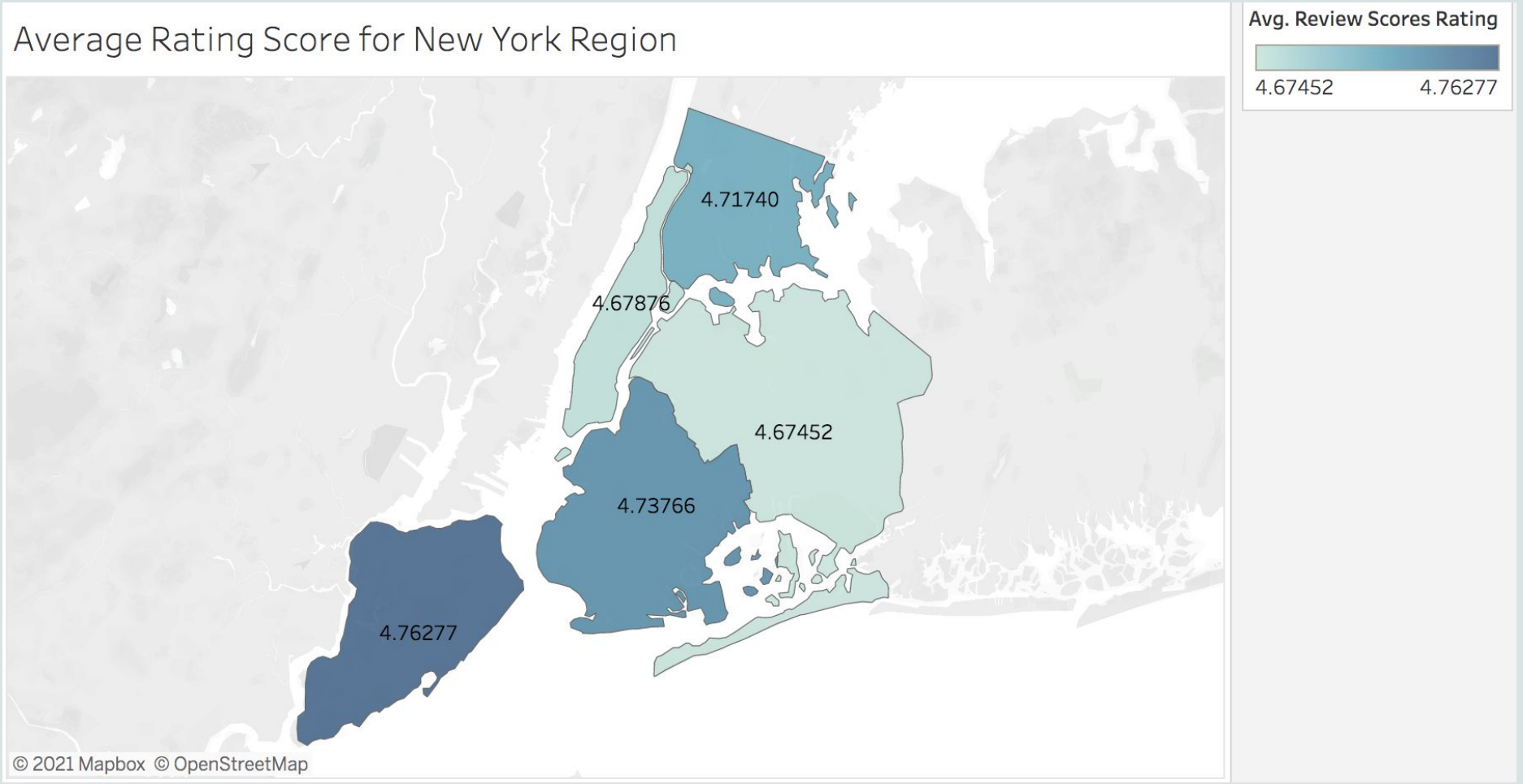
Exploratory Analysis

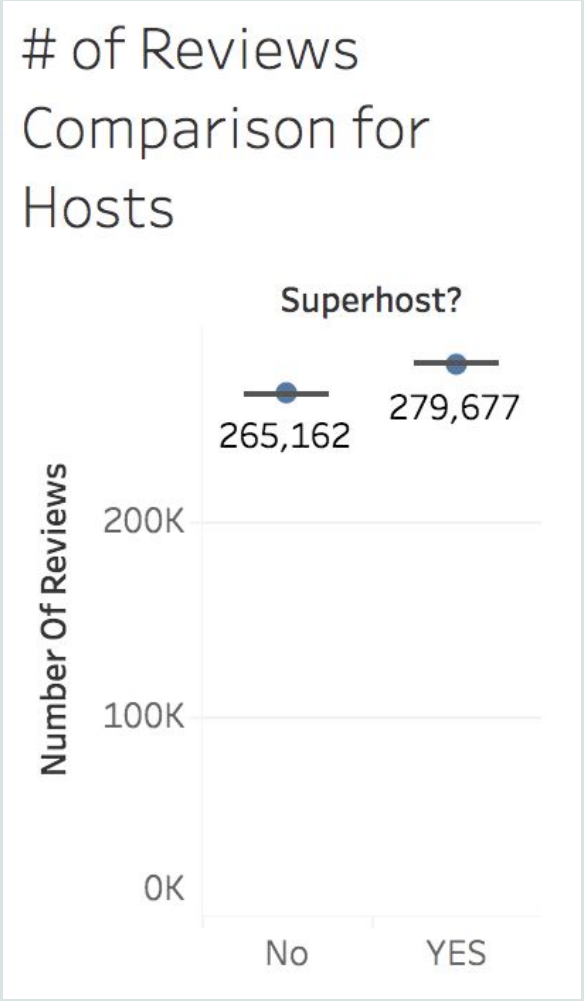
Demographic Visualizations





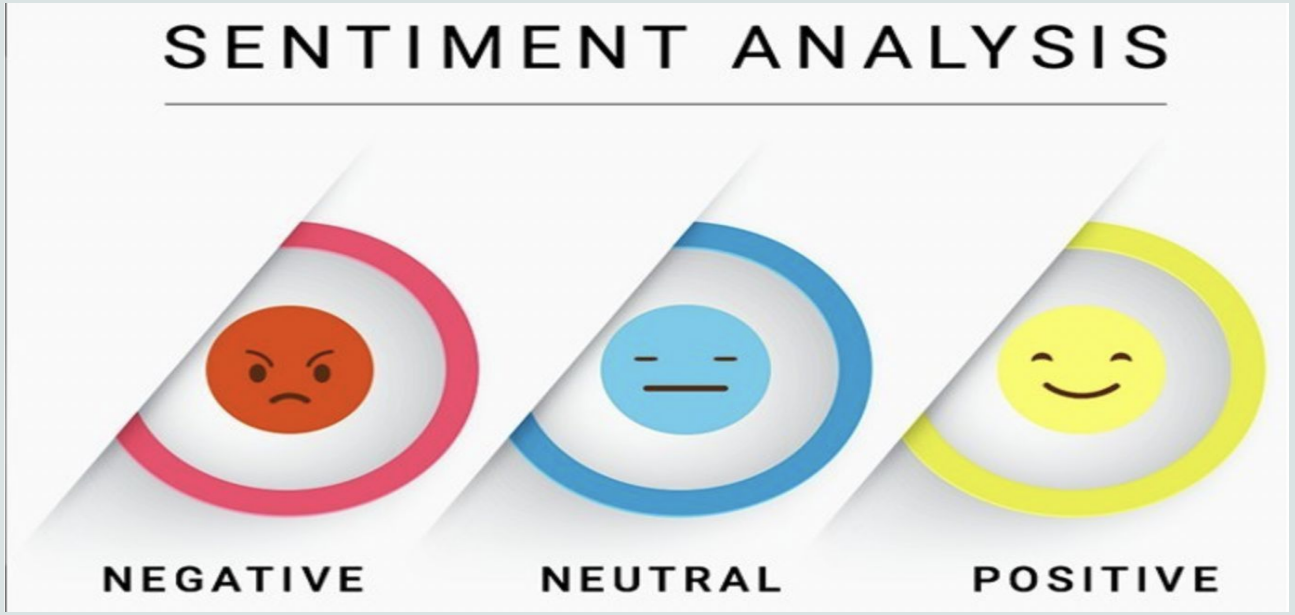
Demographic Visualizations





