Project 3:

Text Classification

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Introduction

- **Problem Statement**

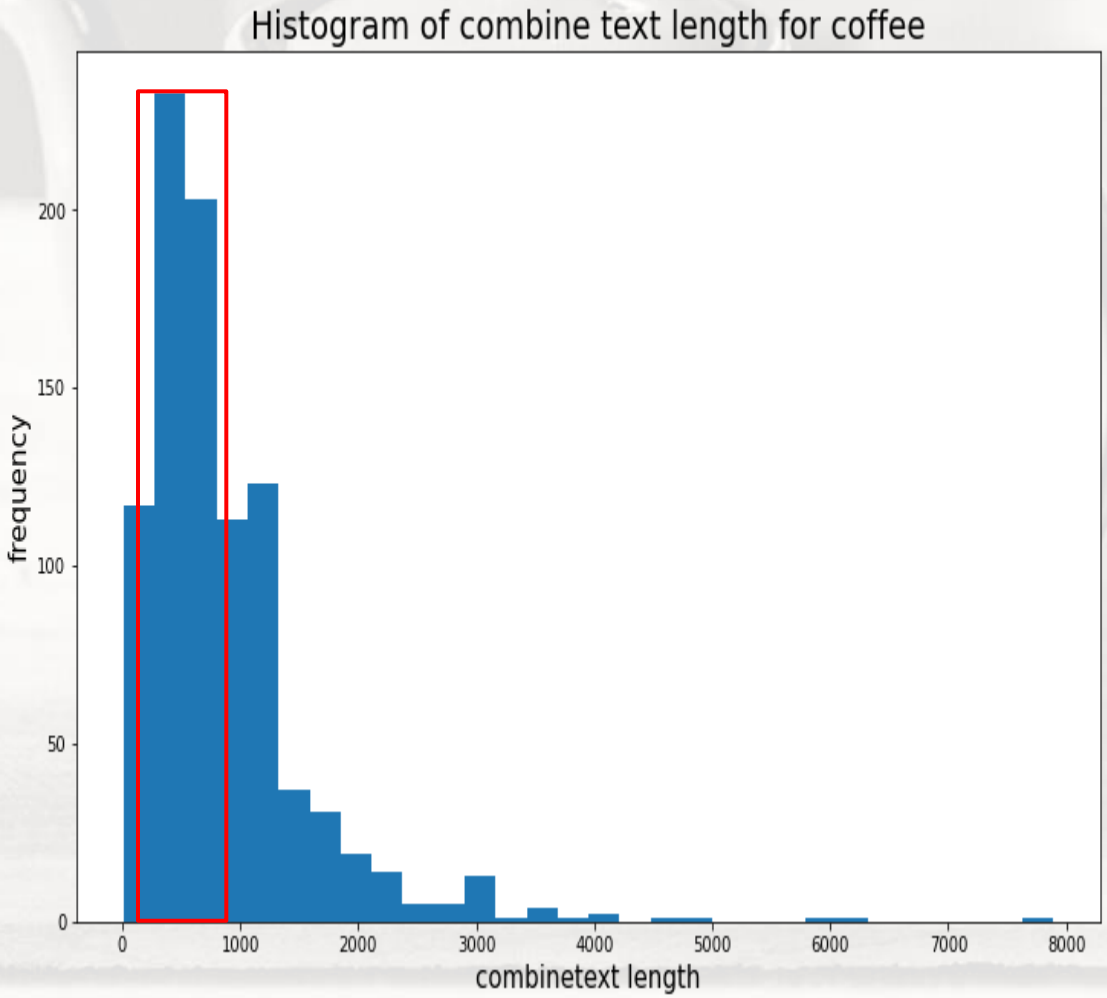
  - KiddyToy has online business to sell toys. The company faces the problem that receive drastic amount of customer feedback each day. The current system only allows employees to categorize customer feedback manually which is time-consuming. As the company's data science team member, we initialize a project to build up a text classifier to automate this process.

