

# SENTIMENT ANALYSIS OF DYSTHYMIA FORM OF DEPRESSION USING MULTIMODAL APPROACH

Kshitij S. Kale <sup>[1]</sup>, Sandip M. Jagtap<sup>[2]</sup>, Vishal K. Madane <sup>[3]</sup>, Yogesh S. Thorat <sup>[4]</sup>,

Prof. D.R. Kamble <sup>[5]</sup>

<sup>1,2,3,4</sup> BE Student, <sup>5</sup> Professor

<sup>1,2,3,4,5</sup> Department Of Computer Engineering

<sup>1,2,3,4,5</sup> S.B. Patil Collage Of Engineering, Indapur, Maharashtra, India

\*\*\*

## Abstract -

To investigate the correlation between linguistic traits and dysthymia symptoms, researchers have compiled a comprehensive set of speech features, drawing on previous research findings. These features encompass various aspects of speech, including prosody, pitch, intonation, speech rate, and pauses, among others. Analysing these linguistic cues can provide valuable insights into an individual's emotional state and mental well-being. One commonly used technique for assessing the severity of depression is the Beck Depression Inventory (BDI). This approach involves individuals answering specific questions that help gauge their level of depression. By incorporating such self-report measures into the analysis of linguistic traits, a more holistic assessment of dysthymia can be obtained. The combination of objective linguistic analysis and subjective self-assessment measures can enhance the accuracy and reliability of dysthymia detection. We have one solution to solve this issue in terms of machine learning. Machine learning is a process which learns from past experience and provide the best result when the same issue or event occurs in the future.

**Keywords:** Machine Learning, Video Processing, Facial Expressions, Sentiment Analysis, fusion Algorithm, KNN, Depression Detection, Bag-of-Words.

## 1. INTRODUCTION

Every Human being in day to day life is being diagnosed with depression due to affection of different parameters. It disturbed mental state of the human being, So as consider to technology we have one solution to solve this issue in terms of machine learning. Machine learning is a process which learns from past experience and provide the best result when the same issue or event occurs in the future.[2] It considers different parameters like user emotions. Depression is a leading cause of mental ill health. It is a major cause of suicidal ideation and leads to significant impairment in daily life. Machine Learning can help detection and can generate possible solutions to tackle depression. Suicide is one of the most serious social health issues that exists in today's culture. Suicidal ideation, also known as suicidal thoughts, refers to people's plans to commit suicide. Our motivation is to find out a speech feature set to detect, evaluate and even predict Dysthymia. For examining the correlation between Dysthymia and

speech, we extract features as many as possible according to previous research to create a large voice feature set. It can be used as a suicide risk measure. India Depression is a mental illness that is not taken seriously in some countries that can cause us depression.[1] among the top countries among in the world to have annual suicide rate.

Depression is a psychiatric disorder that needs to be addressed with medication. According to Our World in Data Website, Depressive disorders occur with varying severity. The WHO'S International Classification of Diseases defines this set of disorders ranging from mild to moderate to severe. The Institute of Health Metrics and Evaluation adopt such definitions by disaggregating to mild, persistent depression (dysthymia) and major depressive order (severe).

Though this project can use varieties of techniques such as facial expression detection, social media feeds. Question naire, etc. to target and identify users depression levels. We limit the scope of this project by using only facial expression detection[8] and questionnaire based solution to tackle depression. This scope can be extended by adding extra techniques in emotion detection and using variety of machine learning models as we have looked in the papers we have selected as literature for this project.

## 2. LITERATURE REVIEW

Paper 1: "A Survey of Multimodal Sentiment Anaysis"- Mohammad Soleymani, David Garcia, Brendan Jou, Bjorn Schuller, Shih-Fu Chang, Maja Pantic\*

In this paper, it represent an overview of concept and the goal of multimodal sentiment analysis and discussed about the challenges and perspectives related to above field. Sentiment analysis is a promising approach to complementary channels of information for sentiment analysis such as recognition and subjective analysis.

Paper 2 : "Hierarchical Attention Network for Document Classification"- Yang, Z., Yang, D., Dyer, C., He, X., Smola, A., & Hovy, E\*

In this paper, it represents Hierarchical Attention Network (HAN) for classify documents. For better visualization use highly informative components of a documents. kind of pagination anywhere in the paper. Do

not number text heads-the template will do that for you. Picking out important sentences and words from the documents.

Paper 3 : “Multimodal Sentiment Analysis Based on Deep Learning”-J. Bian, L. Rajamanickam,Z. Nopiah\*.

In this paper, it shows on the basis of characteristics of deep learning algorithm. There are various fusion methods that implements sentiment analysis. The CNN model is used which is pre-trained on large scale image data set and then send to train model to train the text emotions classification model. Result is obtained by decision fusion.

Paper 4 : “Multimodal Sentiment System and Method Based on CRNN-SVM”- Y. Zhao, M. Mamat, A. Aysa, K. Ubul\*.

This paper proposed as an AI deep learning method that is used in sentiment analysis for multimodal approach. It is improving recognition rate and analysis accuracy of sentiments. In this paper system performance optimization method is tested, and remarkable result achieved.

Paper 5 : “Multimodal Emotion Recognition Model Based on a Deep Neural Network with Multi-objective Optimization”- M. Li, X. Qiu, S. Peng, L. Tang, W. Yang, y. Ma\*

This paper represents a multimodal emotion recognition model based on multimodal objective algorithm. It will gives accuracy and result at a same time. It is best improvement for emotion recognition model.

