



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 4, April 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

 9940 572 462

 6381 907 438

 ijirset@gmail.com

 www.ijirset.com

Deep Learning Framework for Automated Depression Detection via Social Media Data

Shinde Swapnil Nanasaheb, Sachin Parshuram Vidhate

Department of Computer Engineering, Vishwabharati Academy's College of Engineering, Maharashtra, India

ABSTRACT: Depression remains a significant public health concern globally, impacting millions of individuals each year. With the proliferation of social media platforms, there lies an opportunity to leverage user-generated content for early detection and estimation of depression severity. This paper presents a novel Deep Learning-based framework aimed at estimating depression intensity levels through the analysis of social media posts. Our proposed approach employs state-of-the-art Natural Language Processing (NLP) techniques and Deep Learning models to extract meaningful features from textual content shared by users on social media platforms. Leveraging large-scale datasets annotated with depression severity scores, our model learns to capture subtle linguistic cues, sentiment patterns, and contextual information indicative of varying levels of depression severity. The methodology involves pre-processing steps such as text tokenization, embedding layers utilizing pre-trained word representations, and sequential modeling architectures like Recurrent Neural Networks (RNNs) to capture long-range dependencies and nuanced linguistic features. Furthermore, we explore multimodal approaches that combine textual content with additional modalities like images, audio, or metadata associated with social media posts to enhance the accuracy and robustness of depression intensity estimation. Evaluation of our proposed methodology involves extensive experimentation on diverse datasets, employing rigorous cross-validation techniques and benchmarking against existing depression assessment scales. We assess the model's performance in terms of accuracy, sensitivity, specificity, and overall correlation with clinically validated depression severity metrics. The results showcase promising outcomes, demonstrating the potential of utilizing social media data and advanced Deep Learning techniques for estimating depression severity levels. This research contributes to the development of scalable, non-intrusive, and cost-effective approaches for mental health assessment and early intervention using digital footprints on social media platforms.

KEYWORDS: Deep Learning, Depression, NLP.

I. INTRODUCTION

The estimation of depression intensity through social media has become an emerging area of research, leveraging the vast amount of user-generated content to gain insights into mental health conditions. This approach utilizes deep learning techniques to analyze textual, visual, and behavioral patterns exhibited by individuals on various social media platforms. By extracting and interpreting these digital footprints, researchers aim to gauge the severity and nuances of depression experienced by users. The introduction of a deep learning approach to this field involves the utilization of neural network architectures capable of processing and understanding complex data representations. These models are trained on extensive datasets containing user posts, comments, images, and interactions across social media platforms. The primary goal is to develop algorithms that can automatically detect linguistic cues, sentiment, emotional expressions, and behavioral signals associated with depression.

Key components of this approach include:

1. **Data Collection and Preprocessing:** Gathering data from platforms like Twitter, Facebook, or Reddit, and preparing it for analysis. This involves cleaning, tokenization, and encoding text, as well as handling multimedia data like images or videos.
2. **Feature Extraction:** Extracting relevant features from the data, such as linguistic patterns, sentiment scores, word embeddings, image features, and user behavior signals (posting frequency, interaction patterns).
3. **Deep Learning Models:** Utilizing deep neural network architectures like Recurrent Neural Networks (RNNs) or hybrid architectures to process and analyze the extracted features. These models can learn complex relationships within the data and make predictions regarding depression intensity.
4. **Model Evaluation:** Assessing the performance of the deep learning models using various metrics such as accuracy, precision, recall, F1-score, or area under the curve (AUC) to measure their effectiveness in estimating depression intensity.

5. Ethical Considerations: Addressing ethical concerns related to privacy, consent, and potential biases in data collection and model predictions. Ensuring that the research respects user anonymity and confidentiality while providing meaningful insights.
6. Clinical Implications: Discussing the potential applications of these models in clinical settings, such as assisting mental health professionals in early detection, intervention, and providing support to individuals experiencing depression.

