TEXT EMOTION EXTRACTION

A Course Based Project report submitted
in the partial fulfilment of the requirements for the award of the degree of

Bachelor of Technology

in

Computer Science & Engineering

(Artificial Intelligence and Machine Learning)

by

21071A66C8 V. Sri Vishnupriya

Under the Guidance of

Dr. K Durga Prasad

Sr. Assistant Professor

CSE – AIML & IoT, VNR VJIET

Submitted to

DEPARTMENT OF

CSE- (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING & INTERNET OF THINGS)

Vallurupalli Nageswara Rao Vignana Jyothi Institute of Engineering and Technology,

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Telephone No: 040-2304 2758/59/60, Fax: 040-23042761

CERTIFICATE

This is to certify that V. SRI VISHNUPRIYA (21071A66C8), **have successfully completed course based project work at CSE-(AIML & IoT) Department of VNRVJIET, Hyderabad entitled "TEXT EMOTION EXTRACTION" in partial fulfilment of the requirements for the award of B. Tech degree during the academic year 2023-2024.**

This work is carried out under my supervision and has not been submitted to any other University/Institute for award of any degree/diploma.

Dr. K Durga Prasad
Sr. Assistant Professor
Department of CSE(AIML &IoT)
VNRVJIET

Dr. N. Sandhya
Professor and Head
Department of CSE (AIML&IoT)
VNRVJIET

DECLARATION

This is to certify that our project titled "**TEXT EMOTION EXTRACTION**" submitted to Vallurupalli Nageswara Rao Vignana Jyothi Institute of Engineering and Technology in complete fulfilment of the requirement for the award of Bachelor of Technology in CSE- (Artificial Intelligence and Machine Learning) is a bonafide report to the work carried out by us under the guidance and supervision of K. Naga Durga Saile, Assistant Professor, Department of CSE-(AIML & IoT), Vallurupalli Nageswara Rao Vignana Jyothi Institute of Engineering and Technology. To the best of our knowledge, this has not been submitted in any form to another University/Institute for an award of any degree/diploma.

Students Name	**Registration Number**
V SRI VISHNUPRIYA	21071A66C8

ABSTRACT

In this project, we explore the potential of BERT (Bidirectional Encoder Representations from Transformers) for extracting emotions from text. By leveraging BERT's deep contextual understanding, we aim to enhance the accuracy of emotion detection in various text genres. Through fine-tuning BERT on emotion-labeled datasets, our approach shows promising improvements compared to traditional methods. The experimental results indicate that BERT can effectively identify emotions, even in complex sentences, suggesting its utility for practical applications such as analyzing customer feedback, supporting mental health monitoring, and improving human-computer interactions. While BERT's performance is encouraging, further research is necessary to refine its capabilities and explore its full potential in nuanced emotional contexts.

ACKNOWLEDGEMENT

An endeavour over a long period can be successful only with the advice and support of many well wishers. We take this opportunity to express our gratitude and appreciation to all of them.

First of all we thank the lord almighty who has been with us from the beginning to the end of our project. We are indebted to our venerable principal **Dr. C. D. Naidu** for this unflinching devotion, which lead us to complete this project. The support, encouragement given by him and his motivation lead us to complete this project.

We wish to express our profound gratitude to **Dr. N. SANDHYA, Professor** and **HOD,** Dept. of **CSE (AIML & IOT), VNR Vignana Jyothi Institute of Engineering and Technology** for her constant and dedicated service to brighten our career.

With a great pleasure we express our gratitude to the internal guide **Dr K.Durga Prasad, Assistant Professor,** Dept. of **CSE (AIML & IOT)** for her timely help, constant guidance, cooperation, support and encouragement throughout this project.

Finally, we wish to express our deep sense of gratitude and sincere thanks to our parents and who have technically and non-technically contributed for the successful completion of our project.

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INTRODUCTION

Emotion extraction from text plays a vital role in applications such as sentiment analysis, mental health monitoring, and improving human-computer interactions. Traditional methods often struggle with the complexities and subtleties of natural language, leading to less accurate emotion detection. BERT (Bidirectional Encoder Representations from Transformers) offers a promising solution by capturing deep contextual understanding and processing text in both directions simultaneously.

This project focuses on leveraging BERT's capabilities by fine-tuning it on emotion-labeled datasets to enhance the accuracy and robustness of emotion detection across various text genres. Our approach aims to address the limitations of traditional methods by effectively identifying emotions in both straightforward and complex language. Through our experiments, we seek to demonstrate BERT's potential to significantly advance natural language processing for nuanced emotion analysis, paving the way for more sophisticated applications in diverse fields.

