[SENTENCE TO SENTENCE SEMANTIC SIMILARITY]

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Sentence to Sentence semantic similarity

Introduction:

The project's main idea is to predict which of the provided pairs of questions contain two questions with the same meaning or not (duplicated or not).

Methodology:

➢ Preprocessing

- Change sentences to lowercase
- Replace abbreviations with their original using regular expression
- Tokenization
- Remove stop words
- lemmatization
- Replace nulls with an empty string

➢ Doc2Vec model

Doc2Vec model, as opposite to the Word2Vec model, is used to create a vectorized representation of a group of words taken collectively as a single unit. It doesn't only give the simple average of the words in the sentence.

It is preferred to use the doc2vec instance of word2vec when you have a set of sentences, not words

➢ Models

Using classification models to identify question pairs that have the same intent or meaning

- XGBoost Classifier
  - Train subset accuracy 0.8166909891414579
  - Test subset accuracy 0.8112493507135967

- AdaBoostst Classifier
  - Train subset accuracy 0.7998311855351357
  - Test subset accuracy 0.7998961141754681

Data Set Summary:

1-What is the data set used?

Quora Question Pairs in Kaggle (The train data set in the Link)

2- What is the summary of the dataset columns?

id → number of instances in data

qid1 → ids for first questions

qid2 → ids for second questions

- each question has one id and there are no two questions that have the same id

question1 → the text of the first questions

question2 → the text of the second questions

is_duplicate → classify the two questions are duplicate or not

- 0 → the two questions aren't duplicate or don't have the same meaning
- 1 → the two questions are duplicate or have the same meaning

cosine_similarity→ Cosine similarity measures document similarity in text analysis

cwc_min→ Get the common Tokens from the Question pair

cwc_max → Get the common Tokens from the Question pair

last_word_eq→ Last word of both questions is the same or not

first_word_eq→ First word of both questions is the same or not

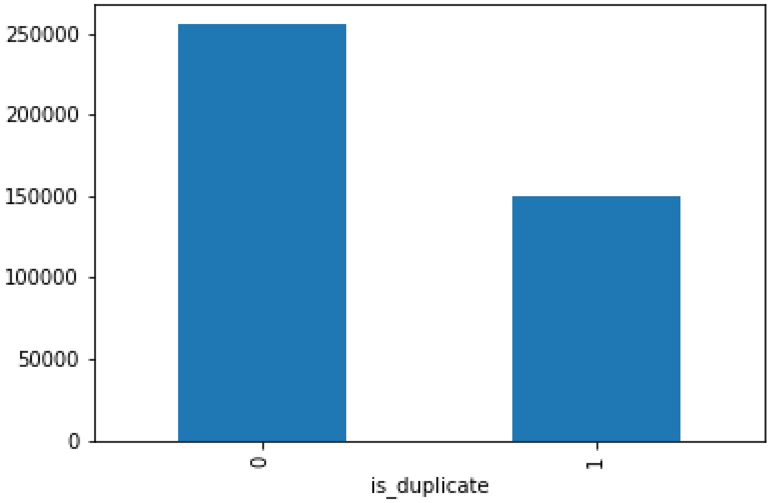
q1_ferq→ frequency of first questions in data