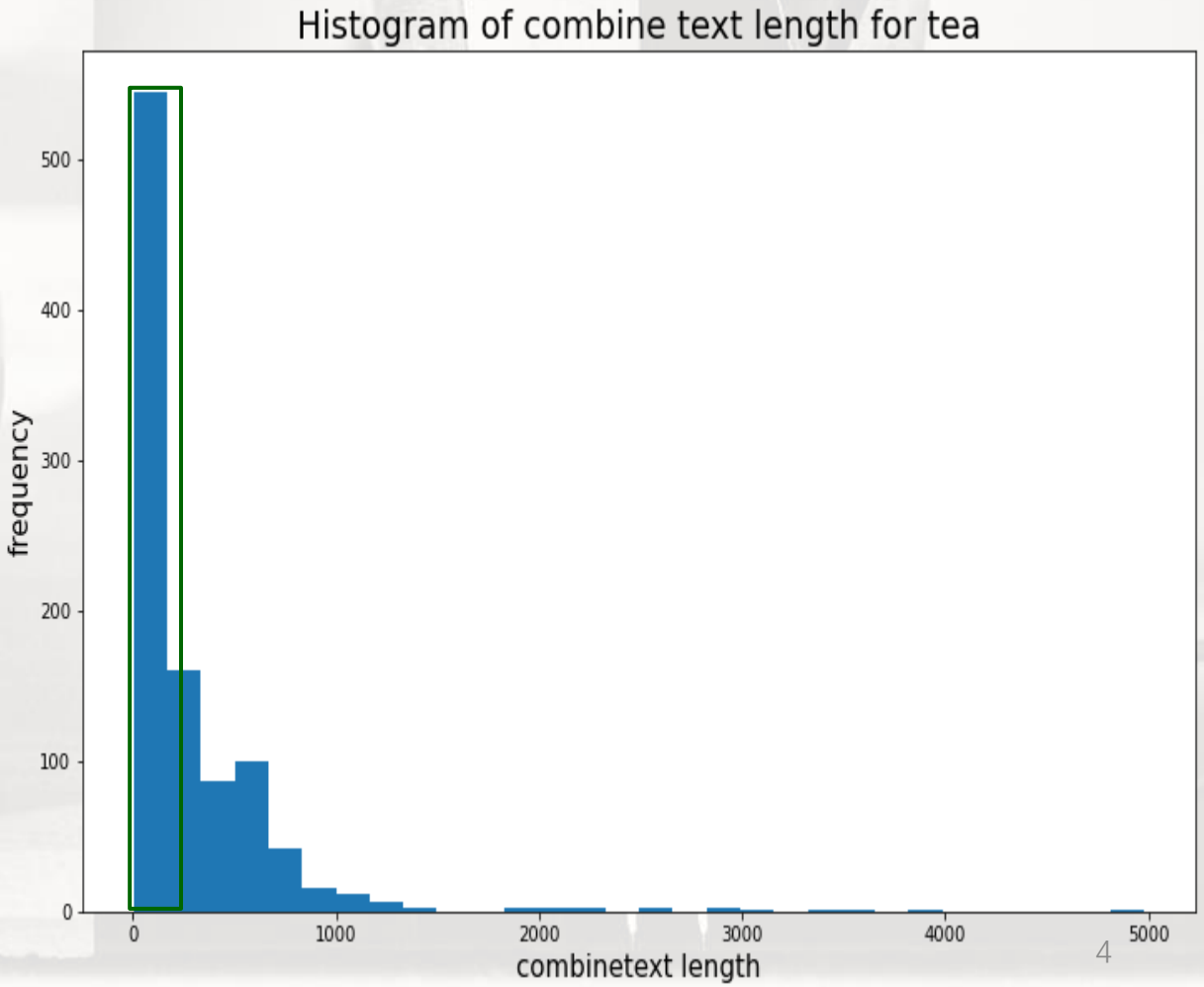
Dataset Description

- **Topics Selected**
  - Coffee and Tea
- **Data extraction**
  - Via Reddit's API
- **Data clean**
  - ➢500+ rows out of 900+ rows for Tea subreddit had no 'selftext'
  - ➢No missing 'selftext' for 900+ Coffee posts
  - ➢concatenate 'title' and 'selftext'

Exploratory Data Analysis

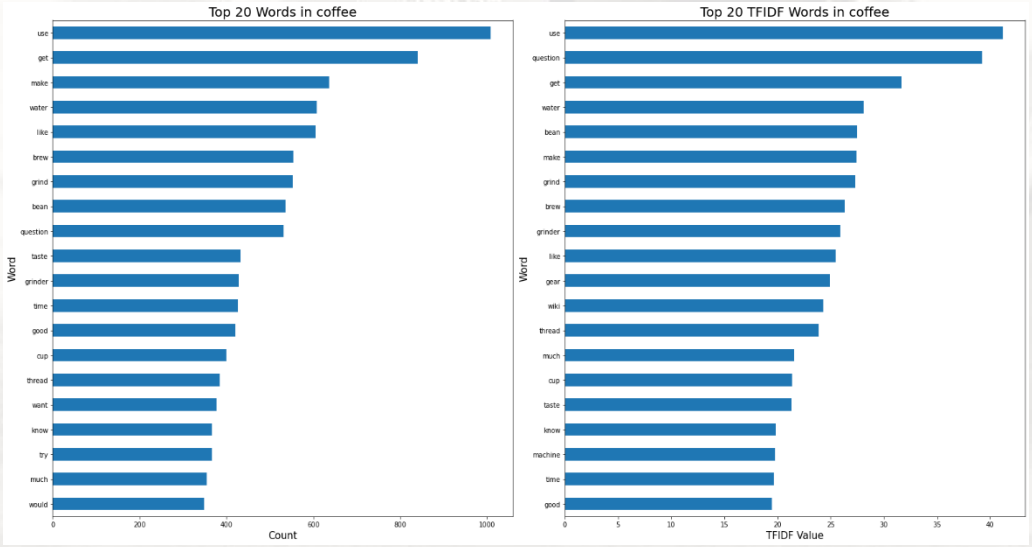
- Overall, tea posts have shorter text length than coffee posts.

