CogVR: A Novel AI Therapeutic System for MS Patients

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Multiple sclerosis is a disease where the immune system attacks nerve fibers, causing communication problems between the brain and the body, affecting over 2.3 million people worldwide. Some patients may have some mild symptoms, while others may lose their ability to communicate or physically move their limbs. Physical therapy for rehabilitation is very time-consuming, tedious, expensive, and often discouraging. This project proposes a novel, low-cost, virtual reality (VR) system, based on electroencephalogram (EEG) and deep learning, that allows motor-disabled patients to engage in an immersive, therapeutic virtual reality game for hand rehabilitation. The custom VR game is deployed on the Google cloud for global, smartphone access. In this system, a patient will use hand motor imagery, in the VR application, to catch balls coming from the left or right side of the screen. An EEG headset, connected to an Arduino, will read these brain waves into a computer and will go through feature extraction. These features will first train a Multilayer Perceptron Model, a highly accurate Deep Neural Network, built in Python. Then, the patient will play the VR game with the trained model which will categorize the brain waves into their respective VR commands. Based on these commands, a certain request is sent to the game, which will tabulate the game score. As the score increases, the ball's speed increases, making the user involved with the game. Consequently, the game encourages muscle movement in the arm, which can be monitored by an electromyography device.

Awards Won:
Third Award of $1,000