Sentiment Analysis

- Textblob
  - Polarity
  - Subjectivity



Negative — Neutral — Positive

-1 — 0 — 1

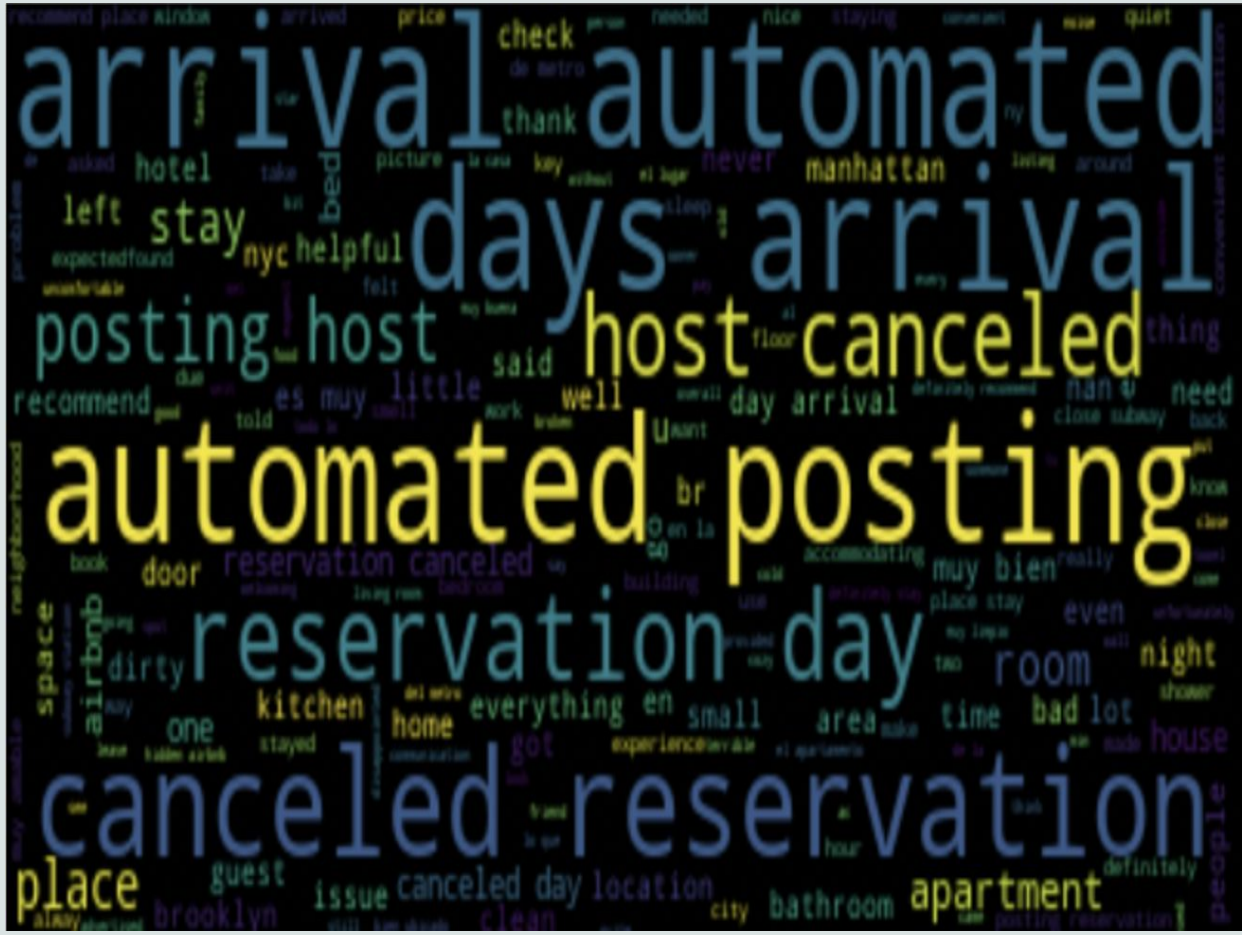
Objective (factual) — Subjective (opinion)

