



Depression Intensity Detection via Social Media using Deep Learning

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Abstract

Depression has become a big problem in our society today. It is also a major reason for suicide, especially among teenagers. In the current outbreak of coronavirus disease (COVID-19), the affected countries have recommended social distancing and lockdown measures. Resulting in interpersonal isolation, these measures have raised serious concerns for mental health and depression. Generally, clinical psychologists diagnose depressed people via face-to-face interviews following the clinical depression criteria. However, often patients tend to not consult doctors in their early stages of depression. Nowadays, people are increasingly using social media to express their moods. In this article, we aim to predict depressed users as well as estimate their depression intensity via leveraging social media (Facebook) data, in order to aid in raising an alarm. We model this problem as a supervised learning task. We start with weakly labelling the Facebook data in a self-supervised manner. Using these features, we train a small long short-term memory (LSTM) network using Swish as an activation function, to predict the depression intensities. We outperform the baseline models for depression intensity estimation by achieving the lowest mean squared error of 1.42 and also outperform the existing state-of-the-art binary classification method by more than 2% of accuracy. We found that the depressed users frequently use negative words such as stress and sad, mostly post during late nights, highly use personal pronouns and sometimes also share personal events.

Keywords

Deep Learning, Depression Intensity Estimation, Emotional patterns, Mental Health, Social Media Mining, Naïve Bayes, Natural Language Processing, LSTM.

Introduction

DEPRESSION is one of the most overlooked causes of suffering and death globally, especially among young adults. It is important to understand and realize the far-reaching negative impacts of this silent killer [1]. According to WHO [2], more than 264 million people are affected worldwide and it is increasing day by day. Depression is totally different from the usual mood fluctuations and ephemeral emotional responses that we face in our everyday life [3].

It may become a serious health issue when it lasts more than two weeks with moderate or severe intensity. It can affect a person's mind as well as physical health. As a result, a depressed person functions poorly at the workplace and misbehaves with family and close ones. It can even lead to suicide if a depressed person is not receiving proper treatment. Each year approximately 800000 people die due to suicide. It is the second leading cause of death among teenagers. The situation is worst in countries like India, China, and the USA, as compared to the global scenario. India is said to be the most depressed country in the world. According to WHO [4], India, China, and the USA are the worst victims of anxiety, schizophrenia, and bipolar disorder.

Nowadays, people extensively use social media platforms like Facebook, Twitter, Weibo, and WhatsApp. These social media sites have become a platform for users to express their views, ongoing moods, and emotions and share with their family, friends, and other related people. The behaviors of posting and sharing content on social media reflect the users' daily lives and their mental state.

Our proposed project model monitors the social media posts of the user and detects whether the user is stressed, depressed or normal. NLP is used to clean the data by removing stop words, tokenization and stemming. The classification algorithms like Naïve Bayes is used to compute accuracy.

Motivation

The Mental sickness is considered to be a major factor of change mood of a user and user goes into a depression or stress.

➤ Now days user can be mentally disturb due to social interactions of social networks.

➤ The rapid increase of mental sickness has become great challenge to human health and life quality.

➤ Thus there is significant importance to detect mental sickness before it turns into sever problems.



Objectives

➤ To detect user's mental sickness i.e. stress and depression by using user's post on social networks.

➤ To improve accuracy using deep learning algorithms.

➤ To provide the precautions / health tips to the stressed and depressed users before they take any drastic step.

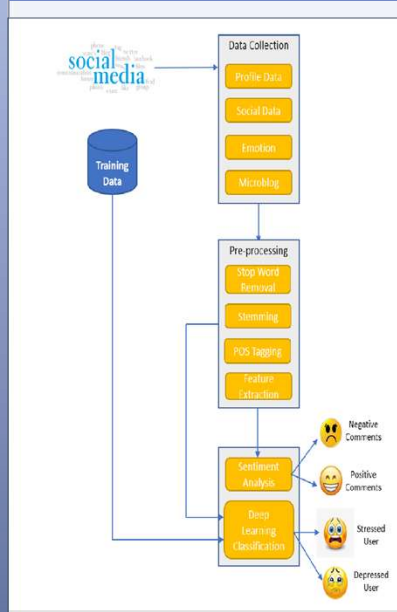
How to Cope With Anger When You're Depressed



Problem Statements

We are creating a project for the detection of Depression Intensity by the use of social media. In that, we have taken datasets from the activities of people on the social media applications like Facebook, Twitter. From the activities of people by using Deep learning we will analyze the current state of peoples and its actual state of mind which will be emotional and mental states. So our project is very useful for saving the people which will be affected by Depression.

