Transformer Performance on Kinyarwanda Tweets using Trainer Framework

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March 2023

1 Introduction

In this paper, we explore the performance of transformers on Kinyarwanda tweets using the Trainer framework. We used the Kinyarwanda dataset available on Hugging Face, which was divided into three categories: test, train, and evaluation sets. We combined the train set with the validation set to increase the training samples. The dataset had three labels - positive, negative, and neutral. We cleaned both the train and test sets by removing duplicates, links, stopwords, and emojis in the dataset and casing.

Using the Google API, we translated Kinyarwanda to English by using Kinyarwanda preprocessed texts. We added stopwords and then removed them and stemmed both the train and test sets. The following figure shows the sentiment labels used: 1 representing neutral tweets, 2 representing negative tweets, and 0 representing positive tweets.

2 Results

We performed transfer learning using six pretrained models using the Trainer framework and five epochs. None of the pretrained models were able to achieve more than 69 percent of the f1 score. The dataset was slightly imbalanced, with positive sentiment not highly represented compared to other labels. The highest score was achieved by the cardiffnlp/twitter-roberta-base-sentiment-latest pretrained model with an f1 score of 68.60 percent on the test set using translated English train tweets and test done on translated test tweets.

Using Kinyarwanda available transformers, we were able to achieve a 64 percent f1 score on the Kinyarwanda preprocessed test set. The following table presents the results obtained:

Transformer Model	Train Dataset
Translated Train Tweets	Translated Test Tweets
Preprocessed Translated Test Tweets	0.625459922 distilbert-base-uncased-finet
0.642492736 cardiffnlp/twitter-xlm-roberta-base-sentiment	Translated Train Tweet
Translated Train Tweets	Translated Test Tweets
Preprocessed Kinyarwanda Test Tweets	0.644029075 Davlan/xlm-roberta-base-fine
0.598704083 height	

We plan to explore various ways to improve the results obtained by the transformers, such as using the PyTorch framework.