0 — 1

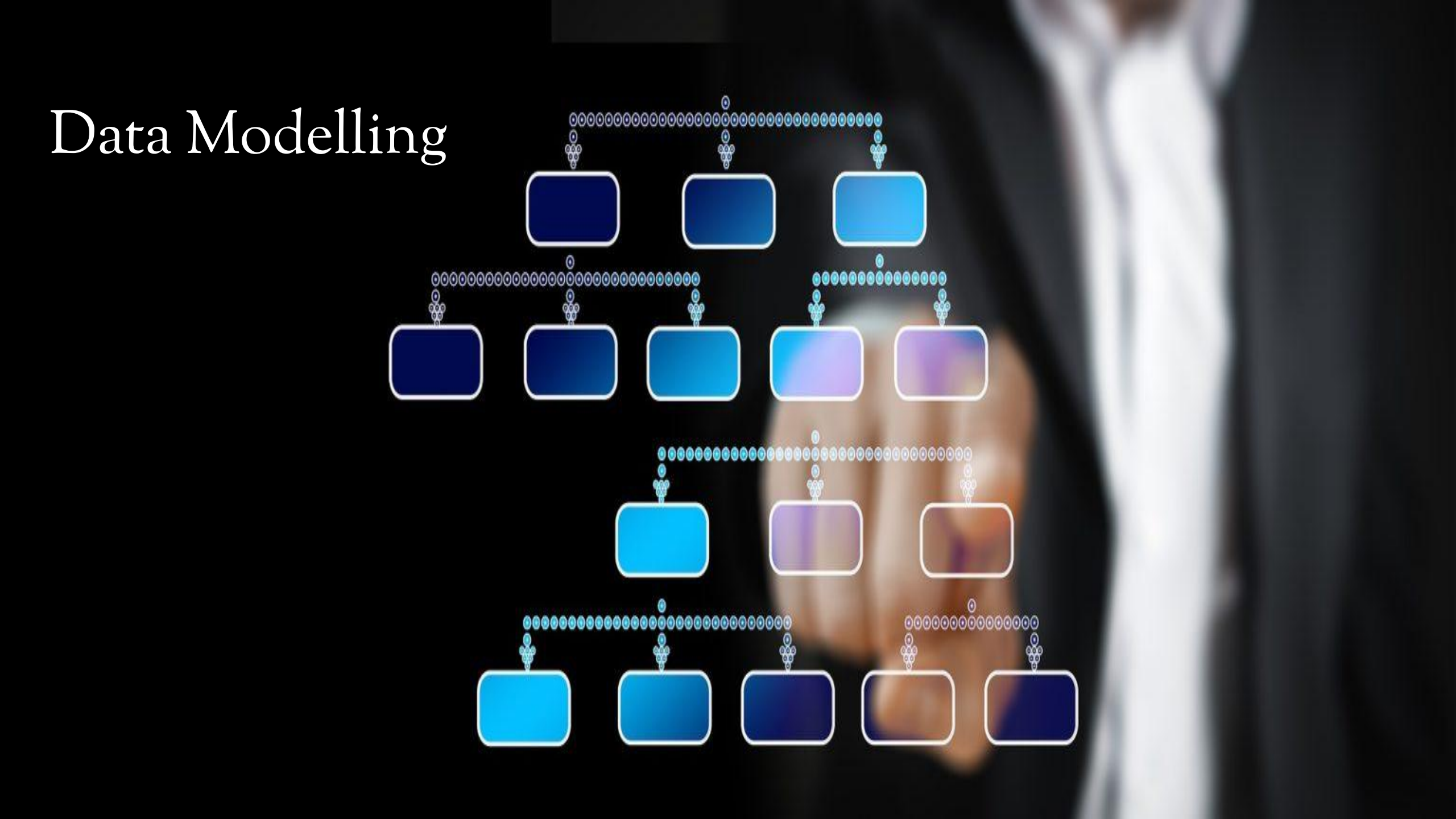
WordCloud

Positive

Negative



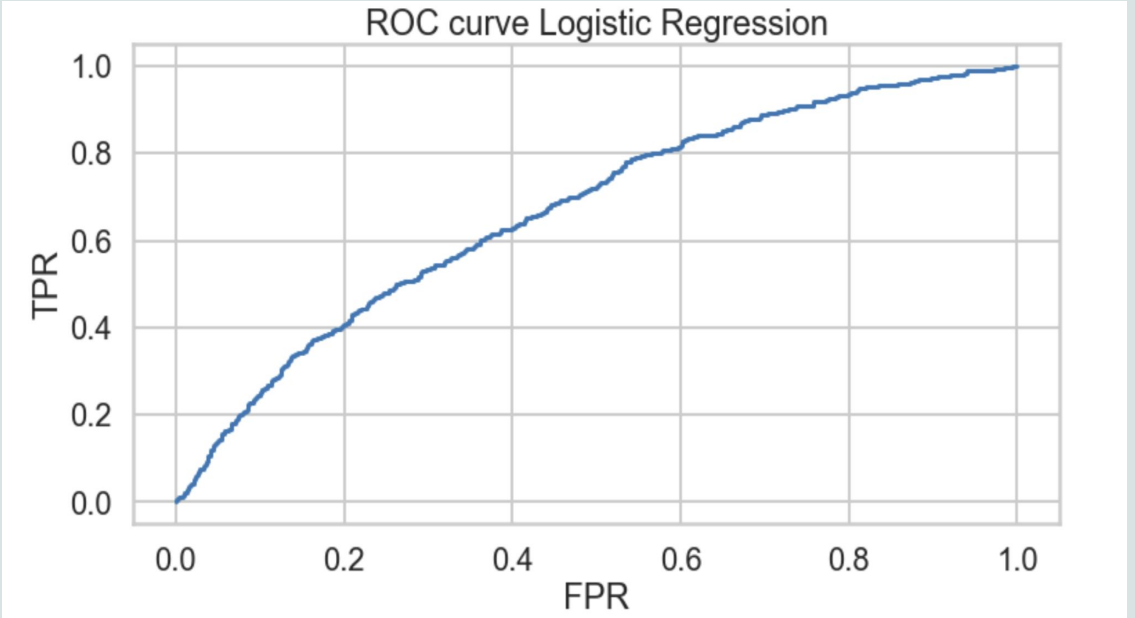
Data Modelling



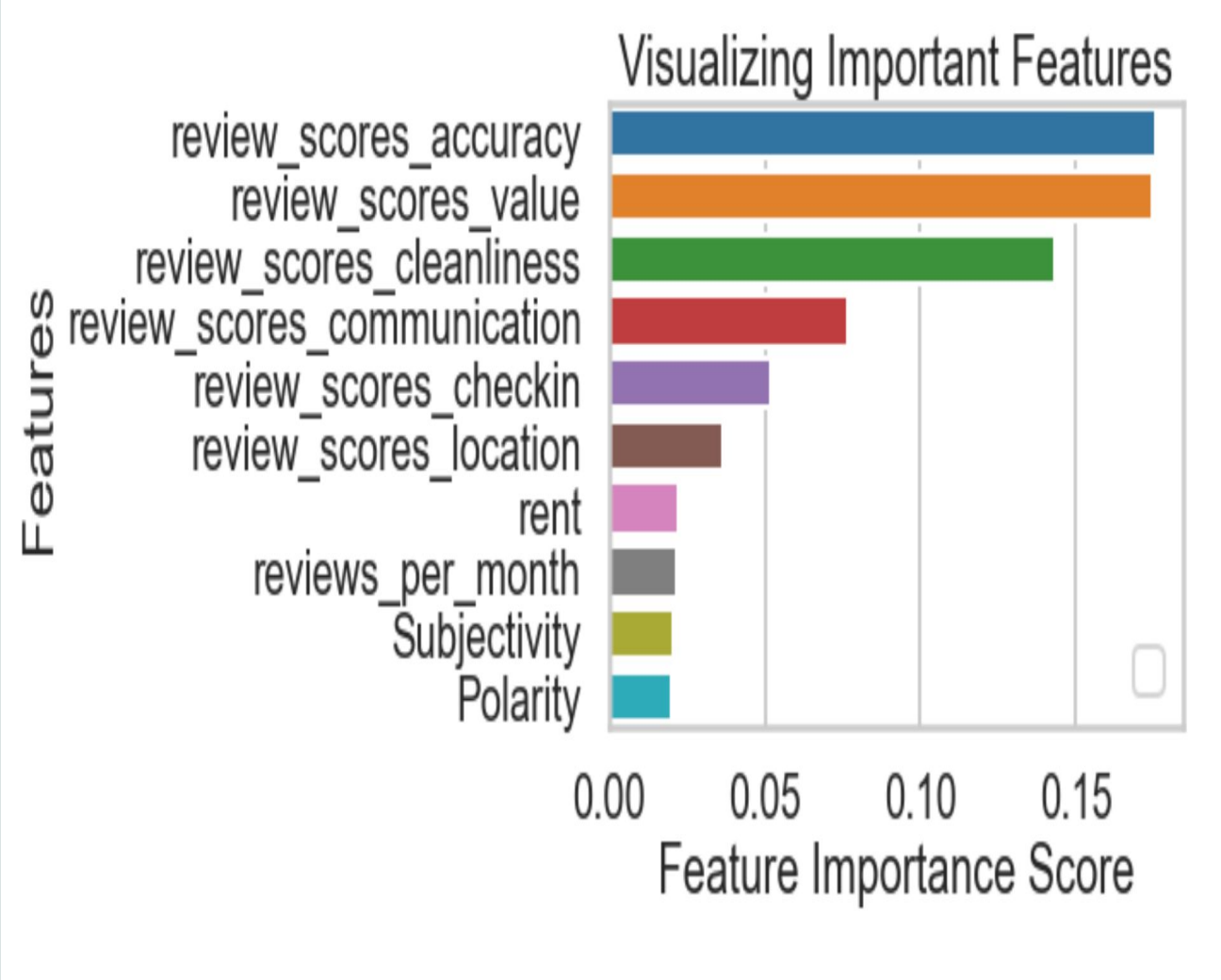
Logistic Regression

- Without processing the data
- Benchmark model

	precision	recall	f1-score	support
0	0.69	0.94	0.80	1121
1	0.58	0.16	0.25	553
accuracy			0.68	1674
macro avg	0.64	0.55	0.52	1674
weighted avg	0.66	0.68	0.62	1674



