Predicting yelp Review Quality

Jeff Johannsen

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- Illinois to Colorado in 2016
- Finance > Supply Chain > Process Improvement > Data Science
- I love to explore and support local businesses

Quality Reviews Are Important

Review Sites

Better user engagement and satisfaction

Users

Better choices and easier decision making

Small Businesses

More effective advertising and customer acquisition

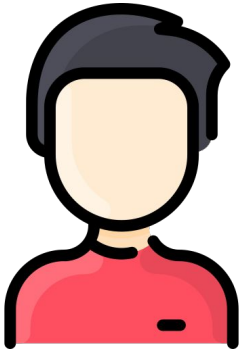
Central Questions

Can the quality of a review be determined by the data available?

What types of data are most useful for predicting review quality?

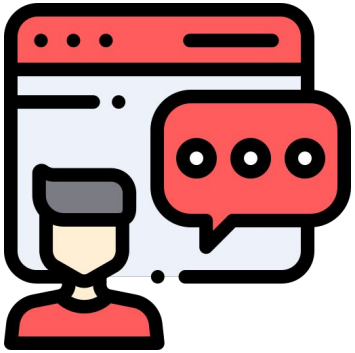
Yelp Open Dataset

Review Text



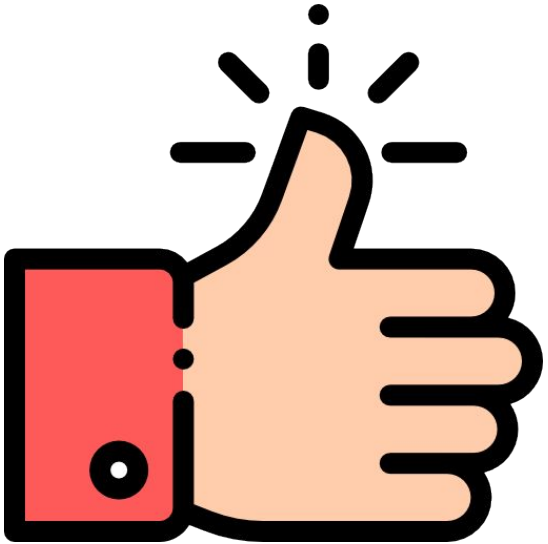
User Data

Business Data

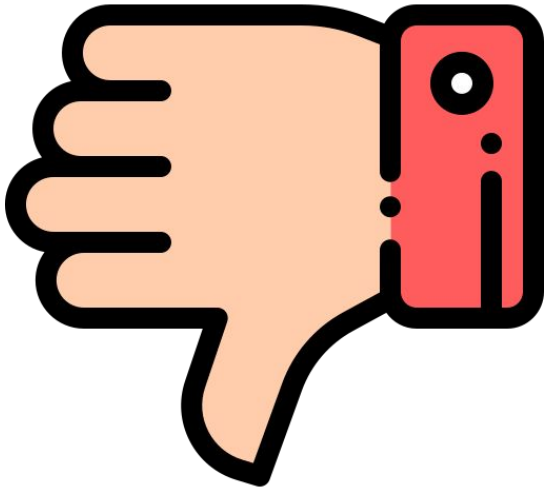


Review Data

