Soul Surveyor- Depression Detection System Using Business Intelligence

[1]Dhanashri Patil, [2]Siddhesh Panchal, [3]Abhidnya Patil, [4]Bhavika Thakur

[1]Student, [2]Student, [3]student, [4]Professor

Department of Computer Engineering, Mumbai

University, Mumbai, India

Abstract: This project focuses on leveraging business intelligence methods to conduct sentiment analysis on mental health-related data, aiming to provide valuable insights into individuals' emotional well-being. By analyzing text-based interactions from various sources like social media, forums, and chat logs, sentiment analysis models categorize text into positive, negative, or neutral sentiments. Emotion detection algorithms further identify specific emotions such as sadness, happiness, or anxiety. Business intelligence tools and dashboards are utilized to visualize and present sentiment analysis results, enabling stakeholders like mental health professionals, policymakers, and researchers to monitor online sentiments in real-time. Predictive models are also developed to forecast mental health trends using sentiment analysis data, facilitating early intervention and resource allocation. By applying business intelligence techniques to analyze mental health data, this project aims to enhance understanding of mental health trends, support timely interventions, and promote overall well-being. The insights generated can aid individuals, healthcare providers, and policymakers in making informed decisions and delivering targeted support for mental health challenges.

Index Terms - Business Intelligence, Depression Detection.

I. INTRODUCTION

In recent years, the importance of mental health in overall well-being has garnered increasing recognition. With the advent of the digital age, individuals often share their thoughts, feelings, and experiences online, offering a rich source of data for understanding and supporting mental health. The "Soul Surveyor- Depression Detection System using Business Intelligence" project aims to harness advanced analytics and Business Intelligence (BI) tools to gain insights into individuals' emotional well-being through the analysis of text-based mental health-related data. Globally, millions of people face mental health challenges, yet the stigma surrounding these issues often leads individuals to express themselves anonymously or through digital platforms. This presents a unique opportunity to employ sentiment analysis, evaluate sentiments, emotions, and trends in online conversations about mental health. This entails analyzing text data from various sources like social media posts, forums, chat logs, and mental health support platforms to classify sentiments as positive, negative, or neutral, thereby providing insights into individuals' emotional states.

Moreover, the project extends sentiment analysis to include Emotion Detection, enabling the identification of specific emotions such as sadness, happiness, anxiety, or stress expressed in the text. This deeper understanding of underlying emotions offers a more nuanced perspective on mental health-related discussions. The integration of Business Intelligence tools and dashboards facilitates the visualization of sentiment analysis results. These interactive dashboards support evidence-based decision-making by allowing researchers, policymakers, and mental health practitioners to examine data trends, patterns, and correlations. The "Soul Surveyor- Depression Detection System using Business Intelligence" project underscores the potential of data

analytics and BI to enhance mental health awareness, support, and services. By exploring how individuals communicate their sentiments and emotions in digital chats, this research aims to foster a more empathetic and informed approach to addressing mental health concerns within society.