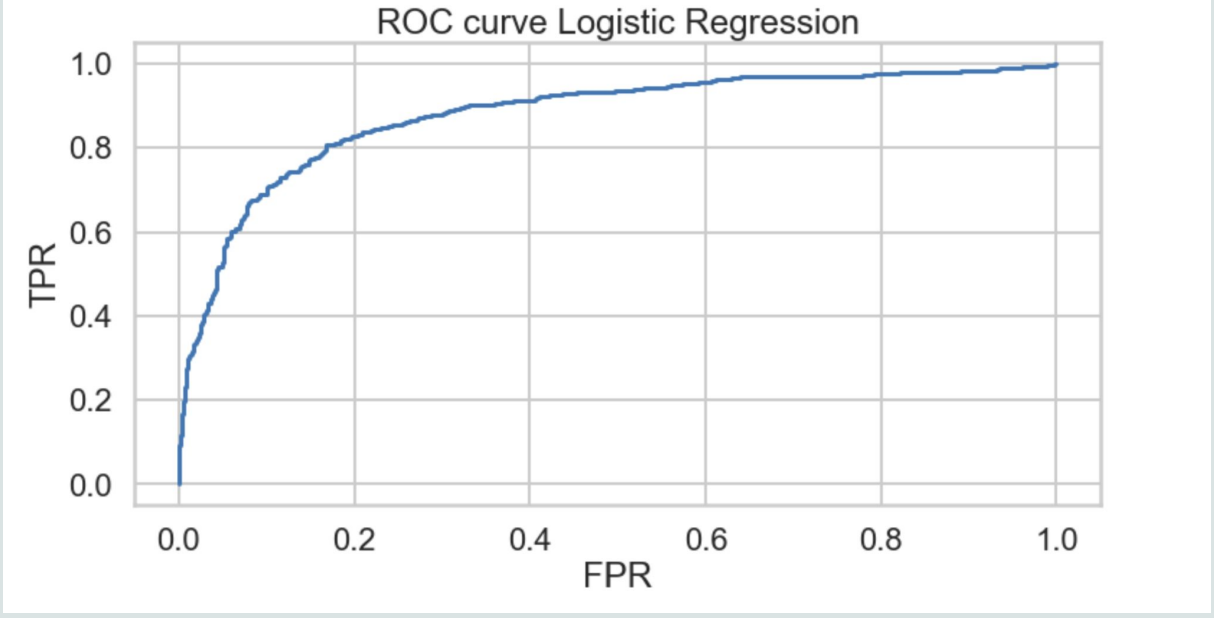
Feature Selection



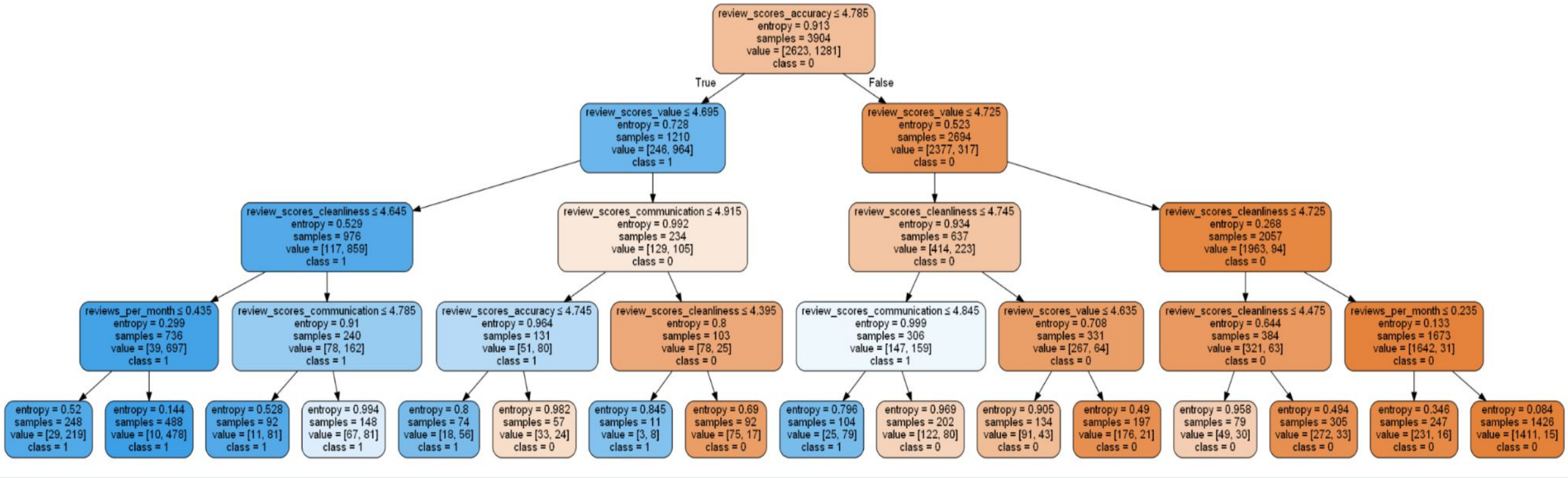
Logistic Regression with processed data

```
Optimization terminated successfully.
         Current function value: 0.292887
         Iterations 8
                           Logit Regression Results
==============================================================================
Dep. Variable:                Ratings   No. Observations:                 5578
Model:                          Logit   Df Residuals:                     5568
Method:                           MLE   Df Model:                            9
Date:                Mon, 29 Nov 2021   Pseudo R-squ.:                 0.5375
Time:                        18:11:46   Log-Likelihood:                -1633.7
converged:                       True   LL-Null:                       -3532.7
Covariance Type:            nonrobust   LLR p-value:                     0.000
================================================================================================
                                   coef    std err          z      P>|z|      [0.025      0.975]
------------------------------------------------------------------------------------------------
Intercept                       97.9725      3.001     32.648      0.000      92.091     103.854
review_scores_checkin           -1.8481      0.384     -4.819      0.000      -2.600      -1.096
reviews_per_month                0.0454      0.016      2.781      0.005       0.013       0.077
review_scores_accuracy          -5.9947      0.414    -14.463      0.000      -6.807      -5.182
review_scores_cleanliness       -3.9142      0.221    -17.718      0.000      -4.347      -3.481
review_scores_communication     -3.8983      0.415     -9.403      0.000      -4.711      -3.086
review_scores_location          -1.6668      0.203     -8.225      0.000      -2.064      -1.270
review_scores_value             -3.4218      0.290    -11.815      0.000      -3.989      -2.854
Subjectivity                     0.8386      1.064      0.788      0.431      -1.247       2.925
Polarity                        -0.5390      0.940     -0.574      0.566      -2.381       1.302
================================================================================================
```

