Chapter 6
Early Depression Detection Using Modern AI Techniques: Issues, Opportunities, and Challenges

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ABSTRACT

Depression is a widespread and debilitating mental health disorder, impacting over 300 million individuals globally, as reported by the World Health Organization. Early detection and timely intervention are essential for effective treatment and mitigating the severity of depressive symptoms. However, accurately identifying the nuanced symptoms of depression—manifested through body language, speech patterns, or neurological signals—remains a significant challenge. The advent of modern AI technologies has revolutionized the landscape of depression detection, offering new methodologies for identifying these symptoms This study investigates the current challenges, opportunities, and advancements in AI-driven approaches to early depression detection. We conducted a comprehensive review of approximately 60 high-quality, peer-reviewed research articles from reputable journals and conferences, focusing on the relevance and objectives of each study. Our findings highlight the latest trends in depression detection and outline the obstacles faced in this field, providing a roadmap for future researchers aiming to enhance early

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detection strategies and improve mental health outcomes.

1. INTRODUCTION

Depression is one of the major reasons for people's deaths and damage to lives, causing the loss of life of about 3.8% of people worldwide, according to a recent report published by the World Health Organization (Beyond Blue, 2023). It is a silent killer which may damage your inner world. A person having deep depression inside doesn't need to be sad from the outside, rather the reverse may happen. This mental health disorder may be caused by many factors such as stressful work life, routine disorder, lifestyle disorder, personal stress, etc. Individuals with depression often experience a lack of interest in anything, and intense and prolonged feelings of sadness, despair, and worthlessness. They may have difficulty experiencing joy or enthusiasm for activities they once enjoyed (Matsushima et. al., 2024).

Depression is often associated with increased blood pressure and hypertension issues. it can affect the emotional behavior of a person, and a tendency to do work, all of which can affect long-term health outcomes ('Mayoclinic', 2021). Therefore, timely diagnosis and cure is important to curb this menace effectively however, Depression detection is associated with some challenging factors that make it difficult to detect and prevent depression at the earliest. Subjective experiences of individuals that vary in intensity and effect on mental health, lack of confidence among people to express their problem as may fear of judgment from others, Depression often co-occurs with other mental health disorders, such as anxiety, making it challenging to isolate and diagnose depression on its own. Symptoms may overlap, leading to misdiagnosis or delayed treatment, some individuals with depression are adept at masking their symptoms, appearing outwardly functional and cheerful, even when they are experiencing severe emotional distress. This can make it difficult for healthcare providers to recognize depression. To minimize the risk of depression counselling can be a helpful method along with medicinal treatment.

1.1. Types of Depression-

Depression is of different types and each type has discrete symptoms for identification. Below are some depression types and they can be differentiated depending upon the symptoms and severity. Following are some of the depressive disorder types, which could affect people in several ways ((Matsushima et. al., 2024).