II. REVIEW OF LITERATURE STUDY

Developing system to detect issues related to health such as depression and anxiety analyzing social media. Using semantic and syntactic meaning from the text, utilizing the command on distillation technique in conjunction with BERT to implement a framework for efficient identification of depression and anxiety posts [1] Providing importance to mental health as it affects factors such as physical, psychological and communal. Therefore accessing data from smartphones and smart watch for sentimental analysis for prediction. Survey states a methodology and model applying Lambda Architecture to examine presence and mental state onto social sites [2]. Proposes the two elements first is twitter API and second is Natural Language understanding API tool to figure out emotional text and content on social sites. The main motive is to find the negative emotional content to and to provide them reliable content and satisfaction on social sites [3]. Using smart mirror AI device and Sentiment Analysis and Korean Text analysis consist of deep learning for increasing weightage mental health in today's world. These tools will inspect the GRU, LSTM, CNN, Bi-LSTM and Bi-GRU which will give response as actions to Deep Q Network [4]. Multiple dimensions were recognized from the study of 110,000 Weibo texts. It mainly aimed to COVID-19 noting down work life stress as concern. Solution is considered using epidemic prevention policies in sentiment intensity and local concerns for updation [5]. Twitter plays a huge role as a social site examining health impacts of COVID-19, using Logistic regression for classifying the tweets and to get an accuracy of 94.71% [6]. The research talks about an impact of depression onto whole world, using Twitter for study of Arabic tweets. Primary aim is to back the analysis of tweets in Arabic language to note signs of depression, using Machine Learning, Natural Language methods as Support Vector Machine, Random Forest, etc. and Random Forest classifiers for an accuracy of 82.39% [7]. The study about the feelings spread and expressed over Twitter on vaccination work during COVID-19. Combined techniques were used together in Sentiment Analysis deep learning and Lexicon based techniques. Recurrent Neural Network achieves high accuracy scores 92.48% and 93.03% thus classifying vaccination tweets helping healthcare practitioners and policymakers [8]. Filipinos taken Sentiment on Twitter site subjecting Delivery of COVID-19 vaccines under the Philippine government. Applying Natural Language processing and Naïve Bayes model, achieving accuracy 81.77% breaking previous analysis record and had positive impact on Government's effort [9]. Recognizing negative emotions using sentiment analysis by flourishing media content. With intelligent profile management recruiting a model specially to acknowledge user behavioral patterns [10]. Businesses utilizing Sentiment mining following machine learning, deep learning and natural language processing techniques. Showcasing high performance and transformer models transforming landscape of natural language processing, pre-trained models can boost the static and dynamic data point which is taken in investigation [11]. Results for exploring mental health is complex task to tackle this situation researcher's implemented Word-Frequency method for analysis and forming relations with mental health providing familiar relations with the SVD [12]. Framework at small level can be builded using sentiment analysis for computing and monitoring the depression but, as the system becomes high level it is finds trouble in updating the system [13]. AI algorithms can be utilized to discover the classification of users, studies can help to reach out the presence of depression into to the user's mental health using social networking sites and exploring techniques like Support Vector Machines and Naïve Bayes [14]. Metal disorder is a challenging disability and is one of global problems, mental illness can pointed out using social network sites. A tool Major Depression Disorder diagnosis will give us alerts [15].

III. METHODOLOGY

      Methodology for implementation of Soul surveyor depression detection system has done integration of frontend as well as backend process to create a required solution for automating the work of psychologist and to complete required objectives. Exploring Hamilton values and researched questionnaire for user to visualize the depression of the user in real time. Which can further provide the services like seminar and appointment for the depression problem.

Frontend Implementation:

1. **UI design**: Designed with smooth and seamless two way communication with the web application with the features such as live depression results, appointment records, seminar records and notifications onto admin site.

2. **Depression Information**: Here, all the detailed information regarding depression like their type of depression, their do's and don'ts and event schedule option will be provided to have better understanding to the user about themselves.

3. **Real-Time Display:** Displaying real time depression results of user completion and appointment completion as it will provide fast visual feedback to user.

Backend Implementation:

1. **System Initialization:** Initialization of the system starts with the evolution in backend procedure, setting up connections with the backend database to perform further actions.

2. **Depression Detection:** Develop an algorithm referring to the Hamilton values and using some of researched questions asked by Psychologist in order to provide the logic in backend procedure using JavaScript.

3. **Dashboard Integration:** Implement a dashboard for visualization to showcase the total data regarding to that topic. And to have deep understanding and analysis of that data at admin site.

4. **Event Scheduling:** For people having low or medium depression can attend event and book their seat in the provided option, database gets stored in MongoDB.

5. **Appointments for Psychiatrist:** For people having severe depression they need to book an appointment with Psychiatrist in the provided option and assign one Psychiatrist according to users time and slot. Database gets stored in MongoDB.

6. **Iterative Improvement:** Taking feedback and utilising into development of our system and continuous testing and enhancing to improve system's accuracy, productivity, efficiency and reliability.