Paper 6:“Understanding and measuring psychological stress using social media”- Guntuku, S.C., Buffone, A., Jaidka, K., & Eichstaedt, J.C\*

In this paper, as a sample take an Social media account like twitter or instagram, check the stress individually. The result show in LIWC. The result also shows that phychological survey data by deep understanding the environment.

Paper 7 : “A Survey on Multimodal Sentiment Analysis”- S.J. Fulse\*

In this paper it is show that the sentiment analysis multi-modal problem is a problem occurs in machine learning. There are many difficulties to sentiment analysis as Cultural influence, linguistic variation and it is difficult to derive sentiment.

Paper 8 : “Multimodal sentiment analysis: Addressing key issues and setting up the baselines.”- Poria, S., Cambria, E., & Bajpai, R.\*

This paper shows useful baseline for the multimodal sentiment analysis for emotion detection. It having different aspects as multimodal sentiment analysis problem like cross-dataset, unknown speaker etc.

Paper 9 : “An MLP-based Model for Multimodal Sentiment Analysis and Depression Estimation”- Hao Sun, Hongyi Wang, Jiaqing Liu, Yen-Wei Chen, Lanfen Lin \*.

In this paper, treat multimodal fusion as feature mixing and propose the MLP-based CubeMLP for unified multimodal feature processing. In CubeMLP, we perform the mix-up at all axis of multimodal features. CubeMLP can reach the state-of-the-art performance for sentiment analysis and depression detection while keeping the computational burden low. We analyzed CubeMLP’s components and compared it to other techniques.

Paper 10 : “Detecting depression of microblog users via text analysis”- Sihua Lyu, Xiaopeng Ren, Yihua Du and Nan Zhao\*.

This study found that depression could be detected solely through word frequency features by machine learning methods. This model could have potential value in the screening for depression and be able to generalized across platforms. Furthermore, our study demonstrated that in addition to LIWC, which was commonly used in previous studies, lexicons related to cultural psychology and suicide risk.

### 3. LIMITAIONS OF EXISTING SYSTEM

- Yet sentiment analysis has some limitations; a recent study showed that the aggregation of LIWC and VADER scores on Twitter and Facebook posts over the span of months are weakly correlated with trait emotionality and general emotion measures in questionnaires [1]
- In the working of sentiment analysis, due to the limitation of the sample, the result of the experiment may not be very scientific. To improve in future work, improvements should be made.[4]
- Emotion recognition has some limitations like dark lighting, different angles, and blocked areas.[5]
- The main limitation is to dealing with Multi Modality entails the use of multiple media such as audio and video in addition to text to enhance the accuracy of sentiment analyzers. [7]
- This study has a few limitations. Firstly, our analysis of the text is limited to the extraction of word frequency features, which have a very limited degree of representation of audio to text conversion information.[10]

### 4.CONCLUSION

Thus we have studied from the above papers, we conclude that in conclusion, multimodal sentiment analysis holds great promise for improving the understanding and management of dysthymia. The integration of audio and video data, along with advancements in AI, NLP, and wearable technologies, can enhance the accuracy and real-time monitoring capabilities of sentiment analysis models. By addressing cultural and contextual factors and fostering interdisciplinary collaborations, researchers can

contribute to the development of effective tools and interventions for individuals affected by dysthymia.

In the traditional approach to treating depression, medication is often prescribed as the primary method of intervention. However, in our innovative system, we have developed techniques that utilize audio and visual formats to determine an individual's level of depression. developed techniques that utilize audio and visual formats to determine an individual's level of depression. By employing a combination of questionnaires, facial expression analysis, and seeking input from nearby medical professionals, we aim to provide a more comprehensive and personalized approach to identifying and addressing depression.

Depression is a complex mental health condition that affects millions of individuals worldwide. While medication can be effective in managing symptoms for some people, it is not a one-size-fitsall solution. Our system recognizes the importance of a holistic approach that takes into account various factors that contribute to an One of the key components of our system is the use of audio and visual formats to assess the level of depression.

## 5. REFERENCES

[1] Mohammad Soleymani, David Garcia, Brendan Jou, Bjorn Schuller, Shih-Fu Chang, Maja Pantic (2017). A Survey of Multimodal Sentiment Analysis

[2] Yang, Z., Yang, D., Dyer, C., He, X., Smola, A., & Hovy, E. (2016). Hierarchical attention networks for document classification. Proceedings of the 2016 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies, 1480-1489.

[3] J. Bian, L. Rajamanickam, Z. Nopiah (2023), Multimodal Sentiment Analysis Based on Deep Learning.

[4] Y. Zhao, M. Mamat, A. Aysa, K. Ubul (2023), Multimodal Sentiment System and Method Based on CRNN-SVM.

[5] M. Li, X. Qiu, S. Peng, L. Tang, W. Yang, y. Ma (2021), Multimodal Emotion Recognition Model Based on a Deep Neural Network with Multiobjective Optimization.

[6] Guntuku, S.C., Buffone, A., Jaidka, K., & Eichstaedt, J.C. (2019). Understanding and measuring psychological stress using social media. Proceedings of the International AAAI Conference on Web and Social Media, 13(01), 214-225.

[7] S.J. Fulse (2014), A Survey on Multimodal Sentiment Analysis.

[8] Poria, S., Cambria, E., & Bajpai, R. (2017). Multimodal sentiment analysis: Addressing key issues and setting up the baselines. IEEE Intelligent Systems, 32(3), 74-80.

[9] Hao Sun, Hongyi Wang, Jiaqing Liu, Yen-Wei Chen, Lanfen Lin (2022), An MLP-based Model for Multimodal Sentiment Analysis and Depression Estimation.

[10] Sihua Lyu, Xiaopeng Ren, Yihua Du and Nan Zhao (2023), Detecting depression of microblog users via text analysis.