Project 3

Reddit API Classification & NLP

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General Assembly DSI14
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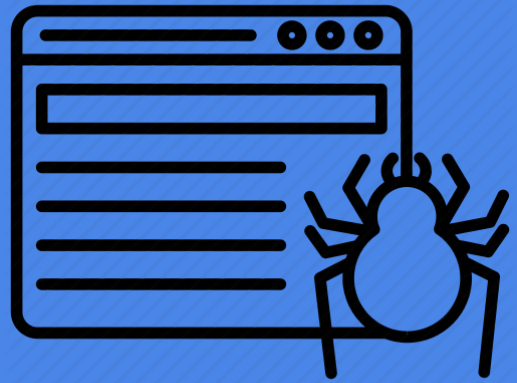
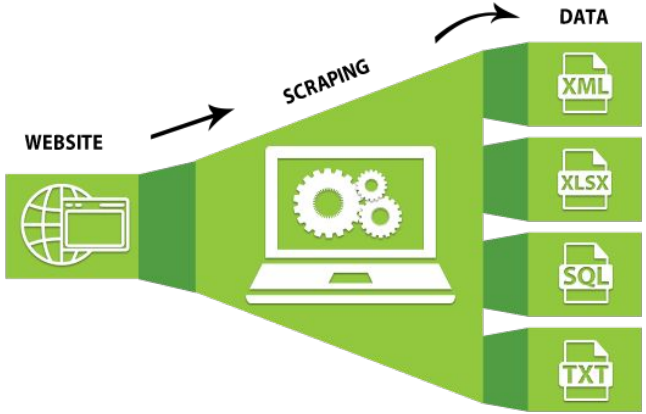


Outline

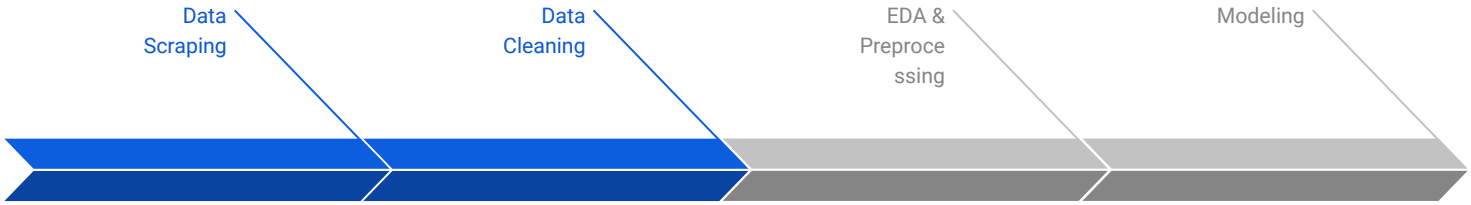
- **Problem Statement**
- **Data Information**
- **Data Cleaning & EDA**
- **Modeling**
- **Evaluation**
- **Conclusion & Recommendation**

Problem Statement

In this project, we will explore how well Natural Language Processing Model differentiate post content from two similar subreddits which is /r/Python & /r/bigdata. Which combinations of model and classifier works best? What is the accuracy and how much of the miss-classification will occur between two different subreddit posts?



My Collected Data



Data Collection

Scrape Data from Reddit API

Data Cleaning

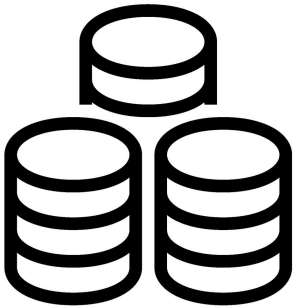
Data cleaning and removal of special characters.

EDA and Preprocessing

To visualize the data to understand the data before proceed to pre-process the data collected

Modeling

Different combinations of modeling to get best score



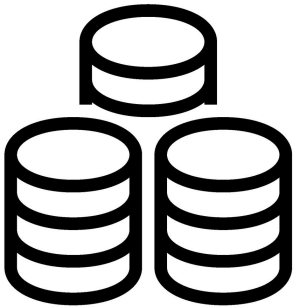
- Total of 1837 rows of data collected after drop duplicates
  - 866 from r/Python
  - 971 from r/bigdata

Data Cleaning

Steps done for data cleaning:

- Fill blank post, containing images/video clips with blank quotes
- Title and Selftext were merged to one single string
- Removing special characteristics with regex
- Stop words removed using stopwords
- Additional stopwords

