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Healthcare Monitoring System for Lymphatic Treatment of Leg Pain: Finding the Related Evidence

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Abstract: *To reviews whether healthcare-monitoring systems for lymphatic treatment of leg pain fits any requirement related on its selected classification. Some reviewed articles will be asses to provide a relatable explanation regarding computational intelligence, double-loop feedback theory, healthcare system and healthcare monitoring system. Each criteria provide a basic strength to fit in healthcare monitoring system for lymphatic treatment of leg pain issues. The article comparison will produce profound results with proper justification to be embed in healthcare monitoring system for lymphatic treatment of leg pain. If the comparisons fit certain requirement on healthcare system, it will be applied into the system in a meantime.*

Keywords: Healthcare system, Lymphatic treatment, computational intelligence

1. Introduction

Review articles play an important role in adaptation of healthcare monitoring system for lymphatic treatment of leg pain because it will assist in keeping the up-to-date issues that related to it. Some paper led to biased results, which implement a sturdy decision and unbalance judgement into certain area. It will be a convenient to make a related comparison for this paper to treat the misguided information and proving whether is there any solution for each problem.

The reviews will extend a better judgement for stating a desired explanation between each problem. The systematic reviews aim to rely on the comprehensiveness of the article regarding the comparison that are should made. In this systematic review paper, the adaptation of health monitoring system for lymphatic treatment of leg pain will be divide into few categories that is computational intelligence, double-loop feedback theory, healthcare system and healthcare monitoring system.

2. Literature Review

Healthcare Monitoring System

Many different types of health monitoring systems have been developed and are now in use on hundreds of different web platforms. Without a doubt, incorporating the internet and online techniques into the systems aids in refuting the efficacy of the activity. As a result, patient health monitoring systems are built using the combination of communication and computing technologies (Imran et al., 2021). The healthcare monitoring system is an essential application for computing since it is prevalent in its sector (Shanmugasundaram et al., 2017), and it can help enhance the healthcare monitoring system and save patients' lives.

For 25 to 70 percent of all patients seeking care, a face-to-face appointment with a physician is not required in some of the circumstances outlined by (Barson et al., 2018). It is more convenient for them to have the online platform as their final option for resolution. Indeed, the healthcare monitoring system leads the medical sector in integrating cutting-edge technology in a way that is as effective as treating patients by hand.

Lymphatic Treatment of Leg Pain

The lymphatic system is a network of lymph veins, organs, and specialized cells that runs throughout the body. It is an important component of the body's defense against microbes. The lymphatic system, which works in tandem with the cardiovascular system to carry a fluid called lymph around the body, is a lesser-known element of the circulatory system. The lymphatic system plays an important role in the body's immune system (Abrahams, 2007).

As indicated by (Baig & Gholamhosseini, 2013), the expense of hospitalization and patient care, including leg discomfort, is predicted to rise around the world, although the main focus is on lymphatic system treatment. There have been a number of studies on the lymphatic system's role in the treatment of leg discomfort. All of these therapies, however, come at a cost and necessitate a visit to a clinic or hospital. Not everyone has the means or the money to visit a clinic or hospital for treatment. The expense of treating leg discomfort in a clinic or hospital is usually quite significant. However, the outcome of hospital treatment differs from person to person. Some people respond to treatment for a long time, others respond for a short time, while still others do not respond to treatment at all.

Compression is a popular way for treating leg pain. (Damstra & Partsch, 2013) Velcro adjustable compression wraps (ACW) and inelastic multicomponent compression (ICM) bandages were first used to treat leg lymphedema. Although this study is randomized, it is also a controlled trial. ACW achieved a significantly greater reduction in volume after 24 hours in patients with moderate to severe lymphedema of the legs than IMC bandages (Muluk et al., 2013) investigated the efficacy of an advanced pneumatic compression device (APCD) in lowering limb volume (LV) and evaluating clinician and patient-reported outcomes.

According to patient-reported outcomes, APCD treatment resulted in a considerable increase in the ability to control lymphedema, as well as an increase in function and a reduction in discomfort interference. The findings show that a reduction in LV and pain can be achieved, as well as functional improvement and patient satisfaction, resulting in a concrete benefit for lower extremity patients. (Rasmussen et al., 2016) suggested near-infrared fluorescence lymphatic imaging

(NIRFLI) as a non-invasive, real-time assessment of lymphatic contribution in the etiology and management of leg ulcers, as well as to determine the lymphatic impact of a single session of sequential pneumatic compression (SPC). The findings of this study confirmed that lymphatic dysfunction occurs early in the pathogenesis of venous ulcer formation and show that SPC therapy may be effective in eliminating access fluid.

3. Methodology

Regards to healthcare monitoring systems, computational results is necessary as it referred to producing a decision-making product for the lymphatic treatment of leg pain. The best way to identify the results is by applying the computational intelligence (CI) factors into the system. However, there are multiple selected choices offer by the CI that are fuzzy logic, neural networks, evolutionary computation, learning theory and probabilistic methods.

