Hate speech Classifier

Sirash Phuyal, Sam Macy,
Sushen Kolakaleti

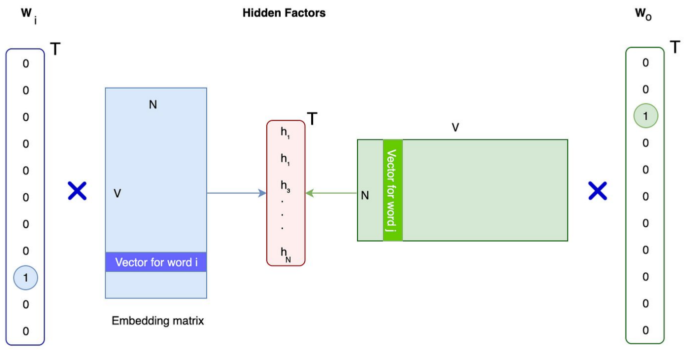
Introduction

- Hate speech become common social platforms triggers the need for more effective detection mechanisms.

- Project attempts classification of hate speech in tweets, leveraging three distinct embedding approach: BERT-based and GloVe/word2vec

- This threefold embedding exploration aims to offer a comparative analysis on the efficacy of each approach for hate speech detection.

Methodology

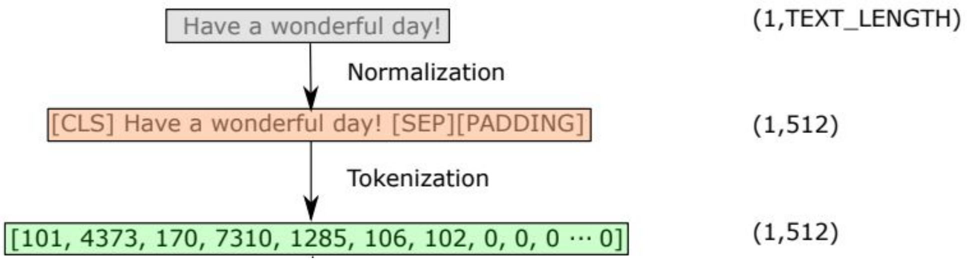


- Dataset processing / cleaning:

- Removing stop-words for GloVe/word2vec
- Majority voting of labels
  (Dataset contained multiple labels for many tweets)

- BERT (Bidirectional Encoders Representation from Transformers)

- Context-rich pretrained model
- Fine-tuned to our dataset, resource-intensive, used condensed version called DistilBERT



Have a wonderful day! (1,TEXT_LENGTH)

