

# Abstract

The purpose of this master thesis is to perform sentiment and stance detection on a social media dataset. To achieve this I have employed pre-trained language models such as GPT-1 and GPT-2 along with a classification head. Language models have proven to have the best language understanding capability and technical sophistication in almost all the natural language generation (NLG) tasks. Therefore, the aim of this thesis work is to the knowledge gained by an NLG model in order to perform an classification task.

The thesis comprises of 3 main tasks. Task-1 includes Stance detection using GPT-1 and GPT-2 on a 2 point scale (Favor and Against). Task-2 focuses on Sentiment Analysis using GPT-2 on 2 point scale (Positive and Negative). Then, we have Task-3 that incorporates a different variant of the traditional GPT-2, i.e German GPT-2. With the help of this pre-trained German model, I have built a Sentiment analysis model that can perform classification on German tweets. Finally, a few of these models were combined with Snorkel AI in order to build a labels generator module.

The dataset used for training and testing are extracted from an ongoing natural language processing competitions such as SemEval, GermEval and Kaggle's Imdb Movie Review dataset. The performance of each of the models are measured in terms of F1 score and accuracy values. The results were then compared with the other competitors of the competition and some state of the art models. Overall, the English GPT-2 models have outperformed top models in Sentiment and Stance detection and German GPT-2 model has achieved  $F_1$  score that is only 4% less than the top performing model in German Sentiment classification.

The model outputs were successfully combined to build a labels generator module using Snorkel AI. This module mimics a real life meeting room scenario where the participants of the meeting are trying to fix the price of their product. The module output was tested on two new datasets, SemEval 2016 task 4 and Kaggle 25k IMDB reviews. The labels generator once again outperforms all the other state of the art models using this dataset.

**Keywords:** Language Models, SemEval, GermEval, GPT-2, Labels generator