Target - Binary Classification of Reviews

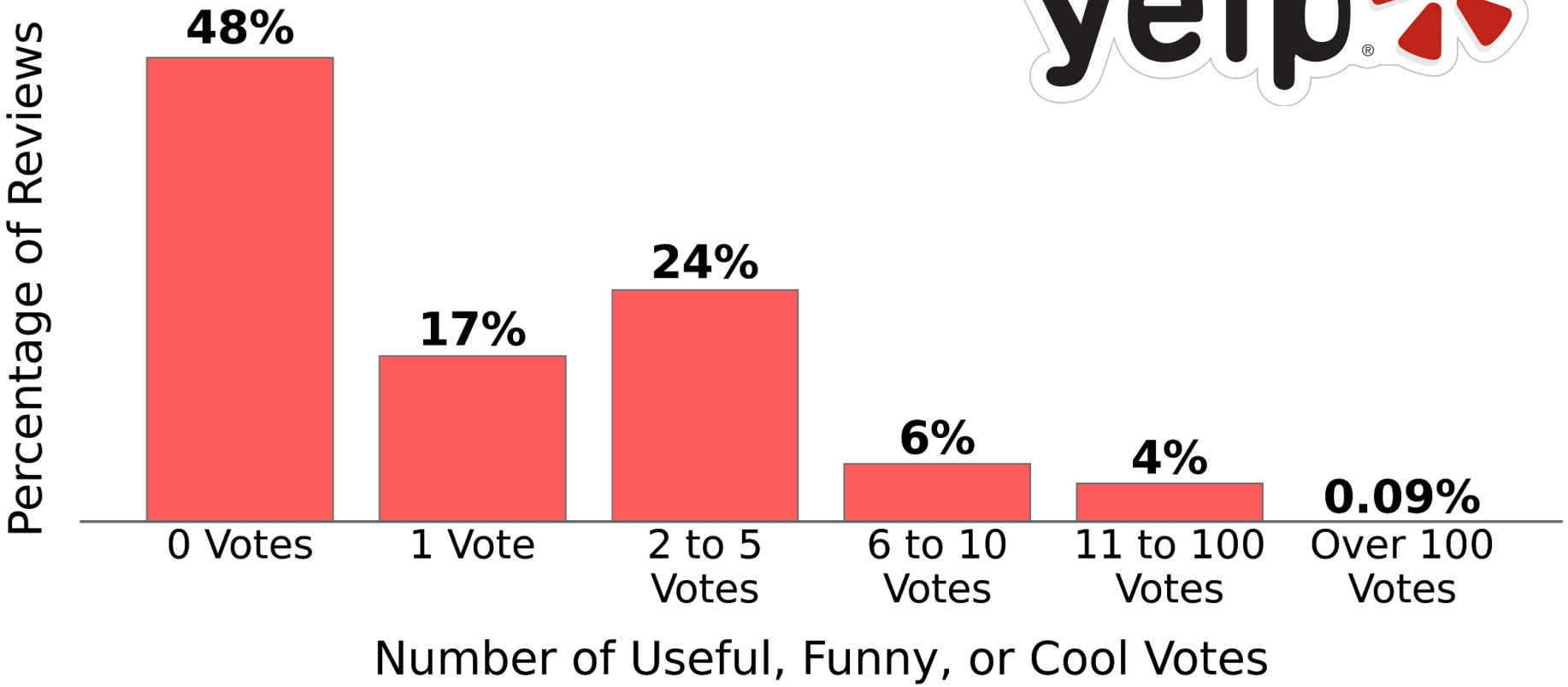


Quality
One or more votes



Not Quality
Zero votes

Votes Per Review



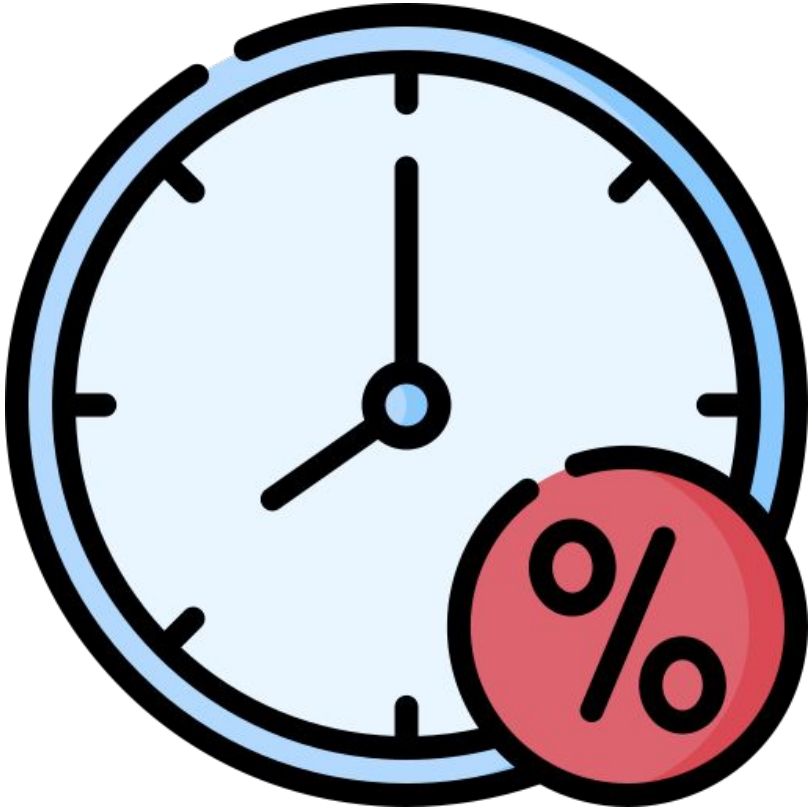
Time Discounting

Targets

- Votes per year instead of total vote count

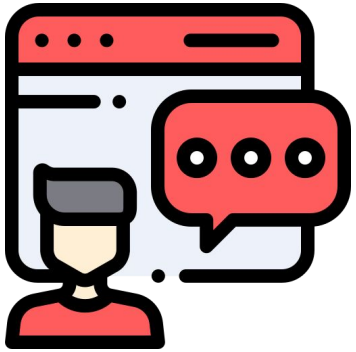
Features

- Actual or estimated counts at the time of the review instead of at the time the dataset was released

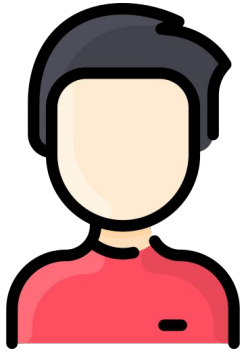


Feature Engineering

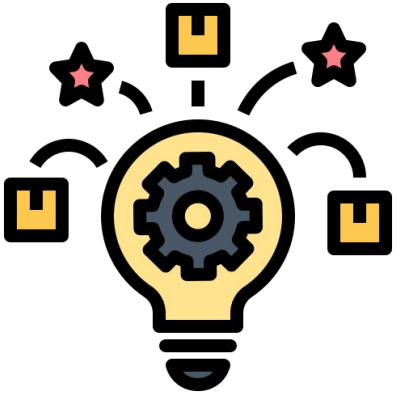
- Review star rating vs average star rating
- User's average votes per review
- User's votes per year



Review Data



User Data



Date and Time

Business Data

NLP Feature Engineering

Basic Text Features

- **Review Length, Word Count, etc.**

NLP Feature Engineering

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Readability

- **Flesch–Kincaid Grade Level**

NLP Feature Engineering

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Parts of Speech

- **Noun, Verb, Adjective, etc.**

NLP Feature Engineering

Basic Text Features

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Parts of Speech

- Noun, Verb, Adjective, etc.

Syntactic Dependency Relations

- **Sentence Structure**

NLP Feature Engineering

Basic Text Features

- Review Length, Word Count, etc.

Readability

- Flesch–Kincaid Grade Level

Parts of Speech

- Noun, Verb, Adjective, etc.

Syntactic Dependency Relations

- Sentence Structure

Named Entities

- **Person, Place, Event, etc.**

NLP Feature Engineering

Basic Text Features

- Review Length, Word Count, etc.

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Parts of Speech

- Noun, Verb, Adjective, etc.

