EARLY DETECTION OF OCD SYMPTOMS USING MACHINE LEARNING

1st Ambuja K, 2nd Bhavani S, 3rd Bhanupriya B, 4th Kavya N

Assistant Professor Dept. of CSE,
Student, Student, Student
K S SCHOOL OF ENGINEERING AND MANAGEMENT

Abstract - Obsessive-Compulsive Disorder (OCD) is a common neuropsychiatric disorder characterized by intrusive thoughts (obsessions) and repetitive behaviors (compulsions), and few studies have assessed the Whole-brain functional connectivity architecture of OCD with electroencephalogram (EEG) during different resting states. Graph theory and network-based statistics (NBS) were employed to examine the neural synchronization and the whole-brain functional connectivity (FC) on the phase-locking value (PLV) of OCD patients and healthy controls (HCs) during eyes-closed (EC) and eyes-open (EO) states. Compare with HCs, OCD patients exhibited not only decreased global synchronization in terms of phase synchrony but also aberrant global topological properties (decreased average shortest path lengths and normalized shortest path lengths together with increased global efficiencies and normalized clustering coefficients) together with inhibited interhemispheric and interhemispheric FCs during rest, which suggested an imbalance between functional integration and segregation of brain networks for OCD patients. Meanwhile, OCD patients had increased global efficiencies and normalized clustering coefficients, but decreased average clustering coefficients and normalized shortest path lengths together with significantly decreased FCs in the alpha band from EC to EO states, which suggested a dynamic switch between highly integrated (EC state) and highly specialized (EO state) modes of information processing.

I. INTRODUCTION

"OCD Prediction using Machine Learning" represents a critical endeavor in the field of mental health assessment and intervention. Obsessive-Compulsive Disorder (OCD) is a complex and debilitating condition characterized by intrusive, persistent thoughts and repetitive behaviors that can significantly impair daily functioning. Early detection and intervention are paramount for effective treatment and improved patient outcomes. The study leverages the power of machine learning techniques to develop a predictive model for identifying potential cases of ocd. By analyzing a comprehensive dataset encompassing a diverse array of psychological and behavioral indicators, including feelings of nervousness, panic, trouble concentrating, and more, this research aims to construct a robust framework capable of accurately discerning individuals at risk of OCD.OBSESSIVE-compulsive disorder (OCD) is a recurrent and refractory chronic mental disorder with high morbidity, which is characterized by unwanted and intrusive thoughts or images (obsessions) and excessive ritualistic behaviors or mental acts (compulsions) typically performed in response to the obsessions . OCD would not only seriously damage individual mental activity in cognitive, emotional, and behavioral aspects, but also affect patients' social functions such as learning and work, which would add a heavy economic burden on society. Most of the early studies have suggested that the pathophysiology of OCD was associated with the dysfunctional cortico-striato-thalamo-cortical (CSTC) loop, which was a widely accepted neurobiological model of OCD.

LITERATURE SURVEY

Aberrant Whole-Brain Resting-State Functional Connectivity Architecture in Obsessive-Compulsive Disorder: An EEG Study This paper investigates the aberrant whole-brain resting-state functional connectivity architecture in Obsessive-Compulsive Disorder (OCD) using EEG. It explores how EEG signals can reveal patterns of connectivity associated with OCD.

Altered cortico–striatal functional connectivity during resting state in obsessive–compulsive disorder This paper investigated potential alterations in resting-state FC within the CSTC system in 44 OCD patients and 40 healthy controls by taking into consideration all relevant nodes of the direct and indirect CSTC loop.

Network-based functional connectivity predicts response to exposure therapy in unmedicated adults with obsessive–compulsive disorder This paper delves into neuroimaging studies that investigate disruptions extending beyond conventional CSTC loops in OCD. Examining whole-brain studies of resting-state functional MRI connectivity among unmedicated OCD participants has unveiled broader alterations across both task-positive and task-negative networks

Altered white matter structural networks in drug naive patients with obsessive compulsive disorder This study employs the EMPaSchiz (Ensemble algorithm with Multiple Parcellations for Schizophrenia prediction) framework, known for its transparency and explain ability, to predict OCD using a resting-state functional magnetic resonance imaging dataset comprising 350 subjects.