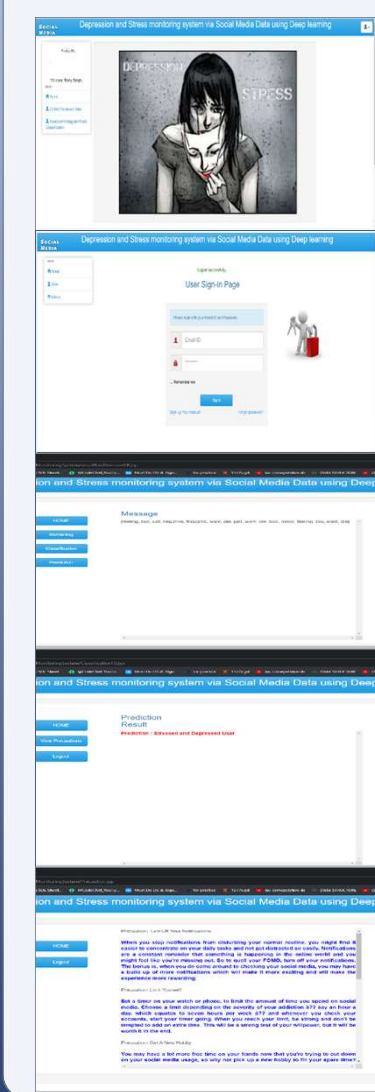
Architecture



System Architecture is a conceptual model that defines the structural, behavioral and more views of the system. System architecture is a formal description and representation of the system. In our system architecture, we collect the user's social media data. After collecting the data we extract the keywords like sad, happy or depressed keywords. We process that data applying the functions like stop word removal, stemming, POS tagging and feature extraction. After that applying deep learning classification and using naïve bayes algorithm we detect the stress and depressed user's.



Result



Conclusion

In this proposed system, automatically identifying potential online users with depression and stress is threatening people's health. Thus users suffering from depression can be identified and they might be helped before they take any drastic steps which might have a long lasting impact. Using the data of the social networks of the real world as a basis, we study the correlation between the states of psychological disorder of users and their social interaction behaviour we recommend the user for health precautions to send by mail for user interaction

References

- Renata L. Rosa, Gisele M. Schwartz, Wilson V. Ruggiero, and Demostenes Z. Rodriguez, Senior Member, IEEE "A Knowledge-Based Recommendation System that includes Sentiment Analysis and Deep Learning" IEEE 2019.
- Guang Yang, Haibo He, Fellow, IEEE, and Qian Chen "Emotion-Semantic Enhanced Neural Network" IEEE 2019.
- M. Al-Qurishi, M. S. Hossain, M. Alrubailan, S. M. M. Rahman, and A. Alamri, "Leveraging analysis of user behavior to identify malicious activities in large-scale social networks," IEEE Transactions on Industrial Informatics, vol. 14, no. 2, pp. 799-813, Feb 2018.
- H. Lin, J. Jia, J. Qiu, Y. Zhang, G. Shen, L. Xie, J. Tang, L. Feng, and T. S. Chua, "Detecting stress based on social interactions in social networks," IEEE Transactions on Knowledge and Data Engineering, vol. 29, no. 9, pp. 1820-1833, Sept 2017.
- M. Khodayar, O. Kaynak, and M. E. Khodayar, "Rough deep neural architecture for short-term wind speed forecasting," IEEE Transactions on Industrial Informatics, vol. 13, no. 6, pp. 2770-2779, Dec 2017.
- N. Majumder, S. Poria, A. Gelbukh, and E. Cambria, "Deep learning based document modeling for personality detection from text," IEEE Intelligent Systems, vol. 32, no. 2, pp. 74-79, Mar 2017.
- R. G. Guimaraes, R. L. Rosa, D. D. Gaetano, D. Z. Rodriguez, and G. Bressan, "Age groups classification in social network using deep learning," IEEE Access, vol. 5, pp. 10 805-10 816, 2017.
- Budhaditya Saha, Thin Nguyen, Dinh Phung, Svetha Venkatesh "A Framework for Classifying Online Mental Health Related Communities with an Interest in Depression" IEEE 2016.
- Chun-Hao Chang, Elvis Saravia, Yi-Shin Chen "Subconscious Crowdsourcing: A Feasible Data Collection Mechanism for Mental Disorder Detection on Social Media" 2016 IEEE/ACM
- I.-R. Glavan, A. Mirica, and B. Firtescu, "The use of social media for communication," Official Statistics at European Level, Romanian Statistical Review, vol. 4, pp. 37-48, Dec. 2016.
- Andrey Bogomolov, Bruno Lepri, Michela Ferron, Fabio Pianesi, Alex (Sandy) Pentland, "Daily Stress Recognition from Mobile Phone Data, Weather Conditions and Individual Traits" IEEE Conference 2015.