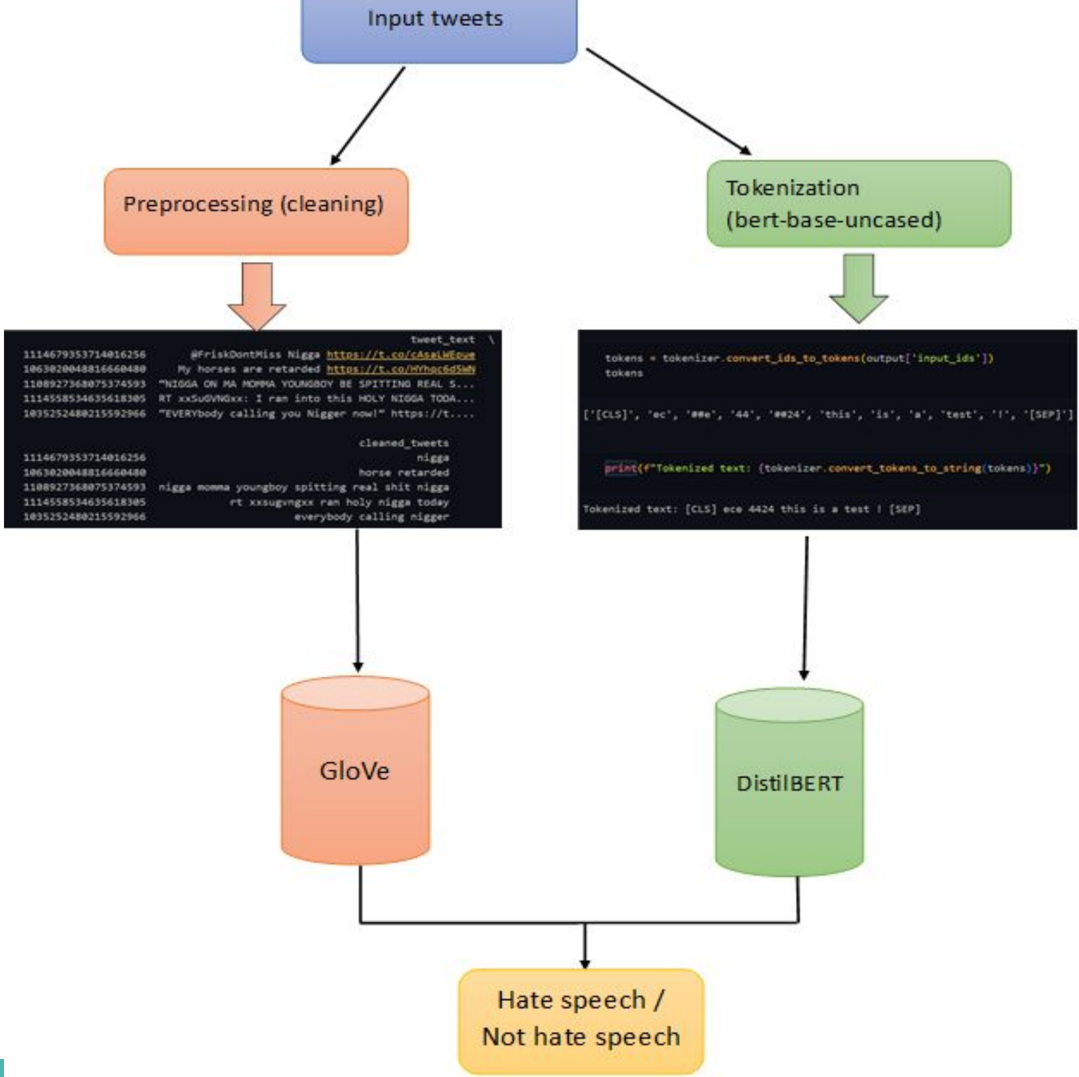
Normalization

[CLS] Have a wonderful day! [SEP][PADDING] (1,512)

Tokenization

[101, 4373, 170, 7310, 1285, 106, 102, 0, 0, 0 ··· 0] (1,512)

Process



Input tweets

Preprocessing (cleaning)

```
                                                        tweet_text  \
1114679353714016256      @FriskDontMiss Nigga https://t.co/cAsaLWEpue
1063020048816660480    My horses are retarded https://t.co/HYhoc6dSWN
1108927368075374593  "NIGGA ON MA MOMMA YOUNGBOY BE SPITTING REAL S...
1114558534635618305  RT xxSuGVNGxx: I ran into this HOLY NIGGA TODA...
1035252480215592966  "EVERYbody calling you Nigger now!" https://t....

                                                 cleaned_tweets
1114679353714016256                                       nigga
1063020048816660480                              horse retarded
1108927368075374593  nigga momma youngboy spitting real shit nigga
1114558534635618305             rt xxsugvngxx ran holy nigga today
1035252480215592966                        everybody calling nigger
```

Tokenization
(bert-base-uncased)

```
  tokens = tokenizer.convert_ids_to_tokens(output['input_ids'])
  tokens

['[CLS]', 'ec', '##e', '44', '##24', 'this', 'is', 'a', 'test', '!', '[SEP]']

  print(f"Tokenized text: {tokenizer.convert_tokens_to_string(tokens)}")

Tokenized text: [CLS] ece 4424 this is a test ! [SEP]
```

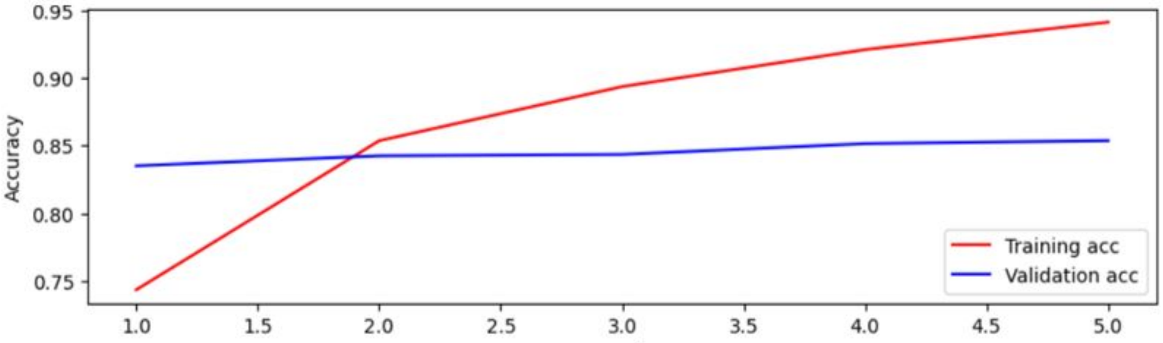
GloVe

DistilBERT

Hate speech /
Not hate speech

Results & Analysis

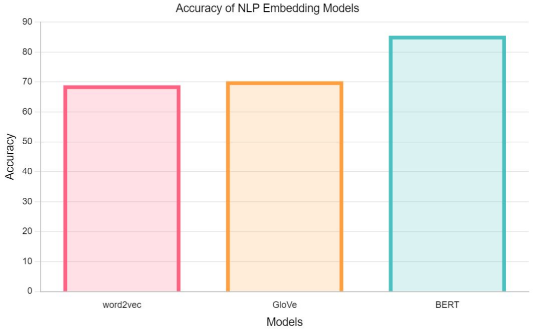
- Word2vec: 73.57% training accuracy, 68.92% testing accuracy
- GloVe: 69.71% training accuracy, 70.24% testing accuracy
- BERT: 45.34% loss, 85.48% testing accuracy



Training vs validation accuracy: Validation consistent around 85%

Conclusion

- Performance is highly dependent on the quality of the dataset.
- BERT performance and accuracy better than GloVe/word2vec
- BERT initially applied stop-word removal and lemmatization before tokenization, it is context-aware
- Potentially even better performance with a larger scale Deep NN model



Any Questions