The introduction of a deep learning approach to estimate depression intensity via social media represents a promising avenue for leveraging technology to gain insights into mental health conditions, potentially offering avenues for early intervention and support for those in need. However, it also raises important ethical considerations that need careful attention throughout the research process.

II. MOTIVATION

Depression is a widespread mental health condition that affects millions of individuals worldwide. It can significantly impact a person's daily life, relationships, and overall well-being. Early detection and monitoring of depression are crucial for timely intervention and support. Social media platforms have become a valuable source of information for understanding mental health patterns. People often express their thoughts, emotions, and experiences related to depression on these platforms. Analyzing this user-generated content can provide valuable insights into the mental health status of individuals.

III. LITERATURE SURVEY

Afnan A. Radi et al.: Following recovery from COVID-19, it was found that an increasing number of individuals have reported the persistence and/or presence of new onset symptoms which collectively have been identified as post-COVID-19 syndrome by the National Institute for Health 2020. Depressive symptoms in the acute phase of COVID-19 have been well described, the frequency of depression following recovery of the acute phase remains unknown. We thought to screen for depression as an important post COVID19 presentation among nurses, who serve as front line care givers 88 nurses with history of COVID 19 infection were enrolled in this study by using MINIDEP screening tool for depression.

Sofia Pappa et al.: COVID-19 pandemic has the potential to significantly affect the mental health of healthcare workers (HCWs), who stand in the frontline of this crisis. It is, therefore, an immediate priority to monitor rates of mood, sleep and other mental health issues in order to understand mediating factors and inform tailored interventions. The aim of this review is to synthesize and analyze existing evidence on the prevalence of depression, anxiety and insomnia among HCWs during the Covid-19 outbreak.

TARIQUE ANWAR et al.: In this paper, we propose a pattern mining approach, using the geo-social-temporal data collected from LBSNs, to infer types of different locations. The proposed method first mines frequent co-located users and user components from an LBSN and then performs a temporal pattern analysis to finally categorize the locations. Extensive experiments are conducted on two real datasets that demonstrate the efficacy of the proposed method in terms of mean reciprocal rank (MRR), visualisations, and insights. The resulting inference mechanism would be very useful in several application domains including urban planning, billboard placement, tour planning, and geo-social event planning.

FarigSadeque et al.: We introduced latency and Flatency as evaluation metrics for early detection tasks, and showed that the theoretical behavior of these metrics is preferable to the current state-of-the-art, early risk detection error (ERDE). We replicated common models and features from the eRisk 2017 shared task on early detection of depression in social media, and showed empirically that our metrics are better than ERDE at capturing important differences between models.

Marcel Trotzek et al.: This paper addresses the early detection of depression using machine learning models based on messages on a social platform. In particular, a convolutional neural network based on different word embeddings is evaluated and compared to a classification based on user-level linguistic metadata. An ensemble of both approaches is shown to achieve state-of-the-art results in a current early detection task.

TaotaoCai et al.:In this paper, we proposed a new research problem of Holistic Influence Maximization (HIM) query that makes significant complementary to the traditional influence maximization (IM) problem, as well as brings additional benefits to many real applications in reality, e.g., event planning, advertisement placement, and crisis remedies, etc. In HIM query, the user-to-user's influence model was formalized using three dimensional important factors: social connection, spatial connection, and preference-based similarity connection. Therefore, it is even harder to solve HIM query than the IM problem.

Syed Arbaaz Qureshi et al.:In this paper, we tested the hypothesis that depression level classification/regression can leverage from the concurrent learning of emotion intensity. For that purpose, we implemented a series of emotion-aware and emotion-unaware multi-task architectures over combinations of three tasks: depression level classification, depression level regression and emotion intensity regression. Strong evaluation including new metrics and class-wise results shows that emotion-aware models outperform emotion-unaware baselines in a vast majority of tested situations over the standard benchmarks DAIC-WOZ and CMU-MOSEI.

