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Predicting Mental Health illness using SVM Algorithm

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ABSTRACT

The graph given in my analysis of prediction with the use of the SVM algorithm of the mental health compared three models: SVM, Naive Bayes, and Logistic Regression. The line on the graph showing most fluctuation explains high sensitivity to input features-a reason why SVM is especially viable in finding subtle symptoms of issues related to mental health: early undiagnosed or even complex cases. In comparison, NB and LR are better predictions for stability, perhaps at the expense of minor changes in symptomatology. SVM is now the best hope for a good predictive model of mental health outcomes from the standpoint of describing complex relationships in the data.

Keywords

Mental illness prediction, Mental health care, Support Vector Machines (SVM), Psychological test data, Personal Information, Mental health disorders, Depression, Anxiety.

1.INTRODUCTION

Mental health is the state of an individual's ability to control his or her thoughts, feelings, and behaviours, and it helps determine how to cope with stresses, relationships with others, and challenges in life. It is important to maintain good mental health at every stage of life, from childhood and adolescence to adulthood and the elderly[1-6]. Hence, improving mental health is too important to wait. Despite considerable progress has been made to promote mental health, much more effort is still required to address the current unmet and underestimated mental health need [7-9]. Computational intelligence (CI) techniques (e. g., fuzzy logic, artificial neural networks, evolutionary computation, learning theory, and probabilistic methods) have recently provided new opportunities at least in these two aspects: i) By leveraging smart devices, especially the mobile ones, the patients are offered a convenient way to collect long-term data and continuously monitor mental health development, which helps to automatically and promptly prevent the degradation of mental health, lower the mental health risks, treat and diagnose the mental disorders and illnesses, across entire mental health pathways; and ii) CI in mental health significantly reduces the intervention of doctors and thus reduces the cost for patients compared with the traditional mental health system that is doctor-extensive, which very likely helps promote the equity of healthcare to everyone [10-15]. This special issue aims to capture contributions from the interdisciplinary domains across computational intelligence, machine/deep learning, mental health, neuroscience and psychology, affective computing, and healthcare. It especially targets challenging and expanding current research on exploring single or multiple modalities including speech, text, image/video, and biological signals, and assessing and monitoring general mental well-being, preventing mental illness development, detecting and diagnosing mental health conditions, and treating people with mental illness[16-22]. The

contributions can focus on both the theoretical and modelling perspective, as well as applications in different mental disorders and illnesses.

2.LITURATURE SURVEY

The current changes in the social landscape have contributed significantly to the increase in the rate of mental health problems and psychological disorders. The World Health Organization (WHO) has defined "mental health" as the condition of a person who is able to handle his/her stress in life according to his/her ability, but is still able to work normally and productively as well as contribute to the society [23-28].

Factors that affect mental health probably originate from an the associate editor coordinating the review of this manuscript and approving it for publication was Shen Yin. individual's way of life, such as work stress, bad financial situation, family issues, relationship problems, and violence, along with environmental factors [29-37].

Approximately 450 million people worldwide are mentally ill, with the disease accounting for 13% of the global disease burden [38-45]

WHO estimated that one in four individuals experiences mental disorders in any stage of their lives [45-54].

In 2018, WHO released a guideline on managing the physical conditions of adults with severe mental health problems. Usually, people will die earlier than the general population if they had severe mental disorders, such as depression, bipolar disorder (BD), psychotic disorder, and schizophrenia [55].

In addition, depression, which can lead to suicidal ideation and suicide attempts, is estimated to affect 350 million people worldwide [56].

WHO established a vision where in people suffering from mental illness are able to recover and live a life like a normal person as outlined in the Comprehensive Mental Health Action Plan (2013–2020) [57].

Mental health problems should be detected and addressed early. Early detection, accurate diagnosis, and effective treatment can alleviate the suffering of people who are dealing with mental health challenges 58].

The effects of mental illness can be severe on the concerned individuals and their families, and on the society as a whole. In general, the traditional methods of mental health detection normally use face-to-face interviews, self-reporting, or questionnaire distribution. However, traditional methods are typically labour-intensive and time-consuming [59].