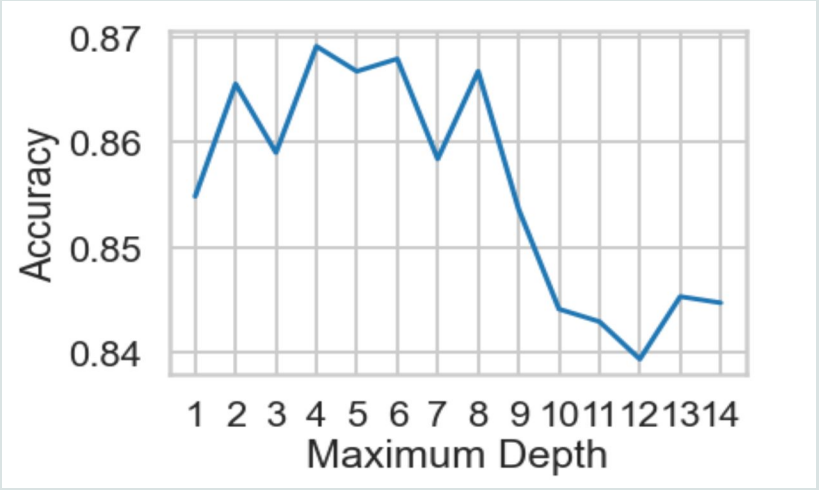
	precision	recall	f1-score	support
0	0.82	0.95	0.88	1121
1	0.84	0.57	0.68	553
accuracy			0.82	1674
macro avg	0.83	0.76	0.78	1674
weighted avg	0.82	0.82	0.81	1674