By usage of frontend and backend both the units and using JavaScript, researched questions and referring Hamilton values, the Soul surveyor depression detection system will provide an helpful and productive interface for real time depression detection and also providing event scheduling and appointment for Psychiatrist. This system will automate the work of psychologist and can be used over large scale public sectors areas like school, colleges and over company to get an oversight about depression.
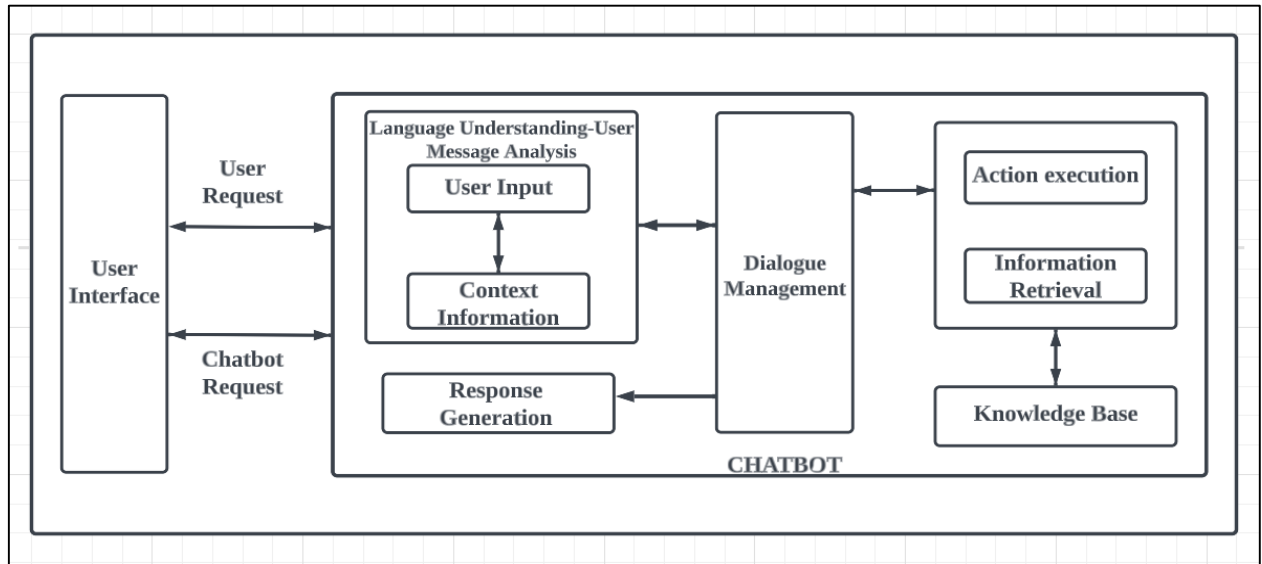
IV. DESIGN DETAILS:

Fig 4.1: Block Diagram

The above figure 4.1 represents the block diagram of the project. It contains different blocks which are present in our project and how the blocks are connected to each other.
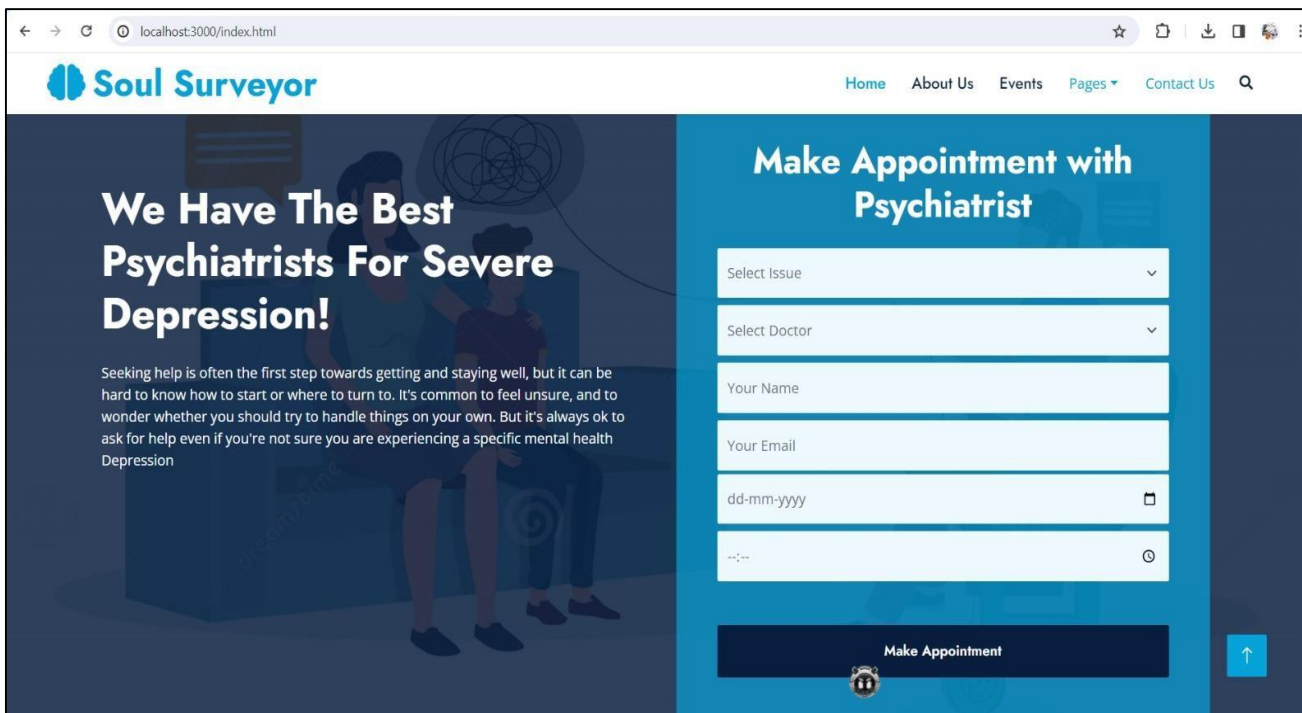
V. IMPLEMENTATION RESULTS:

Fig 5.1: Appointment Page

Figure 5.1 Appointment Page wherein the Severely Depressed people can book an appointment for consulting the counsellor or psychiatrist. Here the user has to enter his details in the form as shown in the figure and book the appointment.
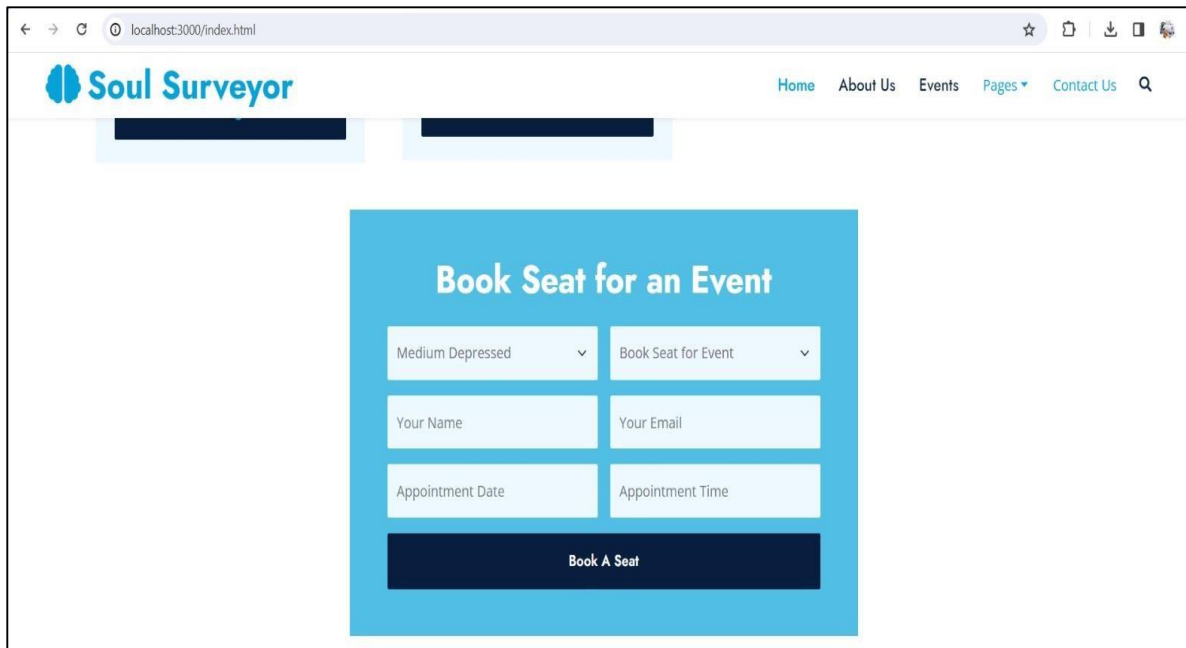
Fig 5.2: Book Event Page