Thus, previous studies have applied technologies, such as wearable sensors and smartphones in healthcare and mental health detection; however, these technologies are typically used by individuals who have been diagnosed with mental illness and have been monitored over time .

A recent research presented a novel approach of mental health problem detection in online social networks (OSNs) .

3.PROPOSED METHDOLOGY

This topic discusses growing incidences of mental health disorders worldwide require new avenues for early detection and intervention. A fertile source of data is offered by online social networks which can be mined to detect precursors for mental health disorders. In this respect, the study aims to investigate how machine learning can be applied towards identifying mental health conditions from user-generated content on Twitter, Facebook, and Instagram.

3.1 Objectives:

There is a literature review about applying machine learning algorithms to the detection of mental health in OSNs.

Various techniques developed for the detection of mental health issues based on machine learning could be analysed.

Looking into the efficiency of the techniques that could achieve accuracy and reliability.

A framework for the better detection of mental health using advanced methods of machine learning to be proposed.

3.2 Methodology:

This study will follow the systematic review methodology as observed in the PRISMA guidelines. The research will be taken along the following steps:

Literature Search: Conducting a comprehensive literature search of databases such as PubMed, IEEE Xplore, Scopus, and ScienceDirect.

Application of Keywords: Finding relevant studies between 2007 and 2018 by using relevant keywords related to mental health and OSNs.

Review Articles: Analysis of the selected articles will be done based on inclusion and exclusion criteria focusing on data sources, machine learning techniques, and classifier performance**.**

Fig1: Types of different mental health issues.

3.4 SVM Algorithm

1. **Step1:** Load the necessary libraries
2. **Step2:** Import the dataset and extract the X and Y variables
3. **Step3:** Divide the dataset into train and test
4. **Step4:** Initialize the SVM classifier model
5. **Step5:** Fit the SVM classifier model
6. **Step6:** Make predictions

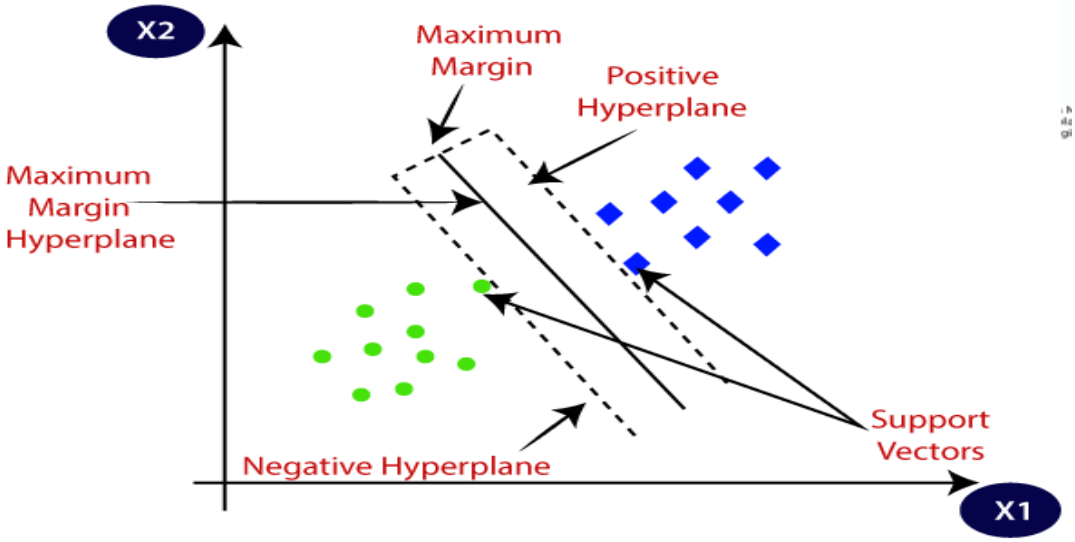

FIG 1:Support Vector Machine(SVM)

 # "Support vector classifier"

```
1. from sklearn.svm import SVC
2. classifier = SVC(kernel='linear', random_state=0)
3. classifier.fit(x_train, y_train)
4.
```

How SVM will work for predicting mental health illness:

SVM is a powerful tool for predicting mental health illnesses due to its efficiency in handling high-dimensional data, robustness against overfitting, and versatility in adapting to different data distributions. Its application in analysing data from online platforms and clinical assessments has shown promising results in identifying individuals at risk for mental health issues, thereby facilitating early intervention and support.