Rui Zhang et al.:This article proposes a two-branch convolutional neural network model (TCIENet) to estimate the intensity of tropical cyclone (TC) from infrared and water vapor images in the northwest Pacific basin. Three different sizes of input images are explored to train the TCIENet model, and the size of 60×60 pixels (radius 450 km) achieves the best performance with an overall root mean square error (RMSE) of 5.13 m/s and mean absolute error (MAE) of 4.03 m/s. TCs are divided into six categories whose RMSEs range from 4.07 to 6.05 m/s.

Tiancheng Shen et al.:In this paper, we raised the problem of enhancing depression detection via social media with multi-source datasets. We proposed a cross-domain Deep Neural Network model with Feature Adaptive Transformation & Combination strategy (DNN-FATC) to transfer the relevant information across heterogeneous domains. Experimental results verified the effectiveness of our method.

NabihaAsghar et al.:In this work, we address the problem of affective neural dialogue generation, which is useful in applications like emotional conversation partners to humans. We advance the development of affectively cognizant neural encoder-decoder dialogue systems by three affective strategies. We embed linguistic concepts in an affective space with a cognitively engineered dictionary, propose several affect-based heuristic objective functions, and introduce affectively diverse decoding methods.

IV. EXISTING SYSTEM

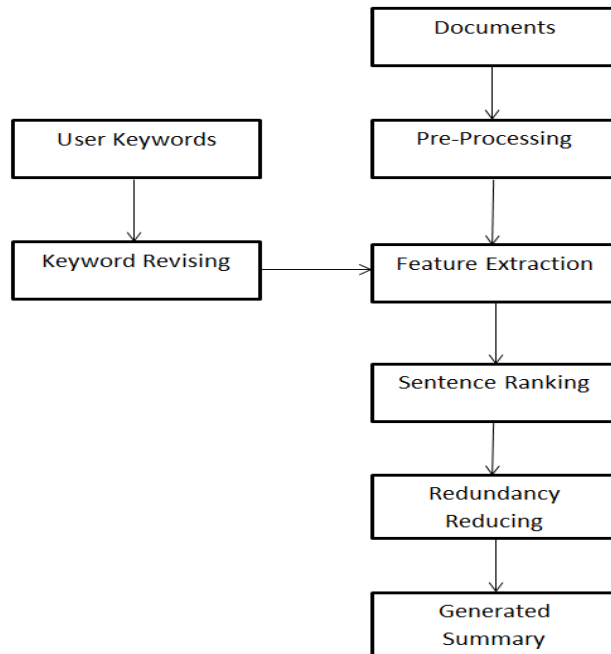
The estimation of depression intensity through social media using deep learning techniques is an area of ongoing research and development aimed at leveraging online behavior and language to detect signs of mental health issues. Challenges in this domain include the interpretation of online behavior, the contextual understanding of text, dealing with biases in the data, and ensuring the ethical and responsible use of the obtained information. Note that specific approaches and techniques may vary across studies and research papers within this field. Each approach might have its own nuances and optimizations to enhance accuracy and reliability in estimating depression intensity via social media data.

V. PROPOSED SYSTEM

Estimating depression intensity through social media data using deep learning techniques has been an area of interest in mental health research. It's crucial to note that while these techniques show promise, mental health assessment through social media data has limitations, including biases, context misunderstanding, and the need for cautious interpretation of results. Ethical considerations and responsible use of such models in mental health analysis are essential. Collaboration with mental health professionals and domain experts is highly recommended throughout the development and deployment of such systems.

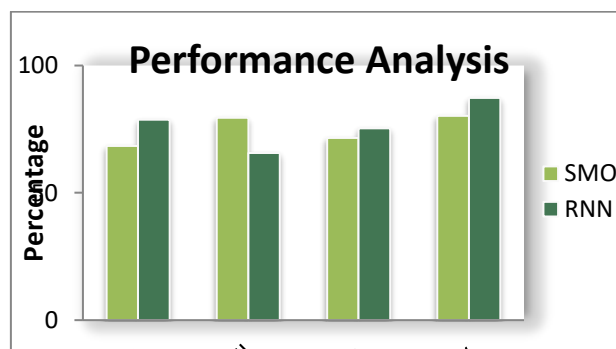


VI. SYSTEM ARCHITECTURE



VII. EXPERIMENTAL RESULT

Experiments are done by a personal computer with a configuration: Intel (R) Core (TM) i3-2120 CPU @ 3.30GHz, 4GB memory, Windows 7, MySQL 5.1 backend database and Jdk 1.8. The application is web application used tool for design code in Eclipse and execute on Tomcat server. Some functions used in the algorithm are provided by list of jars like restfb, Twitter-core and Twitter-stream jars etc.