DESIGN

REQUIREMENT SPECIFICATIONS (S/W & H/W)

SOFTWARE REQUIREMENTS

Python Programming Language

Kaggle Notebook(GPU T4)

PyTorch

Keras

HARDWARE REQUIREMENTS

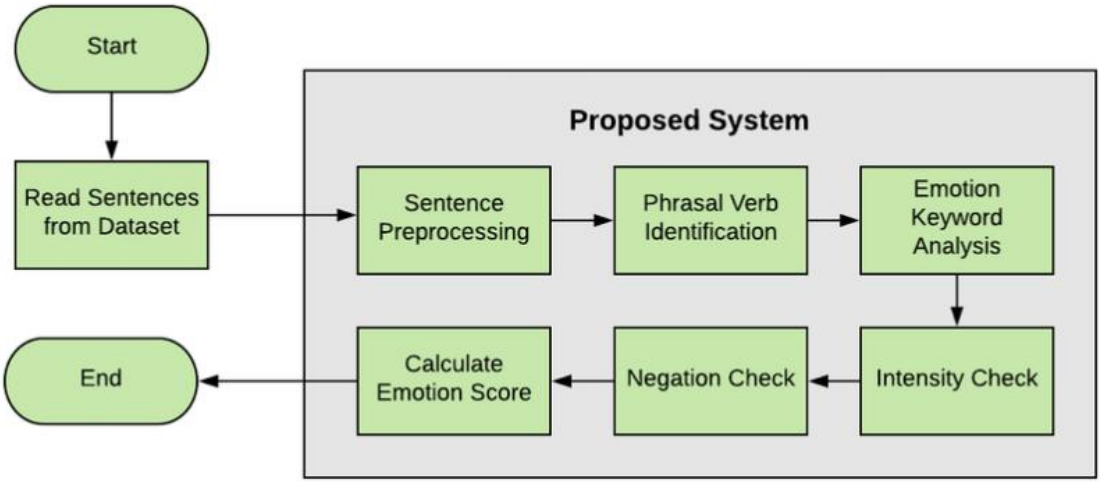
RAM with minimum of 8GB
GPU T4

UML DIAGRAMS

A UML diagram is a diagram based on the UML (Unified Modeling Language) with the purpose of visually representing a system along with its main actors, roles, actions, artifacts or classes, in order to better understand, alter, maintain, or document information about the system. There are several types of UML diagrams and each one of them serves a different purpose regardless of whether it is being designed before the implementation or after (as part of documentation).

DATA FLOW DIAGRAM

A use case diagram is a dynamic or behavior diagram in UML. Use case diagrams model the functionality of a system using actors and use cases. Use cases are a set of actions, services, and functions that the system needs to perform. In this context, a "system" is something being developed or operated, such as a web site. The "actors" are people or entities operating under defined roles within the system.