Decision Tree Classifier

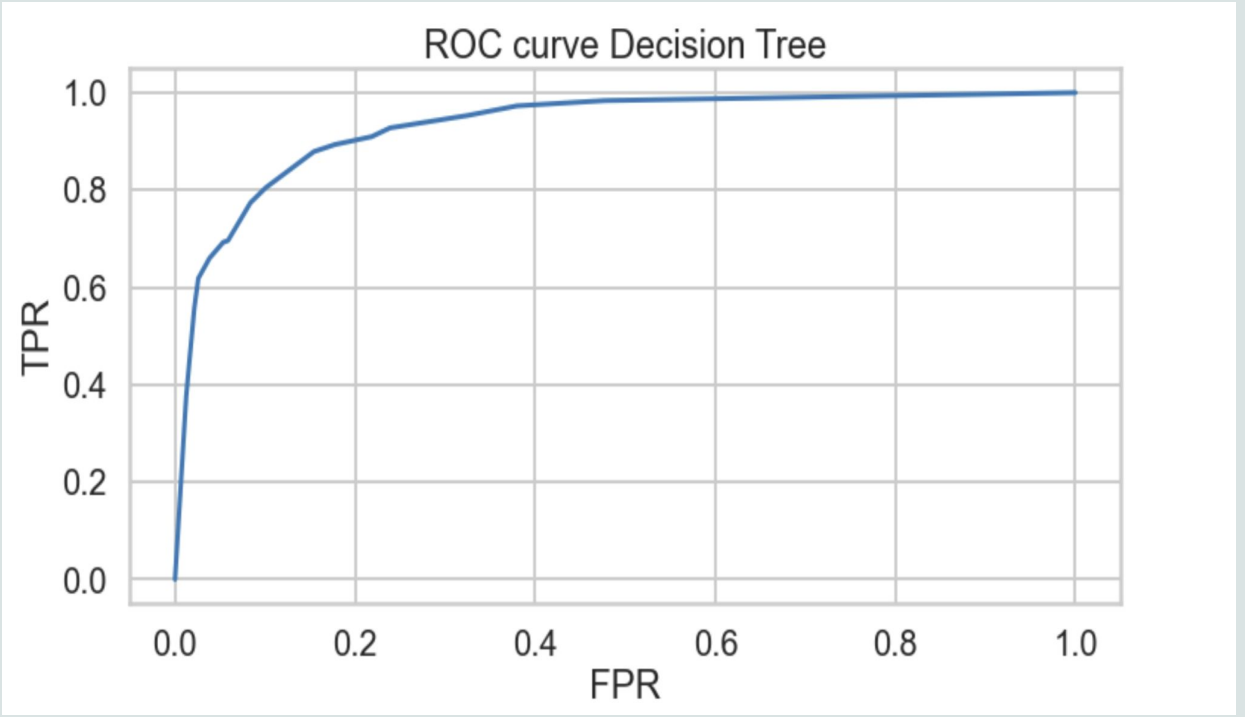


Decision Tree Classifier



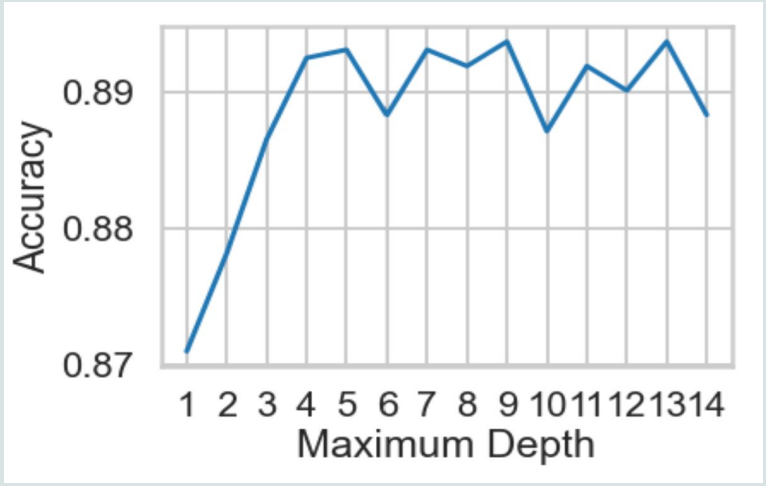
Accuracy: 0.8691756272401434
Precision: 0.8199233716475096
Recall: 0.7739602169981917

	precision	recall	f1-score	support
0	0.89	0.92	0.90	1121
1	0.82	0.77	0.80	553
accuracy			0.87	1674
macro avg	0.86	0.85	0.85	1674
weighted avg	0.87	0.87	0.87	1674



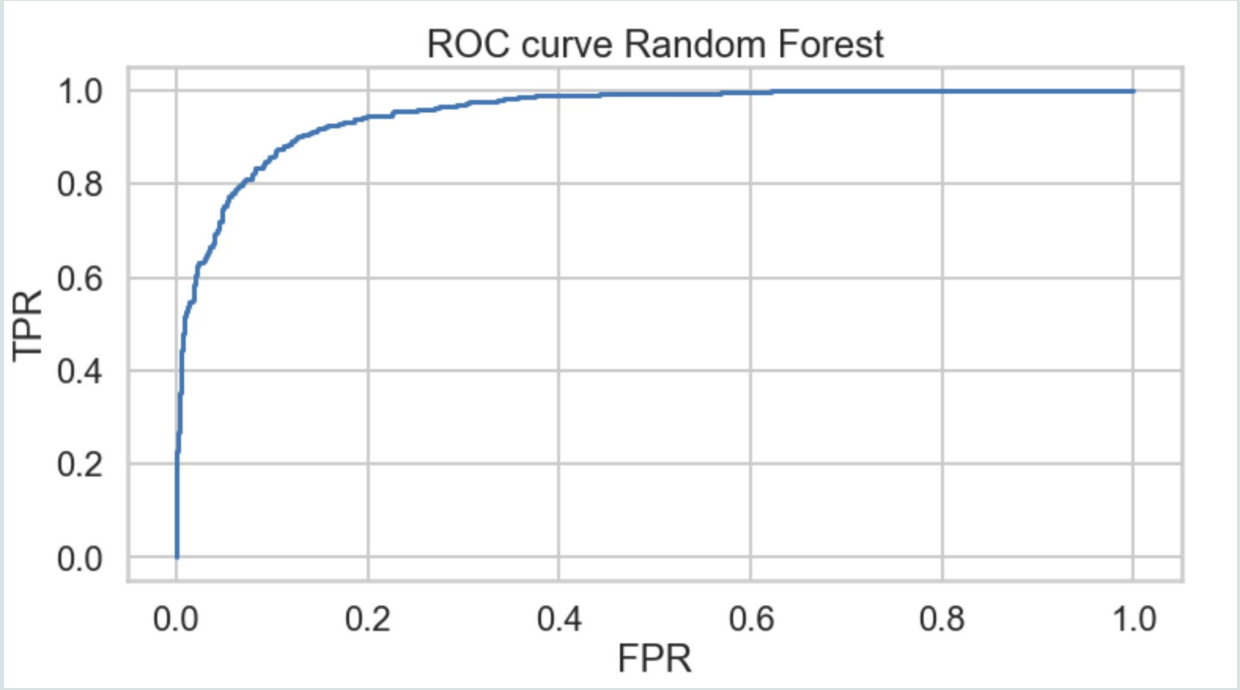
AUC - 0.9316823489747754

Random Forest



Accuracy: 0.8918757467144564
Precision: 0.8381818181818181
Recall: 0.833634719710669

	precision	recall	f1-score	support
0	0.92	0.92	0.92	1121
1	0.84	0.83	0.84	553
accuracy			0.89	1674
macro avg	0.88	0.88	0.88	1674
weighted avg	0.89	0.89	0.89	1674