Syntactic Dependency Relations

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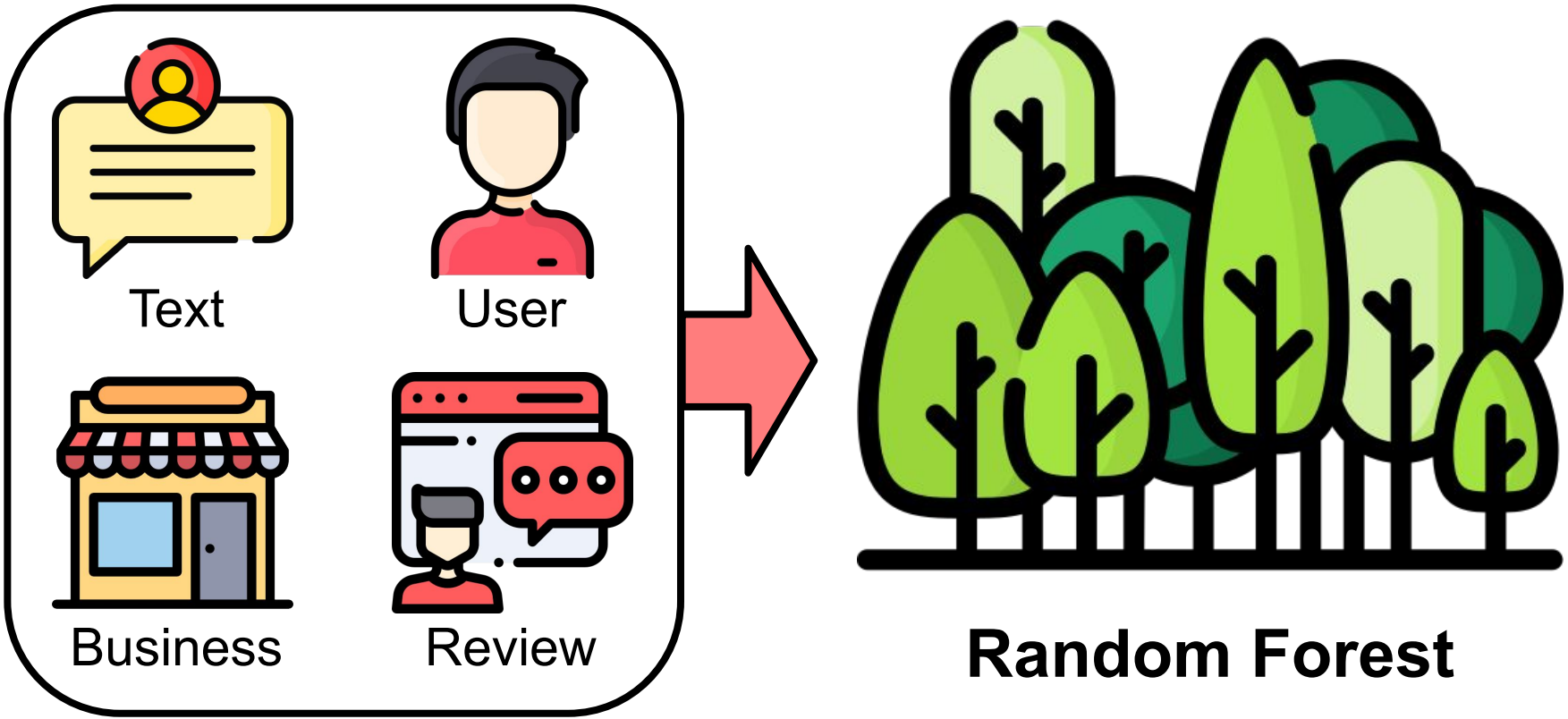
ML Model Predictions