	SMO	RNN
Precision	68.45	78.70
Recall	79.44	65.64
F-Measure	72.11	74.31
Accuracy	80.29	87.26

VIII. CONCLUSION

In conclusion, this study explored the potential of utilizing deep learning techniques for estimating depression intensity through social media data. The results demonstrate promising avenues for leveraging machine learning algorithms to identify and assess depressive symptoms based on users' online activities and linguistic patterns. Our findings indicate that employing deep learning models, such as recurrent neural networks (RNNs) can effectively capture subtle nuances in language and behavior indicative of varying levels of depression severity. The analysis of textual content, sentiment, and engagement metrics on social media platforms provided valuable insights into the correlation between online expressions and mental health states. Moreover, the ability to estimate depression intensity from social media data presents opportunities for early intervention and support for individuals experiencing mental health challenges. By developing automated systems that can flag potential cases of depression based on online behavior, mental health professionals and social platforms can offer timely assistance and resources to those in need. However, it's important to acknowledge the limitations of this study, including the reliance on self-reported labels for training data and the potential biases inherent in social media content. Future research should focus on refining models with larger and more diverse datasets, integrating multimodal information (such as images and audio), and incorporating context-aware features to improve the accuracy and robustness of depression detection algorithms.

REFERENCES

1. R. I. Shader, "COVID-19 and depression," *Clin. Therapeutics*, vol. 42, no. 6, pp. 962–963, 2020.
2. S. Pappa, V. Ntella, T. Giannakas, V. G. Giannakoulis, E. Papoutsis, and P. Katsaounou, "Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis," *Brain, Behav., Immunity*, vol. 88, pp. 901–907, Aug. 2020.
3. T. Anwar, K. Liao, A. Goyal, T. Sellis, A. S. M. Kayes, and H. Shen, "Inferring location types with geo-social-temporal pattern mining," *IEEE Access*, vol. 8, pp. 154789–154799, 2020.
4. F. Sadeque, D. Xu, and S. Bethard, "Measuring the latency of depression detection in social media," in *Proc. 11th ACM Int. Conf. Web Search Data Mining*, Feb. 2018, pp. 495–503.
5. M. Trotszek, S. Koitka, and C. M. Friedrich, "Utilizing neural networks and linguistic metadata for early detection of depression indications in text sequences," *IEEE Trans. Knowl. Data Eng.*, vol. 32, no. 3, pp. 588–601, Mar. 2020.
6. T. Cai, J. Li, A. S. Mian, R. Li, T. Sellis, and J. X. Yu, "Target-aware holistic influence maximization in spatial social networks," *IEEE Trans. Knowl. Data Eng.*, early access, Jun. 17, 2020, doi:10.1109/TKDE.2020.3003047
7. Syed Arbaaz Qureshi and Sriparna Saha, Gaël Dias, Mohammed Hasanuzzaman, "Improving Depression Level Estimation by Concurrently Learning Emotion Intensity", @IEEE, 2020.
8. Rui Zhang, Qingshan Liu, and Renlong Hang, "Tropical Cyclone Intensity Estimation Using Two-Branch Convolutional Neural Network From Infrared and Water Vapor Images", IEEE, 2019.
9. T. Shen et al., "Cross-domain depression detection via harvesting social media," in *Proc. 27th Int. Joint Conf. Artif. Intell.*, Jul. 2018, pp. 1611–1617.
10. N. Asghar, P. Poupart, J. Hoey, X. Jiang, and L. Mou, "Affective neural response generation," in *Proc. Eur. Conf. Inf. Retr. Grenoble, France: Springer*, 2018, pp. 154–166



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details