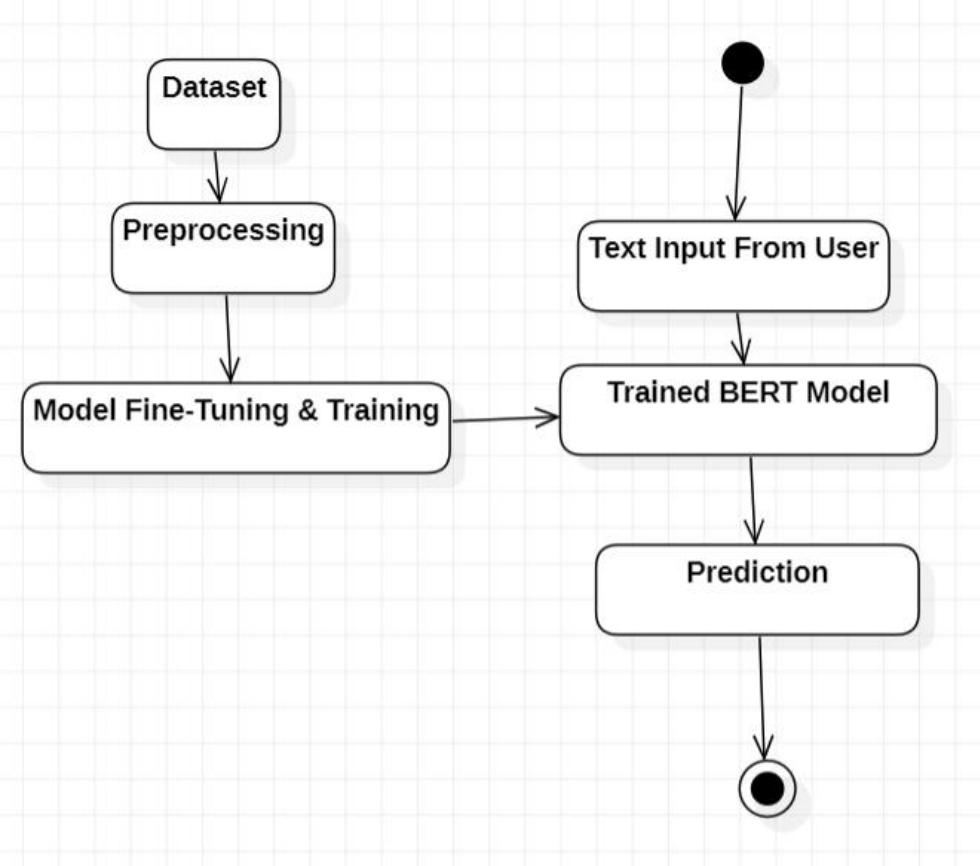


ACTIVITY DIAGRAM

Activity diagram is another important diagram in UML to describe the dynamic aspects of the system.

Activity diagram is basically a flowchart to represent the flow from one activity to another activity. The activity can be described as an operation of the system.

The control flow is drawn from one operation to another. This flow can be sequential, branched, or concurrent. Activity diagrams deal with all type of flow control by using different elements such as fork, join, etc.



IMPLEMENTATION

MODULES

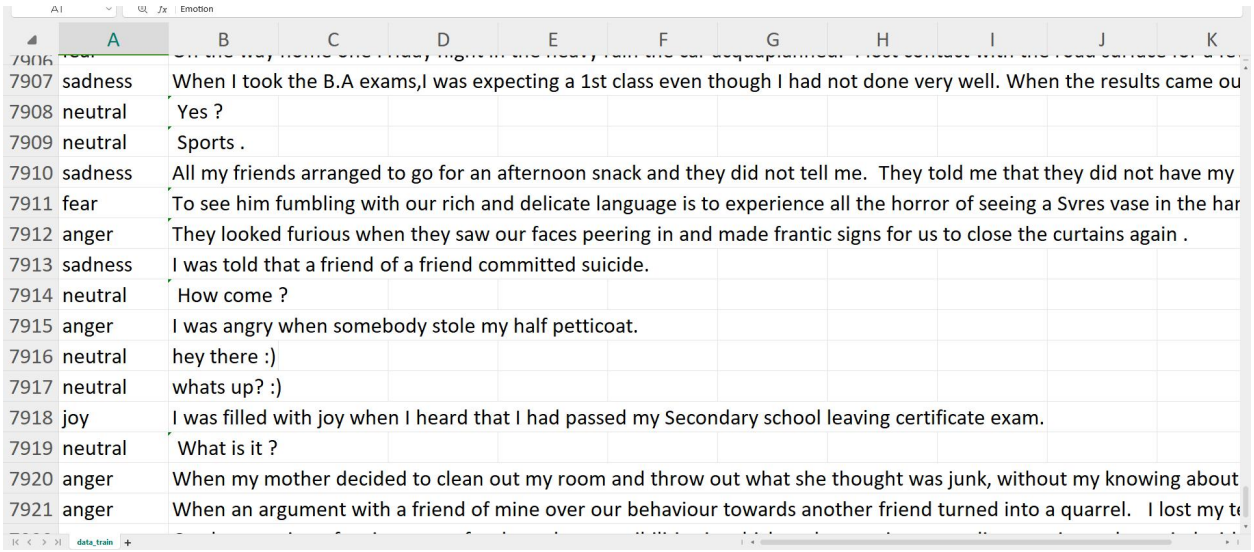
Collect input from user :

```
import time

message = """
We wear the mask that grins and lies,
It hides our cheeks and shades our eyes,–
This debt we pay to human guile;
With torn and bleeding hearts we smile,
And mouth with myriad subtleties.

Why should the world be over-wise,
In counting all our tears and sighs?
Nay, let them only see us, while
       We wear the mask.

We smile, but, O great Christ, our cries
To thee from tortured souls arise.
We sing, but oh the clay is vile
Beneath our feet, and long the mile;
But let the world dream otherwise,
       We wear the mask!
 """

start_time = time.time()
prediction = predictor.predict(message)
```

Use Trained BERT MODEL:

The BERT Model is to be imported from transformers, and its hyperparameters, for e.g epoch values are to be tuned .