q2_ferq→ frequency of second questions in data

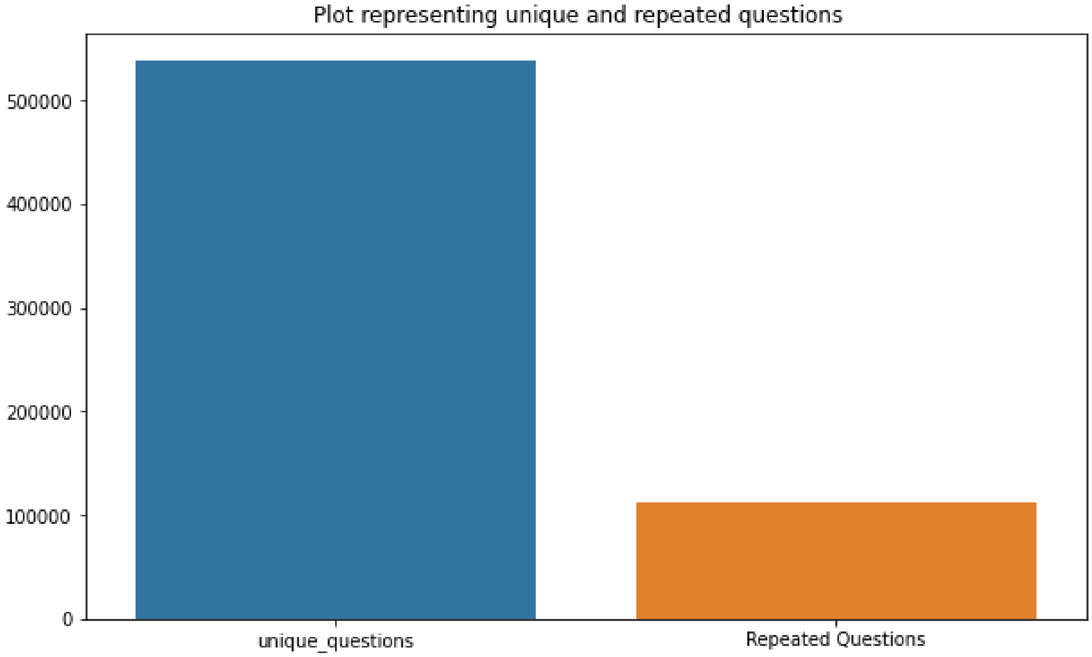
word_share→ word_common (number of common question pair) **/** word_total (length of question 1 + length of question 2)

3- Visualize the dataset statistics*/

- **bar chart for representing is_duplicated column**

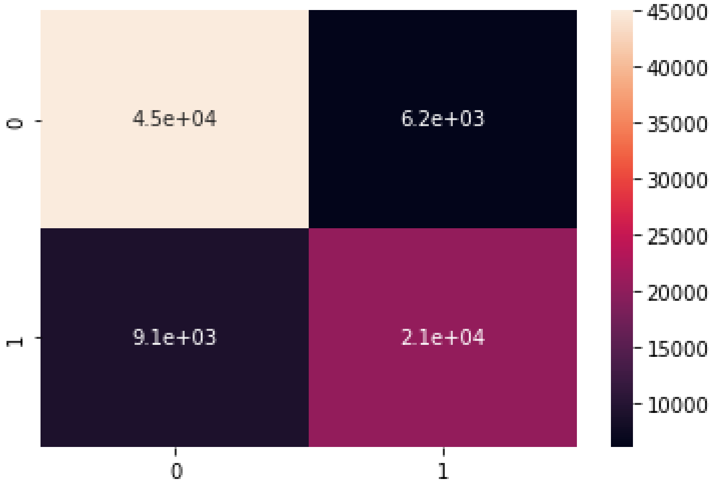


- **bar chart for representing unique and repeated questions**

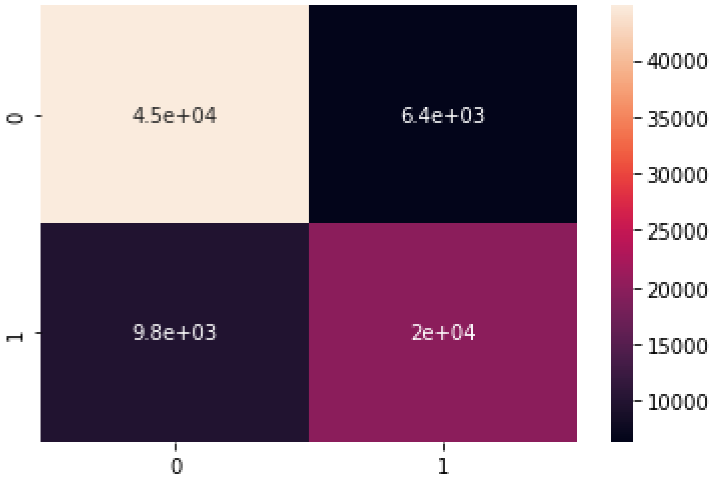


Results:

- **XGBoost Classifier**



- **AdaBoostst Classifier**



- **XGBoost model** has the highest accuracy where Training accuracy = 0. 8166909891414579 , Testing accuracy = 0. 8112493507135967