AUC - 0.9536483345243607

Conclusion

	Precision	Recall	F1-Score	AUC
Logistic Regression(BenchMark)	0.58	0.16	0.25	0.669504
Logistic Regression	0.84	0.57	0.68	0.880348
Decision Tree	0.82	0.77	0.8	0.931682
Random Forest	0.84	0.83	0.84	0.953648

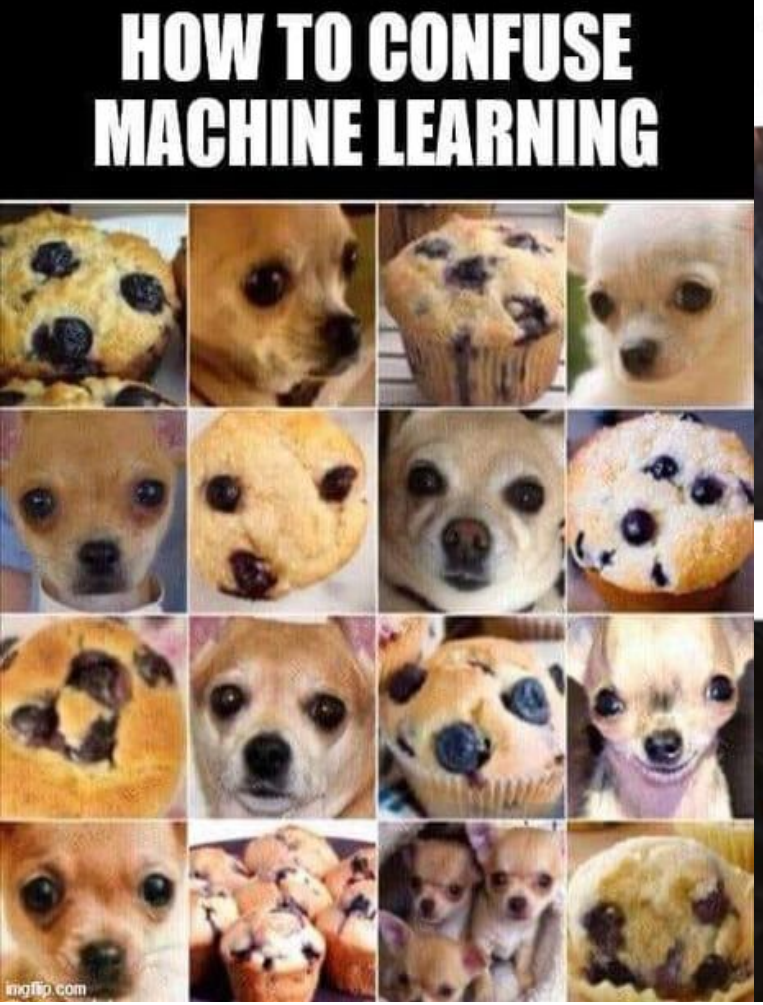
- Changing hyperparameters can change the accuracy of your model

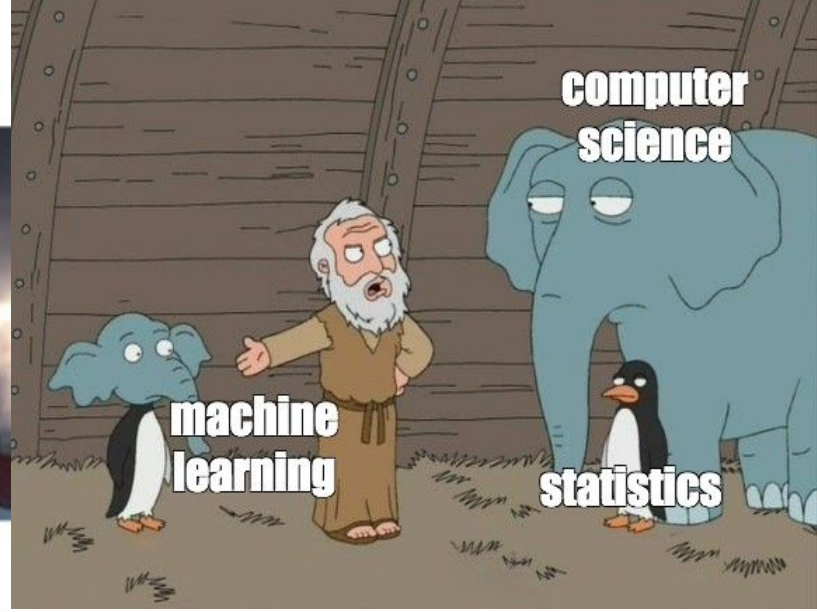
- Avoid overfitting by limiting number of features/attributes used in prediction models

- We must make a decision regarding what attributes to use in model
  - Sentiment analysis did not rate highly in significance but was integral to what we set out to do


YA'LL GOT ANY
QUESTIONS?


Thank You
Merci
Obrigado
Asante
Spasibo
Maake
Kiitos
Grazie
Arigato
Vinaka
Dank Je
Matondo
Juspaxar
Welalin
Multumesc
Mochchakkeram
Ua Tsaug Rau Koj
Kia Ora
Chokrane
Matur Nuwun
Salamat
Obrigado
Nirringrazzjak
Raibh Maith Agat
Terma Kasih
Cam on ban
Dankon
Mamana





Albert Einstein: Insanity is doing the same thing over and over and expecting different results

Machine learning:

Computer Facts
@computerfact

concerned parent: if all your friends jumped off a bridge would you follow them?
machine learning algorithm: yes.