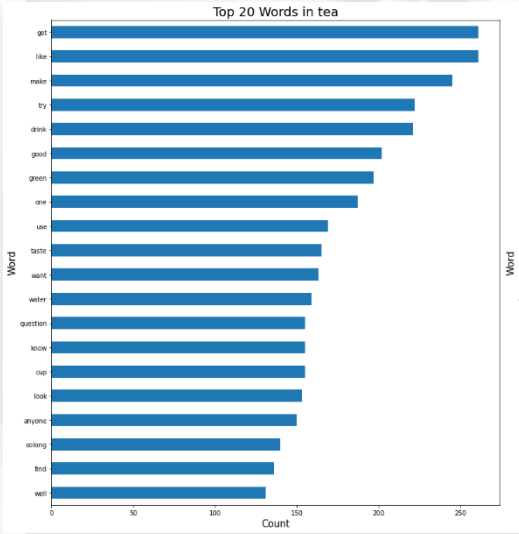


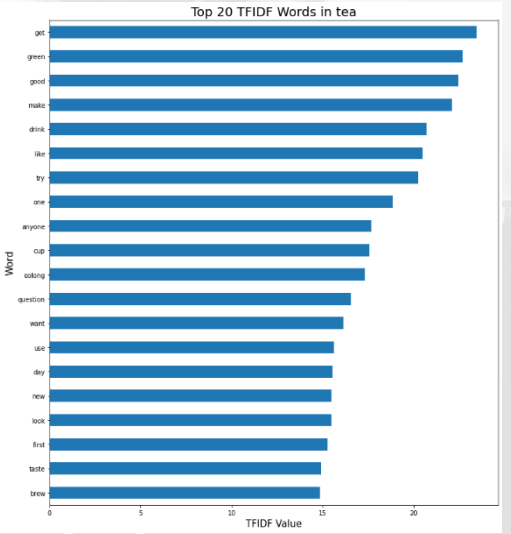


Preprocessing – bag of words

- Coffee
  - **water**, grind, bean, make, **cup**, **taste**, machine, **brew**, time, gear
- Tea
  - **cup**, oolong, green, want, **taste**, **water**, **brew**, black







Modeling

- Word vectorizers:
  - CountVectorizer
  - TfidfVectorizer
- Classifiers:
  - Logistic Regression
  - Naive Bayes

Modeling Comparison

- **Default hyper-parameters**

Model Name	Vectorizer	Train Score	Test Score	Overfit diff
Logistic Regression	CountVectorizer	99.5%	91.8%	7.7%
Logistic Regression	TfidfVectorizer	97.1%	91.6%	5.5%
Naive Bayes	CountVectorizer	96.2%	90.8%	5.4%
Naive Bayes	TfidfVectorizer	96.7%	90.6%	6.1%

- **Use GridSeach to tune hyper-parameters.**

Model Name	Vectorizer	Train Score	Test Score	Overfit diff
Logistic Regression	CountVectorizer	99.1%	91.2%	7.9%
Logistic Regression	TfidfVectorizer	97.2%	91.4%	5.8%
Naive Bayes	CountVectorizer	94.2%	90.4%	3.8%
Naive Bayes	TfidfVectorizer	96.6%	92.1%	4.5%

Evaluation and Conceptual Understanding

- Misclassification analysis:
  - Common words for both coffee and tea posts
    - Such as ‘water’, ‘brew’, ‘cup’, ‘taste’

```
--------------------------------------------------
know problem seem brew hot seem get deep strong flavor cold brew try play water temperature amount put get strong time overnigh
t brew strong flavor

buy haru bancha yuuki cha one recommend vender use gram dry water minute still taste light way make taste strong use gram alway
s taste light way make haru bancha strong

--------------------------------------------------
try blind cup sample pack angel cup see lot people talk angel cup much anymore wonder anyone else subscription past tip
get angel cup cup flight
```

Conclusion and Recommendations

- Naive Bayes classifier performs well with a test accuracy score of 92.05%.
- Misclassification due to some common words.
- Further improvement
  - Optimize stop words
  - Model more than two topics to improve user's satisfaction

Thank you