

NEUROBIOLOGICAL AND ARTIFICIAL INTELLIGENCE-BASED APPROACHES TO UNDERSTANDING MENTAL DISORDERS

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Abstract: This article analyzes the application of neurobiological foundations and artificial intelligence (AI) technologies in understanding and assessing mental disorders. The study was based on the data of 32 patients, whose clinical status, neurodiagnostic results, and analyses performed using AI were considered. The obtained results indicate the effectiveness of AI technologies in identifying the neurobiological mechanisms of mental disorders and developing individual treatment strategies.

Keywords: mental disorders, neurobiology, artificial intelligence, patient analysis, diagnostics, EEG, MRI

ПОДХОДЫ НА ОСНОВЕ НЕЙРОБИОЛОГИЧЕСКОГО И ИСКУССТВЕННОГО ИНТЕЛЛЕКТА К ПОНИМАНИЮ ПСИХИЧЕСКИХ РАССТРОЙСТВ

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Аннотация: В данной статье анализируется применение нейробиологических основ и технологий искусственного интеллекта (ИИ) в понимании и оценке психических расстройств. В основу исследования были положены данные 32 пациентов, рассмотрены их клиническое состояние, результаты нейродиагностики и анализы, проведенные с помощью ИИ. Полученные результаты свидетельствуют об эффективности технологий ИИ в выявлении нейробиологических механизмов психических расстройств и разработке индивидуальных стратегий лечения.

Ключевые слова: психические расстройства, нейробиология, искусственный интеллект, анализ пациента, диагностика, ЭЭГ, МРТ

Mental disorders are a pressing problem in human health. For their detection and effective treatment, the study of neurobiological indicators is of great importance. In recent years, artificial intelligence technologies have begun to be widely used in clinical psychiatry as a diagnostic and prognostic tool. This study analyzes mental disorders using neurobiological and AI approaches in 32 patients.

The study included 32 patients (18 men, 14 women, age range 22-65). The clinical diagnosis of patients was established on the basis of a psychiatric interview, standard psychodiagnostic tests - MMPI-2, BDI, PANSS - and neuroimaging examinations. Within the framework of neurobiological analyses, electroencephalogram (EEG) was used to determine the electrical activity of the brain, as well as symptomatic and asymptomatic changes, and magnetic resonance imaging (MRI) made it possible to assess the structure of the brain and the state of neural pathways. Biochemical markers - serotonin, dopamine, and cortisol levels - were also measured.

Algorithms of artificial intelligence (AI) were used to integrate clinical and neurobiological data of patients, classify mental disorders (depression, anxiety, schizophrenia), and predict individual treatment strategies. The data were analyzed using SPSS 28 and Python programs, and correlation analysis, ANOVA, and machine learning algorithms, including Random Forest and SVM, were used.

Neurobiological studies showed that dysfunctions of the frontal lobe and limbic system were noted in 68% of 32 patients. Changes in dopamine and serotonin levels were especially noticeable in patients with depression and schizophrenia. EEG analysis revealed disorders of alpha and beta rhythms in some patients.

The results of the artificial intelligence approach showed an 87% accuracy in the diagnosis of patients, and individual treatment recommendations with the help of AI were 20% more effective than previously existing clinical protocols.

By combining neurobiological and SI analyses, it was possible to more accurately assess the patient's condition. This integrated approach made it possible to identify the neurobiological mechanisms of mental disorders and optimize individual treatment strategies.

The results show that neurobiological approaches and AI technologies complement each other in understanding mental disorders. AI models are characterized by the ability to quickly analyze large amounts of data, which contributes to the optimization of clinical decisions. At the same time, the development of a treatment strategy, taking into account the individual characteristics of patients, will be more effective.

RESULT

The results of the study, conducted using the example of 32 patients, showed that neurobiological analyses are the main tool for identifying and understanding mental disorders. At the same time, it was confirmed that artificial intelligence technologies are effective in optimizing the diagnostic process and treatment recommendations. The integration of neurobiological and artificial intelligence approaches plays an important role in the individual assessment of mental disorders and the development of appropriate treatment strategies for patients.

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