Project Proposal: Train model for Sentiment Analysis with GoEmotions and consideration of their performance in transfer tasks

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1 Introduction

The aim of the project is to investigate 3 different technical methods for sentiment analysis and their performance. The 3 approaches are a classical approach, a recurrent neural network and a transformer-based network. If necessary, different preprocessing approaches are also tested. A data set from Google called GoEmotions is used for training. In addition, it will be investigated how well the models work on test data that neither belong to the GoEmotions dataset and thus come from completely different sources nor have the same emotion classes.

1.1 Research Questions

- **RQ1:** Which procedures deliver the best results?

- **RQ2:** How well do the models work on external data sets?

- **RQ3:** To what extent does the correct classification depend on the emotion contained? What could be possible reasons for this?

2 Methodology

2.1 Technical Approach

1. **Data Preprocessing:** Preparation of all data records (cleaning, splitting, etc.). Implementation of an interface so that all models can use the text data.

2. **Training:** Optimize and train all models.

3. **Evaluation Step 1:** Evaluation on the GoEmotions test data set.

4. **Evaluation Step 2:** Evaluation on external data sets.

2.2 NLP Techniques

- **Classical machine learning approach** Classic approaches to feature extraction are tried out and then trained on machine learning approaches. These include an SVM and an MLP.

- **LSTM:** An LSTM is trained on various word embeddings.

- **Transformer:** A Transformer-based network is trained on different word embeddings.

3 Team Contributions

3.1 Shared Responsibilities

All Members: Data gathering, pre-processing, train-test split creation, and final project poster preparation.
Deliverables:

- A git repository with all materials to verify the experiments.

- A poster for the poster session.

3.2 Individual Responsibilities

3.2.1 Sarah Langrehr

Job: Implementation of the classic approach as described in 2.2.

3.2.2 Benedikt Berger

Job: Implementation of the LSTM as described in 2.2.

3.2.3 Florian Knopp

Job: Implementation of the Transformer as described in 2.2.

4 Evaluation and Dataset

4.1 Dataset Description

- GoEmotions Datasets
- Emotions dataset
- App Reviews

We are using the GoEmotions dataset containing 58000 Comments on Reddit and 27 classes. We just use the 15 most appearing classes (admiration - confusion). The Emotions dataset only contains 6 classes and the App Reviews dataset contains no emotions but a rating of 1 to 5 stars, which means that a "transfer" of the class must be carried out. Each emotion of the GoEmotions dataset is manually assigned to a class of the corresponding class of the other dataset.
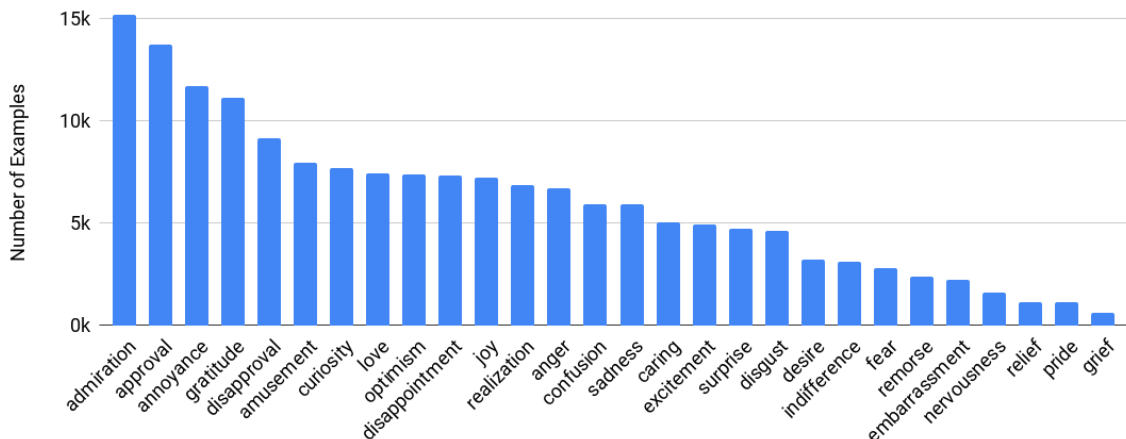

Figure 1: Enter Caption

- **target:** Sentiment class (Top 15 emotions).
- **text:** Reddit comment content.

4.2 Experimental Setup

We will evaluate using the following metrics on our train / validation / test split. For this we once evaluate SVM, MLP, LSTM then Transformer. Optionally, we would use different embeddings.

- Accuracy
- Balanced Accuracy
- precision
- recall
- confusion matrix

- F1 Score

- ROC-AUC Score