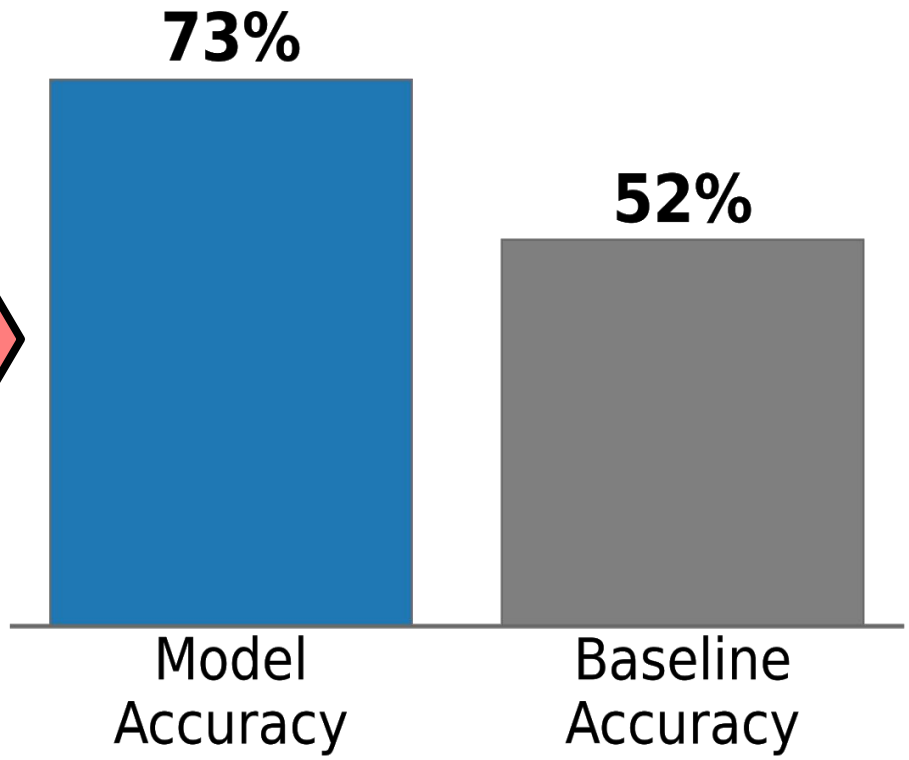
- **SVM and Naive Bayes using TF-IDF**

Making Predictions

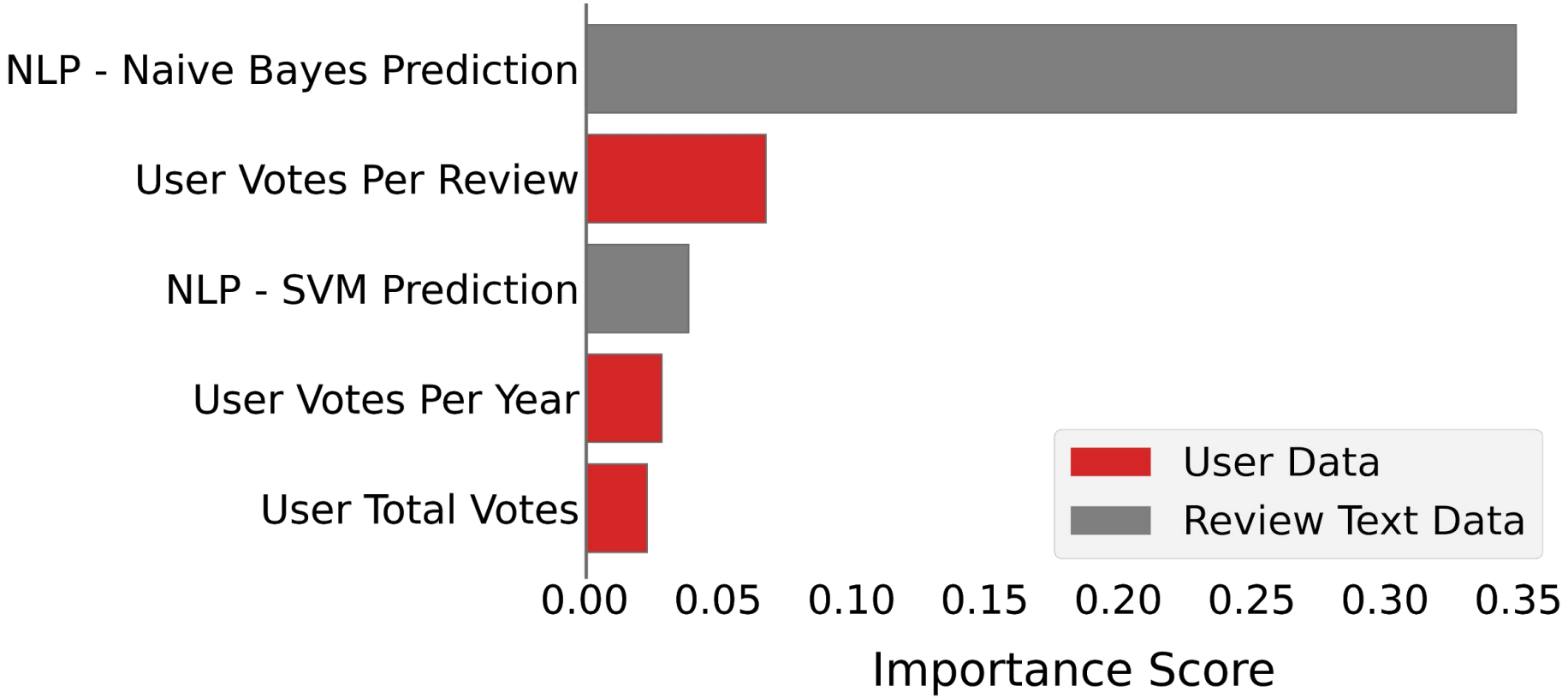


Model Prediction Results

Random Forest



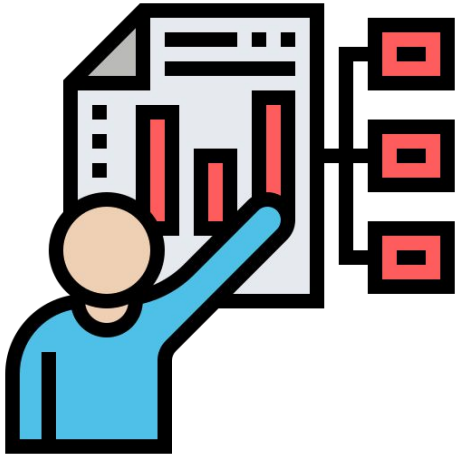
Important Features



Conclusions

The quality of reviews can be determined.

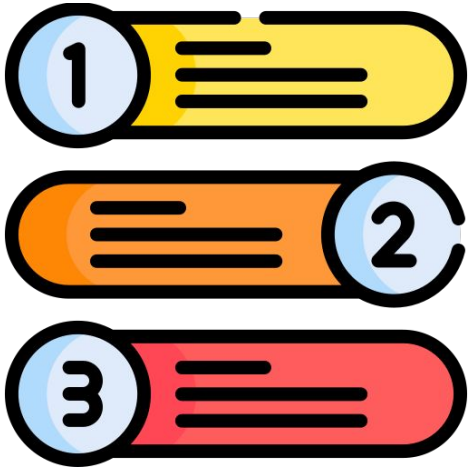
Data about the review text and the user are the top predictors of review quality.



Next Steps

Advanced NLP with Spacy and Tensorflow

Scale up using Apache Spark and AWS



