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USING NEURAL NETWORK MODELING FOR THE DIAGNOSIS OF EPILEPSY BASED ON ELECTROENCEPHALOGRAM RHYTHMS

Epilepsy affects about 50 million individuals worldwide and is characterized by sudden seizures caused by abnormal electrical activity in the brain. The electroencephalogram (EEG) technique [1] is used to quantify the increase in brain activity during epileptic seizures, and neurologists analyze EEG recordings to identify different stages of epilepsy. However, this approach can be time-consuming and laborious, necessitating an automated epileptic seizure prediction system.

To address this, a neural network model for epilepsy control using the Long Short-Term Memory (LSTM) method has been developed [2]. The goal of my project is to create an automated seizure prediction and control system that can assist patients and healthcare providers in managing the condition. To ensure the effectiveness and reliability of my model, I am training it on the real patient data, both with healthy EEG readings and those diagnosed with epilepsy.

LSTM is a type of Recurrent Neural Network architecture that has been successful in time-series data analysis. To compare the effectiveness of different LSTM implementations, including LSTM for Regression Using the Window Method, LSTM for Regression with Time Steps, and LSTM with Memory Between Batches, I conducted experiments using data from the Boston University dataset. My findings indicated that LSTM for Regression Using the Window Method achieved the lowest error rate, while LSTM with Memory Between Batches showed the highest error rate. In contrast, LSTM for Regression with Time Steps yielded moderate results but required the least amount of computational resources.

To demonstrate the effectiveness of my proposed LSTM model, I included an example of a healthy patient's EEG signals in Fig.1, and my model's predictions matched the actual EEG signals, indicating its potential for accurately predicting epileptic seizures. With the increasing incidence of epilepsy worldwide, innovative approaches such as my LSTM model may help manage this condition more effectively.

The further development of the research lies in this field.

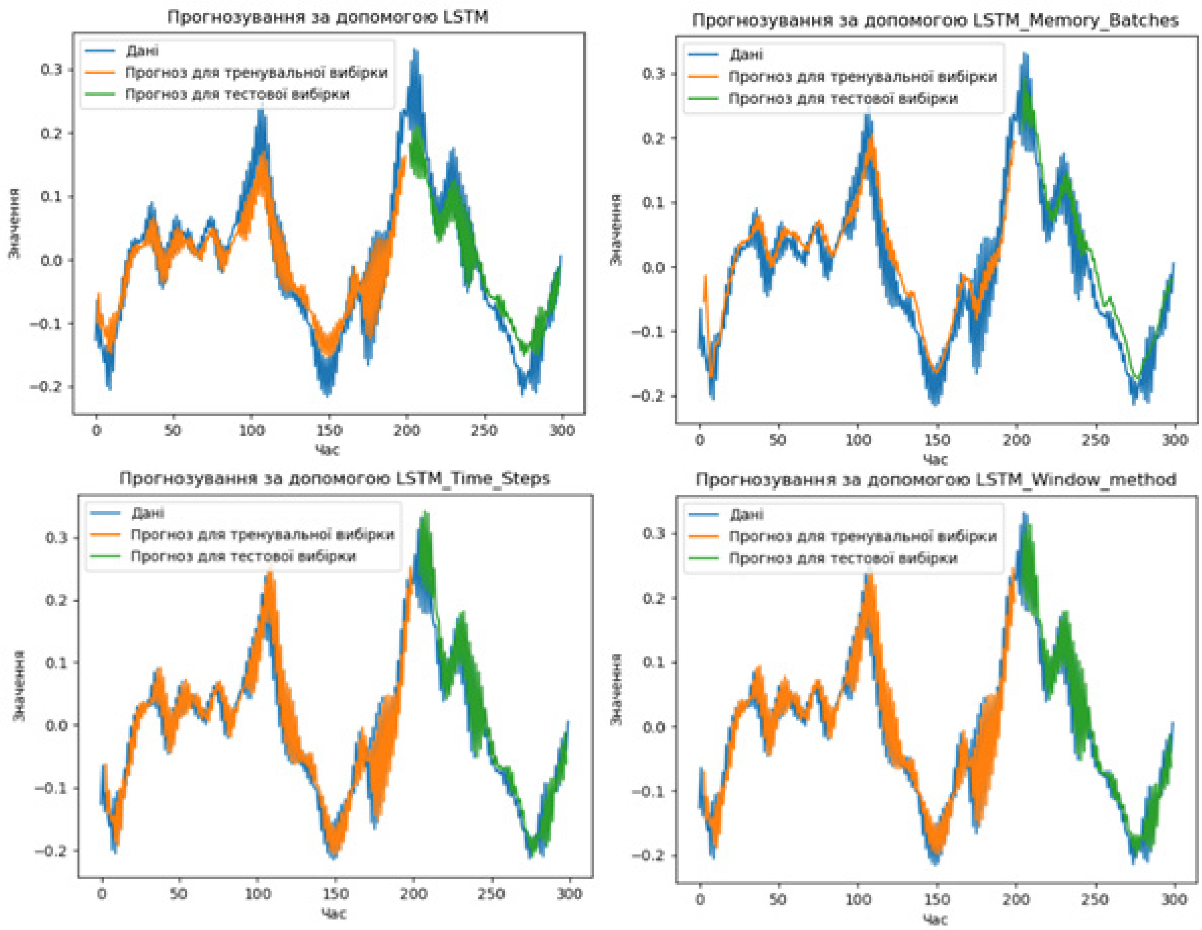

Fig. 1 – Comparative graphs of the performance of different LSTM methods on the same data

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