"Comparative Evaluation of Deep Learning Models for Multiple Combination Emotion Detection in Text Data"

Objective

The study aims to compare the efficiency and effectiveness of different deep learning models in recognizing and analyzing the multiple combinations of emotions in text data.

The specific objectives of this study are:

1. To collect a suitable dataset of text data that includes multiple combinations of emotions. The dataset should be diverse, containing texts from different sources and in different formats, including social media, news, and reviews.

2. To preprocess the collected dataset by removing irrelevant information, cleaning the text, and performing feature engineering to extract relevant features that can be used for emotion detection.

3. To implement and evaluate different deep learning models, including Convolutional Neural Networks (CNNs), Long Short-Term Memory (LSTM) Networks, and Recurrent Neural Networks (RNNs). These models will be compared based on their performance metrics such as accuracy, F1 score, and confusion matrix.

The above objectives are important to achieve because they will help in understanding the performance of different deep learning models in multiple combination emotion detection. The research will provide insights into the efficiency and effectiveness of these models and will be helpful in identifying the best model for a particular application. Additionally, the proposed study will help in improving the accuracy of emotion detection in text data, which is crucial in various applications, including sentiment analysis, chatbots, and customer feedback analysis.

Rationale

This research topic focuses on comparing the performance of different deep learning models for emotion detection in text data. With this study the researchers can have a better understanding of the strengths and weaknesses of different deep learning models. Emotion detection has become an important research topic in natural language processing, and it has several practical applications in the real world, such as sentiment analysis, chatbots, and virtual assistants and with the conclusion of the study, it can improve performance to more accurate and effective applications that can better meet the needs of users and identify the most effective models and approaches that can be applied to a wide range of tasks beyond emotion detection.

Field of Study

- Machine Learning
- Natural Language Processing
- Text
- Linguistics

Research Theme

- Education
- Human Resource
- Business

Process

Once the datasets are obtained, they can be preprocessed and used to train and evaluate deep learning models for emotion detection in text data. The data can be split into training, validation, and testing sets, and the deep learning models can be trained on the training data and evaluated on the validation and testing data. The performance of the models can then be compared using appropriate evaluation metrics to determine the most effective deep learning model for emotion detection in text data.

What Specific Emotions and Why

happiness, sadness, anger, fear, surprise, disgust, love, and excitement.

These emotions are commonly found in various text data sources, such as social media, news, and reviews, and are often used in sentiment analysis and customer feedback analysis.

Including a diverse range of emotions is important because it will help in identifying the limitations and strengths of the selected deep learning models. The inclusion of multiple emotions will help in understanding how different models perform in recognizing and analyzing the combinations of emotions. It will also help in improving the accuracy of emotion detection in text data, as the models will be trained to detect multiple emotions simultaneously.

Software

TensorFlow - an open-source platform for machine learning and deep learning developed by Google. It provides a comprehensive set of tools and libraries for building and training deep learning models and evaluating their performance.

TensorFlow is a powerful and highly optimized library for building and training deep learning models. It provides a wide range of tools for evaluating the performance of deep learning models, including a variety of metrics and loss functions. TensorFlow also provides a range of visualization tools that can help to analyze and interpret the results of the evaluation.

Keras - an open-source deep learning library written in Python. It provides a high-level interface for building and training deep learning models and can be used with other deep learning libraries such as TensorFlow and Theano.

Keras, on the other hand, is a high-level neural networks API that is designed to be easy to use and highly user-friendly. It can be used with TensorFlow as a backend, which provides a range of powerful tools and libraries for building and evaluating deep learning models. Keras provides a range of evaluation metrics and loss functions that can be used to evaluate the performance of the deep learning models.

Data Gathering Method

The research can involve collecting a dataset of text data that contains emotional content and testing it on different deep learning models.

1. Emotion Detection in Text (EDT): This dataset consists of 7,500 text samples, with each sample labeled with one of six emotion categories - anger, fear, joy, love, sadness, and surprise.

2. Affectivetext: This dataset consists of 2,476 text samples, with each sample labeled with one of four emotion categories - joy, sadness, anger, and fear.

3. Sentiment140: This dataset consists of 1.6 million tweets, with each tweet labeled as positive or negative.

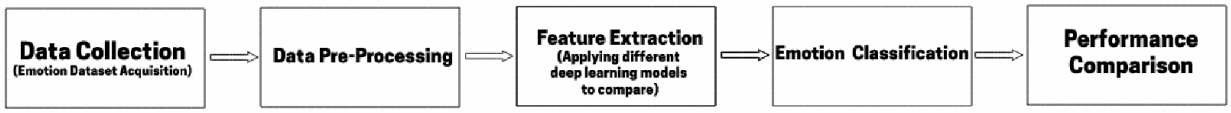
4. Movie Review Data: This dataset consists of movie reviews labeled as positive or negative.

To obtain these datasets, you can either download them from publicly available sources or purchase them from commercial providers.

Deep Learning Models to Compare

- Recurrent Neural Networks
- Convolutional Neural Networks
- Transformer-based Model
- Others (TBD)

Flowchart



Originality

There has been research on this but most of the experimentation on the studies we found was performed with most of the five emotions categories, namely *joy, fear, sadness, shame, and guilt.* To obtain more robust results, further experimentation is required with a different combination of emotions, such as fear_disgust, anger_disgust, and shame_guilt and so on. The researchers can include a combination of recent deep neural network systems to determine if there is an improvement in emotion classification which can be used in the near future. Some limitations of the recent approach is that their training and test data were annotated on sentence level, and the classification models work on the same level. By doing so, they might have missed emotional appeals caused by the context of the complete text (e.g., the entire speech). The researchers could address this by moving from sentence level to paragraph level or document level.

Measurement of Success

The study can compare the accuracy, precision, recall, and F1 score of each model to determine which one performs better. Basically, to determine which Deep Learning Model is superior among the others in emotion detection and what areas of improvement can these deep learning models work on.

The study can provide insights into the strengths and weaknesses of different deep learning models for emotion detection in text data, which can be useful for future research and practical applications.