

MSc Project Report

Cloud based Muscle cramp prediction through machine learning by sensing EMG patterns

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Abstract

Muscle cramps or muscle abnormalities can be defined as the sudden contraction in muscles. Most of the time they are harmless but could develop the pain due to some conditions. The stress level, temperature, no movements in muscles for period, unexpected changes of electrolyte concentration level in the body and less muscle density can be specified as some of the reasons for muscle cramps. The muscle abnormalities are very common between bed ridden patients, post-operative rehabilitated persons, and old age persons. The muscle cramps could be uncomfortable and more effective for them. The muscle abnormalities can be experienced in any time of the day. They can be experienced in many forms. There are few categories of muscle cramps such as rest cramp, heat cramp, nocturnal cramp. Calf muscle is one of the most vulnerable body parts that could suffer from a cramp. There is no accurate methodology to predict the muscle cramps in current world. The level of electrolytes percentage that discharge from the body can be measured in order to detect the changes that could develop a muscle cramp. This level could be measured using the urine/ sweat of a person. The electrolyte concentration of the blood also can be identified as a measure to detect the change that could affect a muscle cramp.

The proposed system in this research suggests a more successful solution for predicting muscle cramps. The system utilizes the wave patterns generated in the muscles and subject them to an electromyograms analyzation to predict the muscle abnormalities. The wave patterns are identified by the real time EMG data collected from a person and combining them with a defined benchmark dataset and using them with a trained model. If the identified wave patterns are similar to the wave patterns that results to muscle abnormality the person will be notified by an alert or a caution. Further the person will be instructed on how to recover from the muscle abnormality. The proposed solution is based on time series prediction. The real time data is stored in local and cloud base databases. The required information is provided to the user through user friendly interfaces.