ABSTRACT

A large number of people with trans-radial disabilities is one of the reasons for developing prosthetic hands inefficient technology with daily use. The purpose of this study is to develop prosthetic hand technology using pattern recognition on machines (machine learning). The contribution of this system uses a little signal leads with high accuracy to control prosthetic hands. The control of this prosthetic hand uses two-channel electromyography signaling signals which are able to classify four movements, i.e. grasp, flexion, extension, and relax. Electromyography signals obtained from electromyography instrumentation will be needed through filters and extraction features. Electromyography data signals will be introduced to machine learning algorithms as patterns. The machine learning method used is k-Nearest Neighbors, Naive Bayes, Decision Tree, and Support Vector Machine. The training data that has been introduced will be returned. The training data that has been assessed will be used as data from machine learning to classify movements. The logic of machine learning output will be used as prosthetic hand control. Based on the evaluation results, 80% of training data from 10 respondents were obtained for each maximum of machine learning methods, i.e. k-Nearest Neighbors 98.1%, Naïve Bayes 97.6%, Decision Tree 98.5%, and Support Vector Machine 98.3%. The movements that have the highest average completion rate are extension movements of 99.23%, then relaxed movements 99.06%, flexion movements 96.29%, and grasping movements 92.44%. Prosthetic hands are expected to benefit people with trans-radial disabilities in carrying out their daily lives.

Keywords : Prosthetic Hands, Machine Learning, k-Nearest Neighbors, Naïve Bayes, Decision Tree, SVM.