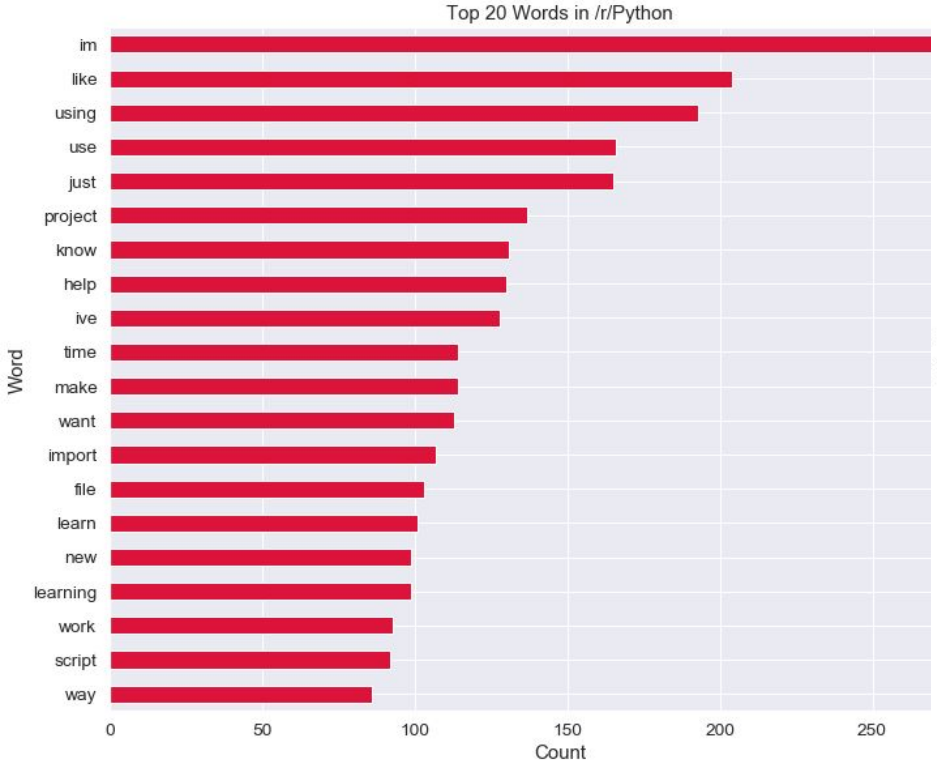
['did', 'doe', 'don', 'doesn', 'getting', 'going', 'got', 'ha', 'isn', 'wa', 'python', 'big', 'data']

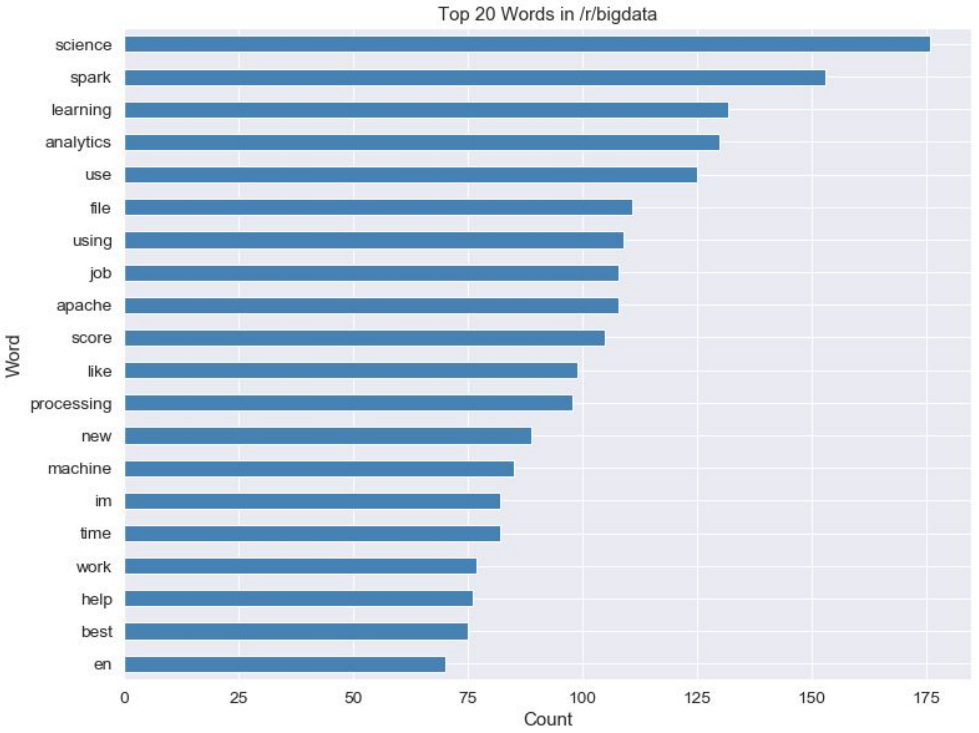


Frequent Words in r/Python and r/bigdata

Frequent Words in r/Python & r/bidata

After additional of Stopwords Removed..['did', 'doe', 'don', 'doesn', 'getting', 'going', 'got', 'ha', 'isn', 'wa', 'python', 'big', 'data']





Modeling

Modeling and Selecting the best parameter with GridSearch CV

Model	Train Score (CountVectorizer)	Test Score (CountVectorizer)	Train Score (TfidfVectorizer)	Test Score (TfidfVectorizer)
Logistic Regression	0.9871	0.8179	0.9741	0.8315
Naive Bayes (Multinomial)	0.9244	0.8478	0.9551	0.8668
Random Forest	0.9918	0.7935	0.9925	0.8043
Decision Tree	0.9918	0.75	0.9925	0.7609