Jeff Johannsen

Gmail • jeffjohannsen7@gmail.com

GitHub • jeffjohannsen

LinkedIn • jeffjohannsen

pandas

docker

jupyter

spaCy

scikit learn

matplotlib

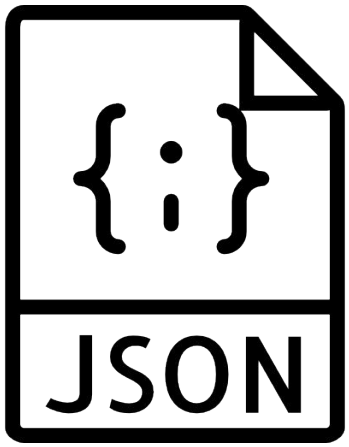
python™

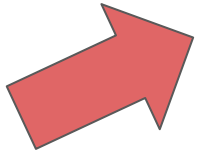
PostgreSQL

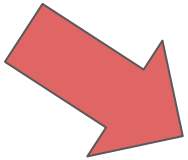
Credits

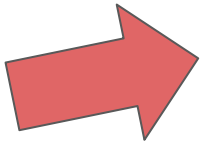
- Yelp - Dataset and logo images
- Great open source data science tools like Pandas and SkLearn
- All of my teachers and fellow cohort members at Galvanize-Denver