Data Set:



	A	B
7907	sadness	When I took the B.A exams,I was expecting a 1st class even though I had not done very well. When the results came ou
7908	neutral	Yes ?
7909	neutral	Sports .
7910	sadness	All my friends arranged to go for an afternoon snack and they did not tell me. They told me that they did not have my
7911	fear	To see him fumbling with our rich and delicate language is to experience all the horror of seeing a Svres vase in the har
7912	anger	They looked furious when they saw our faces peering in and made frantic signs for us to close the curtains again .
7913	sadness	I was told that a friend of a friend committed suicide.
7914	neutral	How come ?
7915	anger	I was angry when somebody stole my half petticoat.
7916	neutral	hey there :)
7917	neutral	whats up? :)
7918	joy	I was filled with joy when I heard that I had passed my Secondary school leaving certificate exam.
7919	neutral	What is it ?
7920	anger	When my mother decided to clean out my room and throw out what she thought was junk, without my knowing about
7921	anger	When an argument with a friend of mine over our behaviour towards another friend turned into a quarrel. I lost my t

OVERVIEW OF TECHNOLOGIES USED

Python

Python is the primary programming language utilized for backend development and integration with Flask.

REST API

Used REST API to upload and use model

RESULTS

Confusion Matrix:

```
107/107 [==============================] - 97s 909ms/step
                precision    recall  f1-score   support

           joy       0.87      0.84      0.85       707
       sadness       0.78      0.83      0.80       676
          fear       0.87      0.84      0.86       679
         anger       0.80      0.77      0.79       693
       neutral       0.80      0.83      0.82       638

      accuracy                           0.82      3393
     macro avg       0.82      0.82      0.82      3393
  weighted avg       0.82      0.82      0.82      3393
```

Accuracy: 82%

Sample Output:

```
[41] In counting all our tears and sighs?
     Nay, let them only see us, while
           We wear the mask.

     We smile, but, O great Christ, our cries
     To thee from tortured souls arise.
     We sing, but oh the clay is vile
     Beneath our feet, and long the mile;
     But let the world dream otherwise,
           We wear the mask!
      """

     start_time = time.time()
     prediction = predictor.predict(message)

     print('predicted: {} ({:.2f})'.format(prediction, (time.time() - start_time)))

     predicted: sadness (0.12)
```

CONCLUSION

This study highlights the effectiveness of BERT (Bidirectional Encoder Representations from Transformers) in extracting emotions from text. By leveraging BERT's deep bidirectional contextual understanding, our approach has shown significant improvements in detecting emotions across various text genres. Fine-tuning BERT on emotion-labeled datasets enables it to capture complex linguistic nuances, outperforming traditional emotion detection methods.

The results from our experiments demonstrate BERT's potential to enhance applications in sentiment analysis, mental health monitoring, and human-computer interactions by providing more accurate and nuanced emotion detection. Despite these promising outcomes, further research is needed to refine BERT's capabilities, particularly in handling subtle emotional contexts and expanding its application to more diverse and complex texts.

Our work contributes to the growing field of natural language processing and sets the foundation for future advancements in emotion-aware systems. Continued exploration and improvement of BERT's models will be crucial for developing sophisticated AI systems capable of understanding and responding to human emotions more effectively.

FUTURE SCOPE

Enhanced Contextual Understanding: Expanding BERT's capabilities to better handle nuanced and context-dependent emotional expressions will be crucial. This could involve training the model on more diverse and complex datasets, including idiomatic and culturally specific language. Enhanced understanding of such subtleties would improve the model's ability to detect and interpret a wider range of emotions accurately.

Real-time Emotion Monitoring: Integrating BERT into real-time systems for continuous emotion monitoring could significantly benefit applications in customer service and mental health. For example, chatbots and virtual assistants could use BERT to respond empathetically during live interactions, while mental health applications could analyze social media or journal entries in real-time to provide timely support and interventions.

Multilingual Emotion Detection: Developing BERT-based models that can accurately extract emotions across multiple languages would make the system more versatile and accessible. By fine-tuning BERT on multilingual datasets, the system can cater to a global audience, providing accurate emotion detection regardless of the language in which the text is written.

Emotion-driven Analytics for Businesses: Leveraging BERT's emotion extraction capabilities for business intelligence can provide deeper insights into customer sentiment. Companies could analyze feedback and reviews to identify emotional trends and patterns, enabling them to tailor their products, services, and marketing strategies more effectively. This could lead to improved customer satisfaction and loyalty.

REFERENCES

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