METHODOLOGY

1. **Data Collection and Preprocessing:** Obtain a diverse dataset containing a rnage of psychological and behavioral indicators associated with obsessive-compulsive disorder (OCD). Clean the dataset by addressing missing values, outliers, and any inconsistencies to ensure data quality. Training the model by instructing it to create resolutions established the news that has existed, been assembled, and been resolved. During this stage of the process, the dossier is partitioned into unconnected classes by the mark .
2. **Feature Selection and Engineering:** Conduct a comprehensive feature analysis to identify the most releated attributes for predicting OCD tendencies. Perform feature engineering to create new variables or transformations that may enhance the model's performance. When judging the acting of our models, we will take advantage of integrity per class and disorientation forms. These verifications, which are frequently second hand for categorization tasks, determine a sign of the model's veracity and conduct by admitting the consumer to equate it to different related models.
3. **Data Splitting:** Divide the dataset into training and test sets to facilitate model development, tuning, and evaluation. Ensure that the distribution of OCD cases and non-cases is representative in each set.
4. **Model Selection:** Explore a diversity of machine learning algorithms suitable for binary classification tasks, such as Logistic Regression, Random Forest and Neural Networks. Evaluate each model's performance using appropriate metrics on the validation set.

II. PROBLEM STATEMENT

Machine learning model for the detection of OCD symptoms based on comprehensive datasets. This includes collecting diverse information on individuals with and without OCD, extracting relevant features, and training a classification model. The model should accurately differentiate between individuals exhibiting OCD symptoms and those without, providing a reliable for mental health professionals. The problem encompasses challenges such as data preprocessing, feature selection, and ethical considerations. Analysing these challenges will lead to a robust system that enhances early detection of OCD, facilitating timely intervention and personalized treatment plans.

III. PROJECT GOALS

1. Early Identification: Develop a machine learning model that can reliably identify early signs of OCD symptoms in individuals.
2. Educational Outreach: Incorporate educational components to raise awareness about OCD and the benefits of early detection.
3. User-Friendly Interface: Develop an intuitive and user-friendly interface for seamless interaction with the system, promoting adoption by individuals and healthcare professionals.
4. Privacy Protection: Implement rigorous privacy measures to protect sensitive information and ensure compliance with ethical standards.

IV. APPLICATIONS

1. Early Intervention: the project's predictive model can facilitate early identification of potential OCD cases, enabling timely intervention and support for affected individuals.
2. Personalized Treatment Plans: By accurately identifying OCD tendencies, the project can address specific needs and symptoms.
3. Mental Health Screening Tools: The model can serve as a valuable screening tool in clinical settings to assist healthcare professionals in assessing the likelihood of OCD in patients.
4. Research and Epidemiology: The project's findings can be applied in research settings to gain deeper insights into the prevalence and characteristics of OCD within different population.
5. Telemedicine and Remote Monitoring: The predictive can be integrated into telehealth platforms to provide remote screening for OCD, extending mental health support to a broader audience.
6. School and Educational Settings: The project's tool can be utilized in educational environments to students who may benefit from additional mental health resources and support.
7. Workplace Wellness Programs: Employers can incorporate the project's predictive model into workplace wellness initiatives to promote mental health awareness and provide resources for employees dealing with OCD tendencies.

V. CONTRIBUTION TO SOCIETY

1. Improved Quality of Life: - Early detection facilitates implementation of coping strategies and therapeutic interventions at a stage when individuals may still have more control over the impact of OCD on their daily lives.
2. Prevention of Secondary Issues: - Detecting OCD symptoms early can help prevents the development of secondary issues such as anxiety, depression, or impaired social functioning.
3. Empowering Individuals and Families: - Early detection empowers individuals and their families with this knowledge about potential OCD symptoms. Education and awareness about OCD can lead to proactive seeking of support, fostering a more informed and resilient community.
4. Reduced Economic Burden: - Early detection may lead to a reduction in the economic burden with a untreated or poorly managed OCD. By preventing severe cases and hospitalizations, the societal cost of OCD can be mitigated.

VI. REFERENCES

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