https://africanjournalofbiomedicalresearch.com/index.php/AJBR
Afr. J. Biomed. Res. Vol. 27(4s) (November 2024); 1907 - 1909
Research Article

A Review Paper on Speech Processing for the Identification of Brain Disorders in Post-COVID Patients

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Abstract
Millions of people around the world have been impacted by the COVID-19 pandemic, and many of them continue to experience symptoms even after they have recovered. The effect of COVID-19 on the brain, which can lead to a number of neurological conditions and illnesses, is one area of worry. Acute disseminated encephalomyelitis (ADEM), encephalitis, exhaustion, seizures, mental issues, and speech impairments are a few of these conditions. One non- invasive method for diagnosing and tracking brain problems is electroencephalography (EEG). In order to identify these issues in patients who have recovered from COVID-19, we evaluate recent studies on the use of speech processing and electroencephalography (EEG) signal analysis. The COVID-19 epidemic has affected millions of people worldwide, and many of them maintain symptoms long after they have healed. One area of concern is the impact of COVID-19 on the brain, which can result in various neurological disorders and diseases. These diseases include encephalitis, fatigue, seizures, mental problems, speech impairments, and acute disseminated encephalomyelitis (ADEM). Electroencephalography is one non-invasive technique for identifying and monitoring brain issues (EEG). We review recent research on the application of electroencephalography (EEG) signal analysis and speech processing to detect these problems in patients who have recovered from COVID-19.

Keywords: COVID-19, EEG, Neurological disorder

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Received 07/11/2024, Acceptance 14/11/2024

DOI: https://doi.org/10.53555/AJBR.v27i4S.3963

Introduction

The COVID-19 pandemic has caused significant disruptions to global health and economies. While much of the focus has been on the respiratory symptoms of the disease, there is growing concern about its impact on the brain and developed various Brain diseases and disorders. These disorderscan bechallenging to diagnose and treat, and thereisagrowing need for accurateand efficient diagnostic methods. Recent studies have shown that COVID-19 can causeavariety of neurological disorders, including encephalitis, meningitis, stroke, and seizures. Additionally, many people who have recovered from COVID-19 report persistent symptoms, including brain fog, fatigue, and memory problems. One potential approach is to analyze EEG signals using speech processingtechniques.This review article aims to provide an overview of the research on this approach for detecting brain disorder of the patients recovered by COVID-19.

Various studies have used EEG signals and speech processing techniques for detecting brain disorders in

patients recovered from COVID-19. For example, one study used a machinelearning algorithm to classify EEGsignals from patients with COVID-19 and healthy controls. The study found that the algorithm could accurately classify the two groups of participants based on their EEG signals. Another study used statistical methods to analyze EEG signals from patients with COVID-19 and found that the patients had abnormal brain activity compared to healthy controls. The study also found that the abnormal activity was associated with cognitiveimpairment.

EEG

Electroencephalography(EEG) is a non-invasive technique that measures electrical activity in the brain. EEG signal analysis has been used to detect abnormalities in brain function associated with a variety of neurological disorders. EEG signals are obtained by placing electrodes on the scalp of a patient, and these signals reflect the electrical activity of the brain. Recent studies have shown that EEG signal analysis can be used to detect changes in brain function in patients who have recovered fromCOVID-19. In recent years, speech processing techniques have been used to analyze EEG signals for detecting various brain disorders. These techniques include signal processing, feature extraction, and machine learning algorithms.

Speech Processing

Speech processing is the use of computer algorithms to analyze speech and identify patterns. Recent studies have shown that speech processing can be usedto detect changes in speech patterns associated with neurological disorders. Speech processing has been used to detect changes in speech patterns in patients with Parkinson's disease, Alzheimer's disease, and schizophrenia.

Approach

The approach we propose involves combining EEG signal analysis with speech processing to detect changes in brain function associated with neurological disorders in patients who have recovered from COVID-19. The patient's speech is recorded and analyzed using speech processing algorithms to identify patterns associated with neurological disorders. At the same time, the patient's EEG signals are recorded and analyzed to detect changes in brain function associated with these disorders.

In another study, researchers used a combination of EEG signals and speech processing techniques to detect cognitive impairment in patients recovered from COVID-19. The study found that the combination of the two techniques could accurately detect cognitive impairment in thepatients.

Methodology

A systematic review was conducted using electronic databases, including PubMed, IEEE Xplore, and ScienceDirect. The search terms included "COVID-19," "EEG," "brain disorders," "speech processing," and "diagnosis." The inclusion criteria were studies that focused on the use of EEG signals and speech processing techniques to detect brain disorders in patients recovered from COVID-19. The exclusion criteria were studies that did not focus on this topic orwere not in the English language.

Results

The review identified several studies that investigated the useof EEG signals and speech processing techniques for detecting brain disorders in patients recovered from COVID-19. These studies used various methods, including feature extraction, machine learning algorithms, and statistical analysis, to analyze EEG signals and speech samples from patients.

One study used a machine learning algorithm to analyze EEG signals from COVID-19 patients with cognitive impairment. The algorithm was able to distinguish between patients with cognitive impairment and healthy controls with high accuracy. Another study used statistical analysis to identify specific EEG patterns associated with COVID-19-related encephalopathy. The results showed that these patterns were distinct from those seen in other encephalopathies.

Other studies focused on analyzing speech samples from COVID-19 patients using various speech processing techniques. For example, one study used deep learning algorithms to analyze speech samples from patients with COVID-19-related depression. The results showed thatthe algorithm was ableto accurately detect depression in these patients based on their speechpatterns.

Conclusion

The use of EEG signals and speech processing techniques for detecting brain disorders in patients recovered from COVID-19 shows promising results. However, further research is needed to validate these findings and develop standardized diagnostic methods. This approach has the potential to provide a non-invasive and efficient way of diagnosing brain disorders in COVID-19 patients, which canimprovepatient outcomes andreducehealthcare costs.

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