4.RESULT ANALYSIS

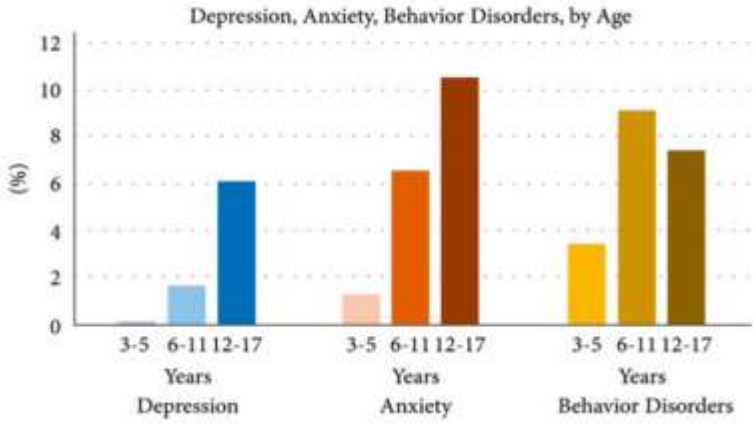

Fig3: Depression, Anxiety, Behaviour Disorders by Age

the graph would illustrate the prevalence of mental disorders, including depression, anxiety, and behavioural disorders, in all age groups of children and adolescents. From the graph, it is very clear that depression prevails most among the elderly children, especially between 12 to 17 years, as compared to the extent of prevalence of the disorder in the younger children. Similarly, anxiety disorders were much more prevalent for those aged 12-17 years, whereas behaviour disorders occurred across all age ranges but were more prevalent in children aged 6-11 and 12-17 years. Data seems to replicate the pattern: more rising mental health problems with age, especially by adolescence.

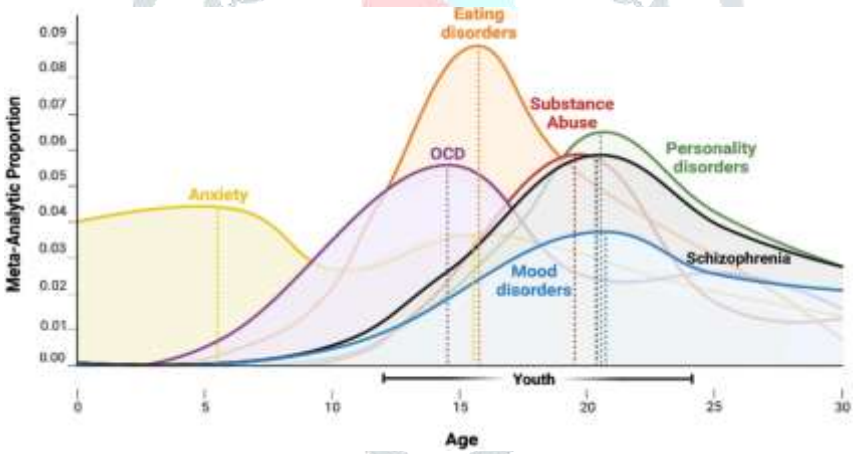

Fig4:Towards youth mental health paradigm

the age at which the mental health disorders start it is evident that most of the illnesses tend to start during youth. Anxiety disorders start early in children, but eating disorders, OCD, and substance abuse appear to be in their peak during adolescent periods. Mood and personality disorders appear during young adulthood and schizophrenia peaks at the age range of 20-25. It is due to this reason that timely intervention during such periods becomes indispensable for proper management.

5.CONCLUSION

Support Vector Machines (SVM) show great potential for predicting mental illness by analysing complex data patterns for early detection and better treatment. To be effective, it's important to use diverse and high-quality training data and to address any biases. Combining SVM results with the expertise of mental health professionals can improve diagnoses and treatments. Future research should aim to refine feature selection, explore combined models, and create real-time prediction systems. Overall, SVMs can significantly enhance mental health care by offering timely support to those who need it.

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