Figure 5.2 Here the severely depressed and the moderately depressed people can book an event to attend some seminars, workshops, activities that mainly focus on improving mental health. Here the user has to enter their details in the form and book a seat for the event.
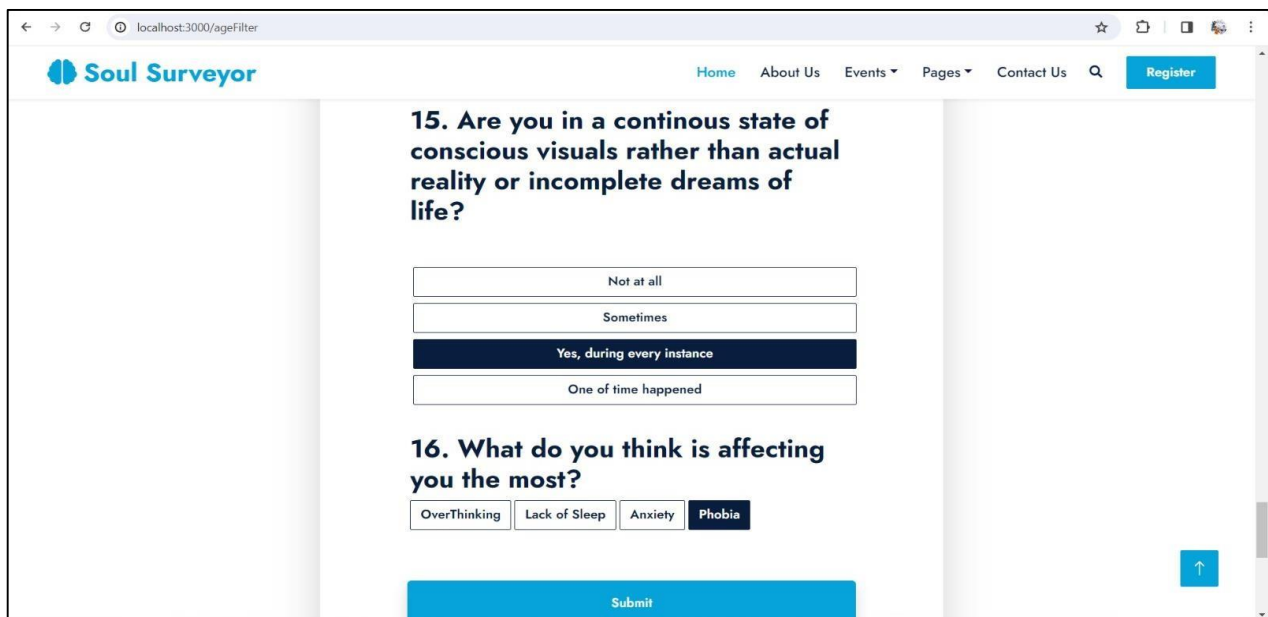

Fig 5.3 Questionaries

Figure 5.3 displays the motion detection mechanism, illustrating how the system identifies and tracks movements in real-time. The diagram highlights the algorithm's ability to detect dynamic changes within the monitored environment.
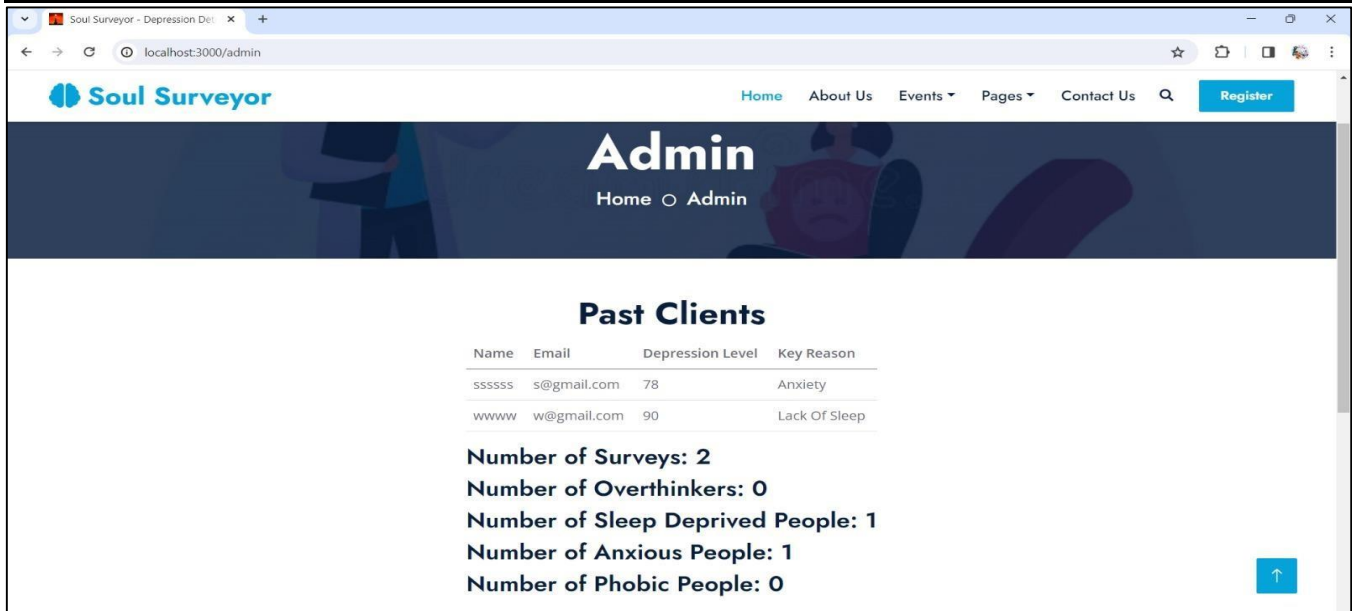
Fig 5.4: Past client history