Data Storage





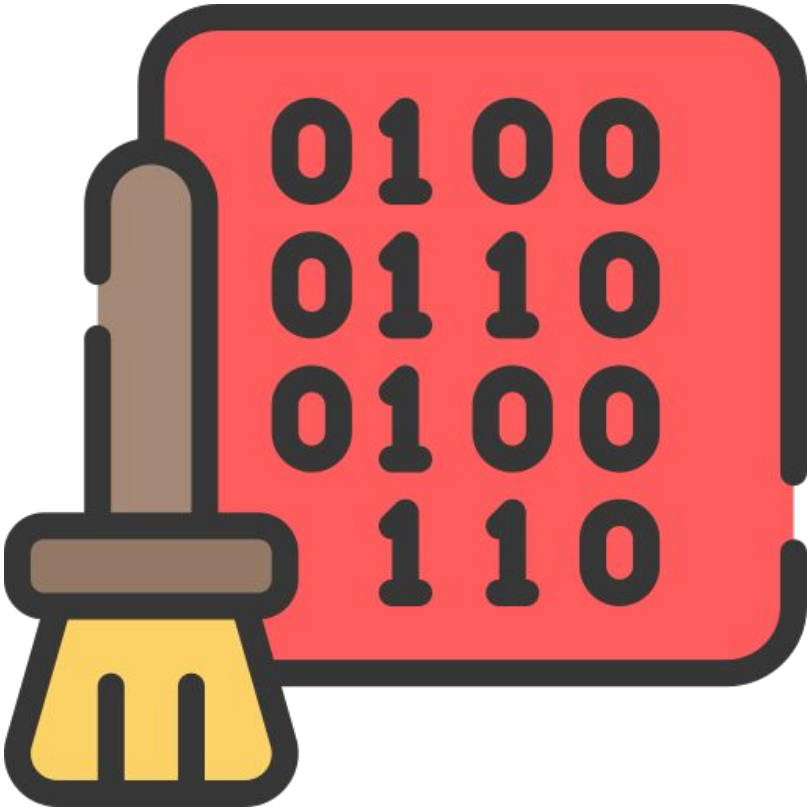


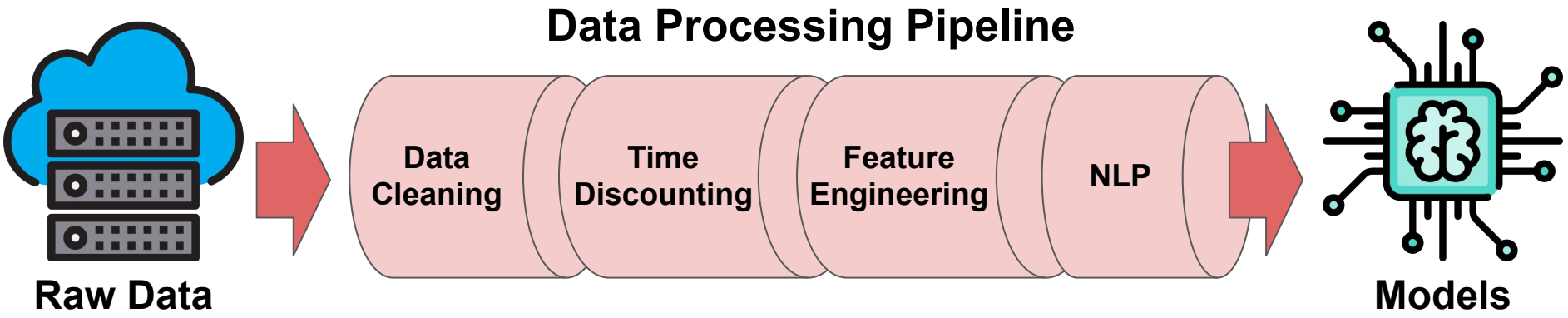


Amazon RDS

Data Cleaning

- Dropped Nan/Null Values
- Removed Duplicate Records
- Deleted Unnecessary Features
- Converted Data-types
- Organized Features




Data Processing Pipeline
Raw Data
Data Cleaning
Time Discounting
Feature Engineering
NLP
Models