

Proposal Title: **Classifying messages related to disasters using Bidirectional Encoder Representations from Transformer (BERT).**

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1. Introduction

The project aims at categorizing the messages from the disaster response messages dataset using Bidirectional Encoder Representations from Transformers (BERT). Each of the messages is checked if it contains any of the keywords related to disasters and are categorized accordingly. The categories are: related, request, offer, aid related, medical help, medical products, search and rescue, security, military, child alone, water, food, shelter, clothing, money, missing people, refugees, death, other aid, infrastructure related, transportation.

2. Related Work

A previous work “An Improved Genetic Algorithm for Feature Selection in the Classification of Disaster-Related Twitter Messages” uses Vector Space Model to extract features from words and then uses one of the genetic algorithms for feature selection. The proposed approach is to use BERT to transform the messages and to categorize it based on the contents of the message.

3. Research Questions

1. **What is the research goal?**

Understanding the working of BERT model on the selected Dataset. Verifying the results and comparing it to the already proposed and proven results. Our main focus is to check the parameters in BERT’s and understand how BERT model is better than other traditional attentive models.

2. **What methods are being applied?**

ELMo and BERT model. Comparison of how BERT is better than ELMo. We also aim to understand the similarities between them.

3. **What claims are made in the paper?**

BERT is designed to pretrain deep bidirectional representations from unlabeled text by jointly conditioning on both left and right context in all layers.

4. Data Set

The dataset used for this project “Disaster Response Messages” was obtained from Kaggle. The dataset is provided by Figure Eight and contains 3000 messages exchanged during multiple disastrous events including an earthquake in Haiti in 2010, an earthquake in Chile in 2010, floods in Pakistan in 2010, superstorm Sandy in the U.S.A. in 2012. The dataset also contains news articles of multiple disasters. The goal is to classify the messages into 36 different categories related to disastrous situations.

5. Overview

Preprocessing the data would be the initial stage in building the model. This would involve changing the text messages to lower case and removing non-ascii characters and URLs. Since BERT requires the data to be in a specific format, additional [CLS] token is added at the beginning of each sentence; and the data is tokenized using BERT too. Since we're using pre-trained embeddings, lemmatization, stop word removal, and punctuation removal are not necessary. We plan to use 4000 samples each for validation and test sets, and the remaining for training. Samples are shuffled after each epoch during training. The default BERT for sequence classification model is then used, and it is fine-tuned using our own tensors and

iterators developed specifically for our disaster management dataset. Additionally, we train the ELMo model and contrast the outcomes. Accuracy, precision, recall and F1-score are the metrics used to evaluate the results.

6. Teamwork Plan (applies only to teams)

This project work is planned and proposed to be done by whole team together and workload is divided amongst the team mates equally. The problem statement and ways to solve the tasks were discussed and understood together over MS Teams and in person. The coding, evaluations, issues, changes in scripts, error corrections are planned to be discussed and resolved by all of us together after referring multiple resources online. A much-detailed split of work and degree of involvement of each member will be updated towards the end of final reporting.

References

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4. Cornelia Caragea, Hyun-Woo Kim, Prasenjit Mitra, and John Yen - Classifying Text Messages for Emergency Response
5. S. M. Dedar Alam - Identifying and Analyzing Disaster-Related Tweet, through Hashtag Monitoring Using Data Mining and NLP Techniques
6. Samuel Auclair; Faïza Boulahya; Babiga Birregah; Robin Quique; Rachid Ouaret - SURICATE-Nat: Innovative citizen centered platform for Twitter based natural disaster monitoring
7. Zihan Wang; Taozheng Zhu; Shice Mai - Disaster Detector on Twitter Using Bidirectional Encoder Representation from Transformers with Keyword Position Information
8. Guoqin Ma - Tweets Classification with BERT in the Field of Disaster Management