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AN INTERNATIONAL AWARD-WINNING INSTITUTION FOR SUSTAINABILITY

ETHICAL DIGITAL LITERACY (ICTF 0513)

CASE STUDY: The Role of Artificial Intelligence in Predicting Mental Health Disorders Among Adolescents

SECTION: 557

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Introduction

Artificial intelligence (AI) is the theory and development of computer systems capable of performing tasks that historically required human intelligence, such as recognizing speech, making decisions, and identifying patterns. AI is an umbrella term that encompasses a wide variety of technologies, including machine learning, deep learning, and natural language processing (NLP). A mental disorder is characterized by a clinically significant disturbance in an individual's cognition, emotional regulation, or behavior. It is usually associated with distress or impairment in important areas of functioning. Mental health encompasses an individual's emotional, psychological, and social well-being. Mental health disorders in adolescence are a significant problem, relatively common, and amenable to treatment or intervention.

Objectives

This case study explores the role of AI in predicting mental health disorders among adolescents, examining the technology's current capabilities, challenges, ethical considerations, and potential to transform adolescent mental healthcare. By delving into AI models such as machine learning and natural language processing, this study aims to assess their effectiveness in predicting, diagnosing, and ultimately preventing mental health disorders in youth.

Background/Literature Review

To analyzing structured data, AI's application to unstructured data through natural language processing is equally impactful. Research by Mansour, R. F., El Amraoui, A., Nouaouri, I., Díaz, V. G., Gupta, D., & Kumar, S. (2021),AI can extract valuable insights from text data, such as clinical notes, research articles, and patient feedback. This capability enhances the analysis of patient records and helps identify early signs of conditions like mental health disorders, which often go undiagnosed in their early stages. By releasing the potential of intricate data sets, AI is transforming healthcare in ways beyond imaging. AI is making great advances in genomes, especially in predicting illness risk and progression, just as it is doing a fantastic job of evaluating medical pictures to discover diseases. Patterns and the development of mental health conditions including substance addiction, anxiety, and depression may be predicted by AI algorithms. This proactive strategy gives medical providers the ability to act early, which may stop the emergence of more serious mental health issues and improve adolescents' overall results.

Analysis

The domains of mental health and artificial intelligence (AI) are undergoing rapid advancements, exhibiting the capacity to mutually influence one another in significant ways. The increasing prevalence of mental health illnesses has prompted the exploration of potential remedies in the field of AI, which show promise in the areas of early detection, prevention, and therapy. Mental Health Disorders have become a significant public health concern worldwide, necessitating accurate and timely diagnostic methods.

In addition, AI approaches have been used to aid mental health professionals, such as psychiatrists and psychologists, in making decisions by analyzing medical records and patients' behavioral data. This research identified and evaluated the performance of machine learning algorithms, namely K-nearest neighbors (KNN), random forest (RF), and long short-term memory (LSTM), in detecting mental health conditions based on many accuracy criteria. This system intends to use AI model methodologies to identify and predict mental health disorders at an early stage. This system is a well-established and effective tool that utilizes AI algorithms to accurately detect and diagnose various mental health illnesses, thus assisting in the decision-making process.

Methods: Validation analysis was conducted in an independent dataset with 290 patients (age 28.08 ± 10.95 years, 169 women) and 310 healthy participants (age 33.55 ± 11.09 years, 165 women). Another three machine learning models of ResNet, DenseNet and EfficientNet were used for comparison. We also recruited 148 individuals receiving high-stress medical school education to characterize the potential real-world utility of the MIL model in detecting risk of mental illness.

Findings & Results

AI can significantly transform mental health services by improving diagnosis, personalizing treatment, and enhancing accessibility. For children and adolescents, whose mental health needs can differ widely from adults, AI tools can analyze vast amounts of data to identify patterns and offer tailored recommendations. For instance, predictive analytics can help clinicians in assessing risk levels and determine the most effective interventions early on (O'Reilly et al., 2021).

AI is also widely applicable in diagnosis of mental health conditions. The diagnosis of a new patient is predicted using the training dataset of the diagnosis of the previous patients. Furthermore, artificial intelligence can also differentiate between diagnosis of diseases with similar symptoms but divergent methods of treatment. This is observed in the instance when bipolar or unipolar depression is to be identified based on brain imaging features and types of dementia are to be differentiated based on structural MRI scans. Data-driven AI methods based on various factors such as demographic features, neurocognitive and biomarker profiles can aid in identifying novel disease subtypes.

BOOLEAN search used.

1. ("Machine Learning") AND ("Mental Health Disorders") AND ("Prediction" OR "Early Detection")
2. (“The Role of Artificial Intelligence”) AND (“Predicting Mental Health”)
3. ("artificial intelligence AND "mental health" AND adolescents")
4. (“artificial intelligence”) NOT (“mental health disorders”)
5. (“mental health disorders”) NOT (“artificial intelligence”)

Conclusion

A considerable proportion of the public is very concerned about mental health concerns. According to the WHO, a quarter of the global population may encounter a mental health condition at some stage in their lifetime. Consequently, the utilization of AI models to enhance the evaluation and therapy of mental health has the capacity to influence a substantial population. In fact,the application of AI in mental health care has excellent prospects and is more promising than ever. In addition, by incorporating these technologies into mental health research, we can augment our comprehension of the fundamental mechanisms of these disorders and ultimately create more efficient and individualized therapies, potentially enhancing the well-being of countless individuals grappling with mental health challenges. Thus, Artificial intelligence (AI) can help us make better decisions by offering real-time insights and individualized assistance, which might lead to life-saving early treatments.

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