

ABSTRAK

Rehabilitasi pasien stroke, terutama pada anggota gerak atas, memerlukan pendekatan yang akurat dan efektif untuk mengembalikan kemampuan motorik. Upper limb exoskeleton merupakan salah satu alat yang dirancang untuk mendukung proses rehabilitasi dengan bantuan teknologi. Penelitian ini mengusulkan penggunaan machine learning berbasis sinyal electromyography (EMG) untuk meningkatkan akurasi gerakan exoskeleton. Algoritma machine learning seperti Random Forest Regression digunakan untuk memprediksi gerakan berdasarkan ekstraksi fitur sinyal EMG, termasuk Root Mean Square (RMS), Mean Absolute Value (MAV), dan Variance. Hasil penelitian menunjukkan bahwa kombinasi fitur MAV dan algoritma Random Forest Regression menghasilkan akurasi terbaik dengan nilai RMSE sebesar 12.197 dan R^2 sebesar 91,6%. Sistem ini berhasil meningkatkan presisi gerakan exoskeleton, yang diharapkan dapat membantu pasien stroke dalam proses rehabilitasi. Dengan pengembangan lebih lanjut, metode ini memiliki potensi untuk meningkatkan efektivitas rehabilitasi pasien stroke secara signifikan.

Kata Kunci: Upper Limb Exoskeleton, Machine Learning, EMG, Rehabilitasi Stroke, Random Forest Regression

ABSTRACT

Post-stroke rehabilitation, particularly for upper limb mobility, requires accurate and effective approaches to restore motor functions. The upper limb exoskeleton is a device designed to support the rehabilitation process through advanced technology. This study proposes the use of machine learning based on electromyography (EMG) signals to improve the accuracy of exoskeleton movements. Machine learning algorithms such as Random Forest Regression are utilized to predict movements based on feature extraction from EMG signals, including Root Mean Square (RMS), Mean Absolute Value (MAV), and Variance. The results show that the combination of MAV features and the Random Forest Regression algorithm achieved the best accuracy, with an RMSE value of 12.197 and an R^2 of 91.6%. This system successfully enhances the precision of exoskeleton movements, potentially aiding stroke patients in their rehabilitation process. With further development, this method has the potential to significantly improve the effectiveness of stroke rehabilitation.

Keywords: Upper Limb Exoskeleton, Machine Learning, EMG, Stroke Rehabilitation, Random Forest Regression