Spiking neural network classification for spike train analysis of physiotherapy movements

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Article Info	ABSTRACT
	Classifying gesture or movements nowadays become a demanding business as the technologies of sensor rose. This has enchanted many researchers to actively investigated widely within the area of computer vision. Rehabilitation exercises is one of the most popular gestures or movements that being worked by the researchers nowadays. Rehab session usually involves experts that monitored the patients but lacking the experts itself made the session become longer and unproductive. This works adopted a dataset from UI-PRMD that assembled from 10 rehabilitation movements. The data has been encoded into spike trains for spike patterns analysis. Next, we tend to train the spike trains into Spiking Neural Networks and resulting into a promising result. However, in future, this method will be tested with other data to validate the performance, also to enhance the success rate of the accuracy. *This is an open access article under the CC BY-SA license.*

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1. INTRODUCTION

Physiotherapy, also known as physical therapy, is an ongoing treatment for those who struggling with serious illness such as stroke, Parkinson's, post-surgeries, etc. This therapy is extremely helpful in order for the patients to cope with their daily living tasks due to their movement's impairment. The assessment movements usually will be prescribed according to the patient's condition within their own pace as the movement for a patient may not be equally adequate for others [1]. Furthermore, the patients need to be monitored while performing the movements so that they executed correct movements and their progression can be tracked by medical experts. However, lack of experts makes physiotherapy session delayed and caused discomfort to the patients and the caregivers as well. Hence, technologies take places in assisting the experts conducting the session. Physiotherapy has caught interests of many researchers in regard to machine learning approaches. Different machine learning algorithms has been utilized for recognizing different types of physiotherapy movements, also recognizing different parts of the body.

Recently, neural networks architecture have been a favour for its flexibility and compatibility in a wide range of machine learning applications including computer vision [2]. In the last few decades, the 3rd generation of neural networks, spiking neural networks (SNNs) has been introduced. SNNs are said to be a promising paradigm [3] as it is practically efficient of modelling complex information as they are adequate to represent and integrate different information dimensions (time, space, frequency, phase). Their flexibility and self-organizing manner make it effortless when they are dealing with large volumes