Supervised Learning with Muscle Re-education of Hemiparesis patients: A review

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Abstract

Background: The focus of this article is on muscle re-education approaches using supervised learning programs. This also includes a discussion of whether or not this strategy is beneficial and convenient to utilize. Thereof adeficiency of resources and population-scale demands, following in-home rehabilitation, continues to be a question. Stroke is the main cause of hemiparesis, the creation of individualized classification methods, involving neural network-based algorithms, to identify rehabilitation activities completed by stroke patients. Wearable sensors based on accelerometry can be worn on both the upper and lower limbs, during therapy to capture movement data. Numerous techniques of supervised learning have been discovered useful in the processing of multimedia content and in machine learning lot of research, activity accounts for supervised learning. To help patients learn and grasp the training, a virtual reality game-based program can be created.

Keywords: supervised learning, machine learning, muscle, re-education, hemiparesis, stroke, paralysis, activities of daily living, strength, balance, robot, wearable sensors.

INTRODUCTION

Liu B. et al conducted a study, supervised learning is a machine learning action that implicates comprehending a process that transforms an input into an output using samples of input-output pairs (SL). This type of learning is analogous to how individuals develop new knowledge and improve their capacity to perform real-world activities by learning from their previous experiences 1-15.

Muscle re-education is the process of using suitable therapy procedures to restore normal or near-normal function to an injured or denervated muscle or muscle with a loss of control.

Stroke is one of the most common causes of long-term disability in stroke survivors. Mobility difficulties, language problems, and paralysis hurts one's quality of life16-25.

Hemiparesis is a condition where the arms, legs, and facial muscles can all be affected by this illness, which causes muscle weakness on one side of the body. While stroke is the most prevalent cause of hemiparesis, brain damage from trauma or head injuries, and cancer-related brain tumors, can also induce muscle weakness. There are a variety of re-educational therapies available to help restore the strength and balance of the patient26-30.

After Stroke, motor impairment is the most common deficit. Hemiparesis following a stroke has been shown to limit the muscle mass available for contraction during physical exercise, and weakness in the lower limb impairs mobility. This muscular weakness has a poor impact on balance, which, in turn, has a bad impact on health. Falls are more likely to occur as a result of this.
Dr. Logeshwari Selvaraj et al conducted a study, a frequent neurological defect after a stroke is the impaired walking function, which includes reduced gait stability and asymmetric walking. Balance issues, as well as strength limitations, can be a direct result of cerebrovascular accidents (CVA). These deficiencies frequently result in severe difficulty carrying out activities of daily living (ADL)31-40.

To discover more about the advantages and disadvantages of this methodology, we must first comprehend how supervised learning can be applied to muscle re-education procedures and aid in the improvement of patients' conditions.

We can have trained robots who can give the output patterns of motions according to the input data using supervised learning, which is machine learning that can be designed suitably, so that the patients can keep an eye on them and try to move their bodies in response. In the absence of the therapist, this can be beneficial to the patients.

Hemiparesis can be caused by different types of factors, including stroke, brain injury from trauma or head injuries, and cancer-related brain tumors.

SILIȘTEANU SC, ANTONESCU E, DUICĂ L. et al conducted a study, as a result, the goal of the discussion is to see if supervised learning may be used in conjunction with muscle re-educational therapy for hemiparesis. It is critical to have an individualized physiotherapy program that is tailored to each patient's functional needs, with the goal of increasing balance, gaining postural control, and eventually functional independence32.

Discussion:

Patients with hemiparesis can be given mat exercises for ADL such as rolling, crawling, and so on. These kinds of inputted physical exercises may be good for post-stroke individuals30.

The adult brain's capacity for remodeling has been grossly underestimated. Issues concerning the connection between behavioral and brain plasticity have been investigated in studies employing CI therapy. A growing number of studies looking into the scientific foundation of function recovery in rehabilitation show that the CNS has the ability to adapt and change31.

Wolf SL, Blanton Set al conducted a study, repetitive repetition of the exercises, as well as adequate training, can improve the ability to restore functional abilities33.

Espinoza Bernal VCet al conducted a study, in a semi-structured environment, customize machine-learning algorithms integrates with the Symmetric approach with information received from wearable sensors have a possibility to track rehabilitation therapies in persons having stroke. Personalized algorithms can be used to capture functional variations across stroke participants, which could lead to personified rehabilitation therapies that increase mobility.

Sahu A and Naqvi WM conducted a study, The brain structures that control the motor and learning processes are known to be considerably altered by repeated, rigorous, and arbitrary practice of functional tasks31-40.

Gait Restoration: The effects of supraspinal centers on gait characteristics in adults have largely been explored utilizing (TMS), (EEG), or commonness and time-domain analysis of muscle activation (EMG). The different physical therapies all aspire to rise functional ambulation, with ground gait training being the most significant. The majority of the patients improved their over-ground walking speed by altering the temporal rather than the spatial gait parameters.

Busam B, Esposito M, Che’Rose S, Navab N, Frisch B., et al conducted a study, Patient engagement is especially critical in robot-assisted upper-limb rehabilitation, which shows that intense motion training is advantageous to therapeutic outcomes both immediately after the stroke and in the long run31.

The status of patients with hemiparesis improves as a result of frequent training with these devices.

Apart from all the benefits that are discussed about technology, one key disadvantage is that it may be more expensive for humanity.
Conclusion:

Individualized supervised learning algorithms, according to the research, can be used to rehab activities and functional outcomes in resource-constrained contexts like LMICs.

The accelerated gait speed was mostly related to functional adaptation in temporal and kinetic variables at both ankle joints, as well as a depletion in compensating techniques on the unaffected side.

REFERENCES

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