Figure 5.4 It individually states the total number of Surveys taken, Number of Overthinkers, Number of Sleep Deprived People, Number of Anxious People, Number of Phobic People.
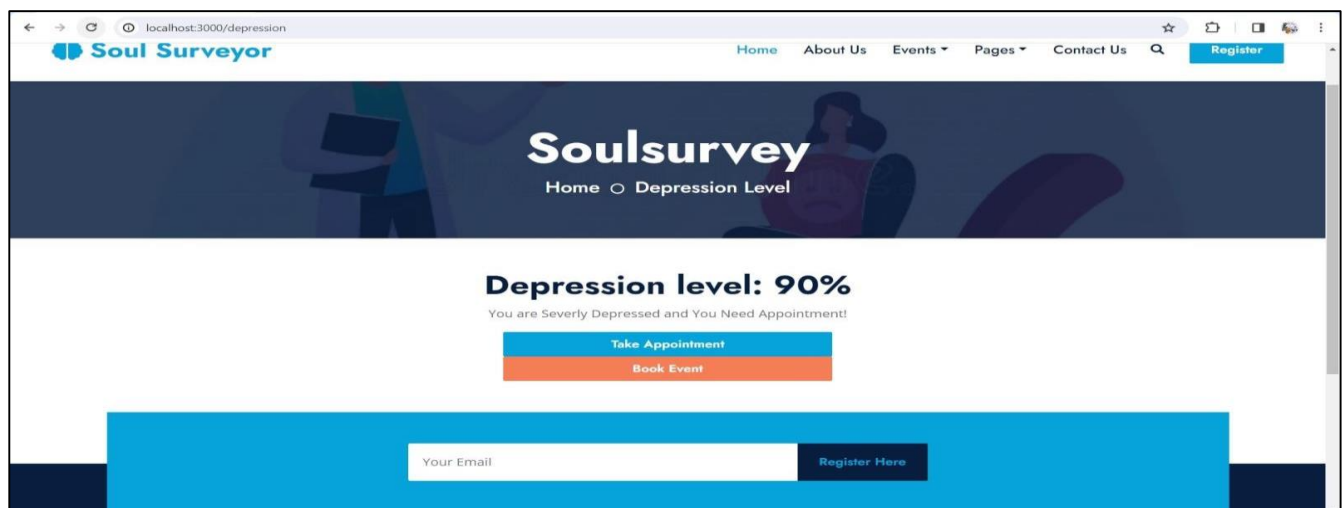

Fig 5.5: Depression level result

Figure 5.5 This page gives information about "Depression level" of that particular person in the scale of 1-100%. Also according to the defined percentage if the percentage score lies between 50-100% then we can say that the person is "Severely Depressed" and he/she needs an appointment.