Model Parameters

Parameter Set...

```
model_params ={
    'cv': {
        'cv__max_features': [2500, 5000],
        'cv__min_df': [2, 3],
        'cv__max_df': [.9, .95],
        'cv__ngram_range': [(1,1), (1,2)]
    },
    'tf': {
        'tf__max_features': [2500, 5000],
        'tf__min_df': [2, 3],
        'tf__max_df': [.9, .95],
        'tf__ngram_range': [(1,1), (1,2)]
    },
```

Comparing Classification Report

CountVectorizer with Naive Bayes (Multinomial)

	precision	recall	f1-score	support
r/Python	0.83	0.86	0.84	173
r/bigdata	0.87	0.84	0.85	195
accuracy			0.85	368
macro avg	0.85	0.85	0.85	368
weighted avg	0.85	0.85	0.85	368

TF-IDF Vectorizer with Naive Bayes (Multinomial)

	precision	recall	f1-score	support
r/Python	0.85	0.87	0.86	173
r/bigdata	0.88	0.87	0.87	195
accuracy			0.87	368
macro avg	0.87	0.87	0.87	368
weighted avg	0.87	0.87	0.87	368

Confusion Matrix

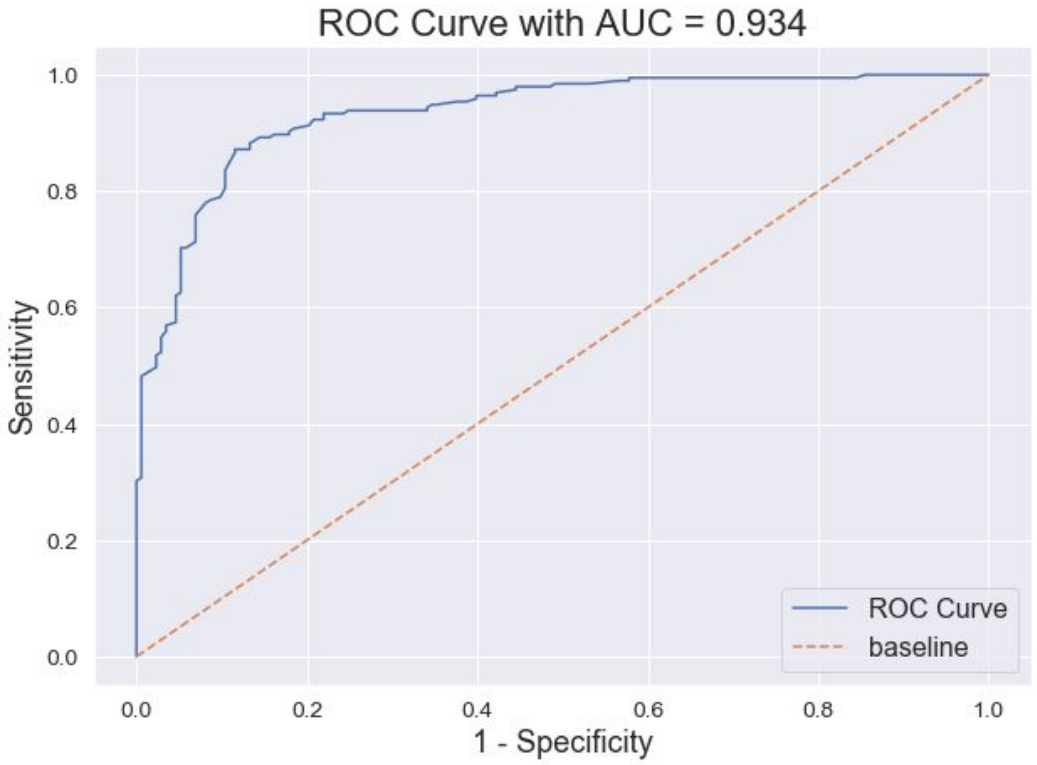
Confusion Matrix based on TF-IDF Vectorizer with Naive Bayes Multinomial

	Predict r/Python	Predict r/bigdata
Actual r/Python	150 / 368	23 / 368
Actual r/bigdata	26 / 368	169 /368

Accuracy	0.8668
Misclassification Rate	0.1332
Precision	0.8802
Sensitivity / Recall	0.8667
Specificity	0.8671

ROC AUC

ROC AUC SCORE : 0.934 based on TF-IDF Vectorizer with Naive Bayes Multinomial



Conclusion

- **Naive Bayes with TF-IDF Vectorizer worked fairly well with accuracy of 87%, with both subreddits considered related.**
- **Naive Bayes with CountVectorizer works well too with accuracy of 85%.**
- **Scope can be expanded to improve modes further:**
  - **Collect more subreddit posts**
  - **Tuning parameters for each model to achieve better scores, will take longer time to tune and compile best parameters**
  - **Consider other classifiers, AdaBoost, Gradient Boost, etc.**

THE END