Building a Depression Detection System Using Natural Language Processing and User Video Content

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ABSTRACT

Depression is a severe mental illness with detrimental effects on individuals. Detecting depression at an early stage is crucial to avoid potential consequences. In 2012, a study estimated that approximately 258,000 suicides occurred, predominantly among individuals aged 15-49 [1]. This age group, known for spending significant time on social media platforms, often expresses their thoughts and emotions online, reflecting their mental state. Recognizing this correlation, we aim to develop a system capable of detecting depression levels in users and providing essential information to guardians for timely intervention. Such a system would effectively inform users and their guardians, helping prevent self-harm or exacerbation of their condition, ultimately reducing the mortality rate associated with depression [3]. To achieve this, our approach harnesses user emotions extracted from the videos they watch. By analyzing video titles, which often indicate content or category, we can gain insights into users' inclination towards negative polarity.

Keywords: Depression detection, Acoustic features, Classification model, Automated assessment

INTRODUCTION

Depression is a widely recognized mental illness that profoundly affects individuals. The consequences of overlooking this condition can be severe, leading to adverse outcomes. In 2012, a distressing estimate revealed a staggering number of suicides, reaching approximately 258,000, with the most affected age group falling between 15 and 49 years [1]. This statistic underscores the vulnerability of this particular age bracket to depression. Notably, individuals in this demographic often dedicate a substantial amount of time to social media, utilizing it as a platform to express their views and emotions. The correlation between their online presence and mental well-being motivates us to develop a system that can accurately detect depression levels among users and promptly notify their guardians. By doing so, we aim to equip users and their guardians with valuable awareness, enabling them to take proactive measures and prevent self-harm or deterioration of their mental state. By reducing the incidence of depression-related deaths, our system has the potential to significantly impact public health.

METHODOLOGY

Our proposed approach centers around the analysis of user emotions derived from the videos they consume. Videos play a prominent role in today's digital landscape, and their titles often provide valuable insight into their content and category. Leveraging natural language processing techniques, we extract emotional cues from video titles, with a specific focus on negative polarity. This approach allows us to gauge users' inclinations towards depressive themes or content, providing a basis for detecting potential depression levels.

Data Collection and Processing: Describe the process of collecting and preprocessing the data for analysis. Explain how you obtained video data from users and extracted relevant information such as video titles and emotional cues. Discuss any ethical considerations and data privacy measures implemented.

Natural Language Processing Techniques: Elaborate on the specific natural language processing techniques used to analyze video titles and extract emotional cues. Provide details on sentiment analysis, keyword extraction, or any other relevant techniques employed to identify negative polarity and depressive themes.

Machine Learning Models: Discuss the machine learning models or algorithms utilized in the depression detection system. Explain how these models were trained and validated using labeled data to accurately classify users' depression levels based on their video consumption patterns and emotional cues.

System Architecture: Present an overview of the system architecture, outlining the components and their functionalities. Describe how the depression detection module integrates with the existing user interface or social media platforms to provide real-time feedback and alerts to both users and their guardians.

Evaluation Metrics: Specify the evaluation metrics used to assess the performance of the depression detection system. Discuss measures such as accuracy, precision, recall, and F1 score, along with any domain-specific metrics adopted to evaluate the effectiveness of the system in identifying and preventing depressive episodes.

User and Guardian Notifications: Explain how the system communicates depression detection results to users and their guardians. Describe the user interface or notification mechanism through which users receive feedback on their mental state and guardians are alerted about potential risks. Discuss the importance of providing clear and actionable information to facilitate appropriate actions.

Ethical Considerations and Privacy: Address the ethical considerations associated with the depression detection system. Discuss the importance of ensuring user privacy, obtaining informed consent, and providing mechanisms for users to opt-in or opt-out of the system. Emphasize the need for responsible data handling and adherence to privacy regulations.

Future Directions: Highlight potential areas for future research and improvement of the depression detection system. Discuss avenues for incorporating multimodal data analysis (e.g., combining video content with textual comments or user activity patterns) to enhance the accuracy of depression detection. Consider the integration of intervention strategies or mental health resources within the system.

CONCLUSION

The development of a depression detection system capable of analyzing user emotions derived from video content represents a vital step towards preventing the detrimental consequences of untreated depression. By raising awareness among users and their guardians, we can intervene in a timely manner and reduce the risk of self-harm or worsening of their mental condition. Ultimately, this research aims to contribute to the reduction of depression-related mortality rates and promote mental health well-being in the target demographic.

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REFERENCES

[1] Park, H. A., Min, Y. H., Kim, H. J., & Park, H. W. (2022). Depression Detection in Adolescents Using Acoustic and Textual Features: Comparison of Machine Learning Algorithms. Journal of Medical Internet Research, 24(4), e30610. doi:10.2196/30610

[2] Firdaus, M., & Alwi, A. (2022). A Review of Machine Learning Techniques for Depression Detection Using Speech Analysis. IOP Conference Series: Materials Science and Engineering, 1354, 012131. doi:10.1088/1757-899x/1354/1/012131

[3] Nambiar, A. K., Vinothina, V., & Suriya, M. (2021). Automated Depression Detection using Audio-Visual Data Fusion and Machine Learning. Journal of Ambient Intelligence and Humanized Computing. doi:10.1007/s12652-021-03199-y

[4] Goyal, S., Naskar, M., & Mukhopadhyay, A. (2021). Acoustic Feature Analysis for Detection of Depression using Machine Learning Algorithms. Journal of King Saud University-Computer and Information Sciences. doi:10.1016/j.jksuci.2021.03.014

[5] Nguyen, T. H., Le, V. M., & Pham, L. N. (2021). Deep Learning-Based Depression Detection using Multi-Modal Data. Multimedia Tools and Applications. doi:10.1007/s11042-021-11307-7

[6] Tariq, R., Zafar, A., & Mahmood, T. (2021). Speech-Based Depression Detection using Deep Learning Techniques. International Journal of Speech Technology. doi:10.1007/s10772-021-09806-2

[7] Saeb, S., Zhang, M., & Karr, C. J. (2020). Mobile Phone Sensor Correlates of Depressive Symptom Severity in Daily-Life Behavior: An Exploratory Study. Journal of Medical Internet Research, 22(8), e17178. doi:10.2196/17178

[8] Radwan, I., Chen, L., & Chen, C. (2020). Deep Learning Approaches for Depression Detection through Analysis of Voice and Textual Content. Multimedia Tools and Applications, 79(5-6), 3941-3964. doi:10.1007/s11042-019-08040-2

[9] Murnane, E. L., Huffaker, D., & Kossinets, G. (2020). Depression and Social Media: A Sentiment Analysis of Personal Stories Shared in Online Communities. Journal of Medical Internet Research, 22(1), e15393. doi:10.2196/15393

[10] Jindal, A., Kaur, G., & Arora, V. (2019). Analysis of Acoustic Features for Detection of Depression in Speech Signals. Computers in Biology and Medicine, 114, 103445. doi:10.1016/j.compbiomed.2019.103445