VI. CONCLUSION:

The conclusion of this project underscores the significant potential of leveraging social media and business intelligence to address mental health challenges. In an era dominated by digital platforms, these tools have emerged as potent instruments for promoting mental health awareness, facilitating peer support networks, and disseminating crucial information. Through the application of business intelligence techniques, we have tapped into the vast reservoir of data available on these platforms to glean profound insights into mental health trends, public sentiment, and user engagement. This data-driven approach not only enhances our understanding of the ever-evolving landscape of mental health issues but also informs the development of more efficacious interventions and support systems. It is evident that, as societal stigma surrounding mental health continues to wane, these technologies offer a scalable, cost-effective, and accessible avenue for fostering a global dialogue on mental well-being. By harnessing the collaborative potential of social media and business intelligence, we can catalyze meaningful change, alleviate the burden of mental health challenges, and contribute to the cultivation of a healthier and more enlightened society.

REFERENCES

[1] K Zeberga, M Attique, B Shah, F Ali, Y Z Jembre, Tae-Sun Chung, "A Novel Text Mining Approach for Mental Health Prediction Using Bi-LSTM and BERT Model", Computational Intelligence and Neuroscience, Volume 2022, 2022.

[2] R. Dixit, G Chawla, I. Bajaj, "Mental Health Monitoring using Sentiment Analysis", International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 8(4), July-August-2022, 324-330.

[3] F. Benrouba, R. Boudour, "Emotional Sentiment Analysis of Social Media content for Mental Health Safety", Springer Nature 2021 LATEX template, October 2022.

[4] H. Yu, J. Bae, J. Choi, H. Kim, "LUX: Smart Mirror with Sentiment Analysis for Mental Comfort", MDPI Sensors 2021, 21(9), 3092.

[5] S. Yang, "Sentiment Analysis of COVID-19 on Weibo text using optimized Bi-LSTM model", Springer Nature 2021 LATEX template, February 2023.

[6] I., F. H. Rachman, "Twitter Sentiment Analysis of Covid-19 Using Term Weighting TF-IDF And Logistic Regression", Information Technology International Seminar (ITIS), Surabaya, Indonesia, October 14-16, 2020.

[7] D.A. Musleh, T. A. Alkhales, R. A. Almakki, S. E. Alnajim, S. K. Almarshad, R. S. Alhasaniah, Sumayh S. Aljameel and A. A. Almuqhim, "Twitter Arabic Sentiment Analysis to Detect Depression Using Machine Learning", Computers, Materials & Continua, 71(2) 2022.

[8] B. S. Ainapure, R. N. Pise, P. Reddy, B. Appasani, A. Srinivasulu, M. S. K. N. Bizon, "Sentiment Analysis of COVID-19 Tweets Using Deep Learning and Lexicon-Based Approaches", MDPI Sustainability 2023, 15(3), 2573.

[9] C. V., J. J. Macrohon, X. A. Inbaraj, Jyh-Horng Jeng1 and Jer-Guang Hsieh, "Twitter Sentiment Analysis towards COVID-19 Vaccines in the Philippines Using Naïve Bayes", MDPI Information 2021, 12(5), 204.

[10] P. Rane, K. Bhansali, Prof. Sindhu Nair, "Sentiment Analysis to Improve Emotional Health of User", International Journal of Computer Applications (0975 – 8887), 120(1), June 2015.

[11] S. Sharma, M. Diwakar, K. Joshi, P. Singh, S. V. Akram, A. Gehlot, "A Critical Review on Sentiment Analysis Techniques", 2022 3rd International Conference on Intelligent Engineering and Management (ICIEM), 2022, ResearchGate, 741-746.

[12] S. T. Sadasivuni, Y. Zhang, "Analyzing Tweets to Discover Twitter Users Mental Health Status by a Word-Frequency Method", 2019 IEEE International Conference on Intelligent Systems and Green Technology (ICISGT), 5-8.

[13] C. Zucco, B. Calabrese, M. Cannataro, "Sentiment Analysis and Affective Computing for depression monitoring", 2017 IEEE International Conference on Bioinformatics and Biomedicine (BIBM), 1988-1995.

[14] M. M. Aldarwish, H. F. Ahmed, "Predicting Depression Levels Using Social Media Posts", 2017 IEEE 13th International Symposium on Autonomous Decentralized Systems, 277-280.

[15] J. Hussain1, M. Ali, H. S. M. Bilal, M. Afzal, H. F. Ahmad, O. Banos, and S. Lee, "SNS Based Predictive Model for Depression", Springer International Publishing Switzerland 2015, 9102, pp. 349–354.