Computational Intelligence

There are details related to the types of computational intelligence will be discussed thoroughly. Fuzzy logic is a type of logic that will used to simulate human reasoning and cognition. Instead of strictly binary examples of truth, fuzzy logic allows 0 and 1 as extreme cases of truth, as well as different degrees of truth in between. It is based on the degree value of membership and truth-value and the measurement findings with the lowest amount of error are chosen; fuzzy logic can make recommendations for measurement results on lab work (Haddin et al., 2020).

As mentioned by (Wu et al., 2021), evolution and genetic theories as sources of inspiration and a generic problem-solving algorithm based on natural selection and population genetics is part of evolutionary computation. It employs the survival of the fittest selection mechanism to discover the best appropriate answer. Other than input two values to carried out the relationship between the vector, neural network can adjust the parameters in such a way that the network can predict the output value for fresh input vectors is part of the learning process. Thus, the predicting values can enhance the computational flexibility of the algorithms (Gharani et al., 2017).

Probabilistic method/framework inferring viable models to explain observable data is what learning is all about (Ghahramani, 2015). A machine to make rational decisions based on future data projections can use the models. Learning theory determine what types of issues are "learnable" by analyzing the design of machine learning algorithms. The theory will required for an introduction of new mathematical formulation especially on non-human animals (Ghirlanda et al., 2020).

There are difference in application of computational intelligence in terms of usage depending on what are the attributes was input. The methods can vary and produce advantages and disadvantages for instance an article by (Humadi & Hamoud, 2017) stated that the fuzzy logic method used are rigid onto certain mathematical calculation. (Tóth-Laufer & Várkonyi-Kóczy, 2015) Also mentioned the fuzzy logic framework had improve the membership function, which is the key framework. Since the mathematical calculation is included, the output will be complicated and flexible.

Using sensors and decision support system by (Hameed et al., 2020), application of neural network able to extract data through sensors and sorted in the cloud to produce a precise results. However,

framework used by neural network should provide clinical feedback in order to produce a precise results (Shahmoradi et al., 2019).

Learning theory and probabilistic methods also plays an important role in order to explain about the observable data by analyzing the algorithm. Even though the articles related to the methods are limited however, the idea of the framework used is convenient for researchers to plan a virtue experiment in future. In terms of infusing the framework into the healthcare monitoring system for lymphatic treatment of leg pain, each type conclude different approach depending on the structural system that being constructed. Either machine learning or computation are important to be included to enhance future experiment and research.

Double-Loop feedback Theory

Agile software development life cycle is widely used in double-loop learning, as it comprises iteration and incremental process that happens repeatedly. By applying, an agile approach tends to foster opportunities for double-loop learning rather than single-loop learning. The importance of team objectives in double-loop learning tends to correlate to agile methodologies' focus. Additional connections between agile and double-loop learning can be seen in the claim that single-loop learning focuses on learning how to execute a task efficiently, whereas double-loop learning focuses on deciding which task is the best to perform and when improvement is appropriate (McAvoy & Butler, 2009). Thus, the correlation between double-loop and agile is significant and emphasizes how the framework will become.

Double-loop feedback theory are suitable for running the research accordingly especially for the healthcare monitoring system for lymphatic treatment of leg pain. The framework stated by (Mohmoud et al., 2019) able to allow the correction of distortions and error in beliefs in the organization. Others, it also lead to acceptance of results and professional responsibilities. It is crucial for every system constructed to have a multilevel strategy, development loops of flexible phases to ensure the reproduction of the system at good state (Nyström et al., 2018).

An article by (Nilsson et al., 2018) also remind us to conduct an explorative design other than making an open-ended interviews to gain a qualitative analysis. The analysis is important in the healthcare monitoring system for lymphatic treatment of leg pain for ensuring the development process went smoothly. The system are bound to bugs and mistakes, in depth analysis should be acquaintance (Van de Klundert et al., 2020).

Healthcare System

Healthcare system widely known in medical fields. The system was introduced to ensure the patient's data would be secure accordingly. It includes having details regarding patient's confidential information and their medication history. The information should be protected by any means from intruders with bad intentions of disclose the data. According to (Lim & Greenberg, 2019), healthcare systems will ensure a continuing success of the feedback system, and validation of patients' safety. Others, implementation of the system are readily construct to collect data for evaluating effect on protocol stated by organization (Moody-Thomas et al., 2013).

Healthcare system can act as a guidance to an organization whether their expectation meets their requirement. Identifying a quality improvement are part of initiative for healthcare leaders to gain

a proper guidance through the systems (Barson et al., 2018). A suitable healthcare system may lead to a functional organization to run in order without troubling themselves into a problem.

Healthcare Monitoring System

Healthcare monitoring system differs slightly from healthcare systems. Their functional are to monitor patients into certain disease and conditions. There should be a target results for the system to achieve. In outmost condition, stabilising some factors that possibly affect a person condition. As (Vyshnavi, 2018) stated the monitoring system are used to organised the doctor's facility for checking the patient's conditions, for example, temperature, pulse, body developments, and eye blink conditions utilizing individual sensors. Apart from that, to provide, secure body area networks (BAN) access to the entire system without disturbing the confidentiality of patients' therapeutic data (Shanthapriya R, 2019).

Others, constructing a precise system will ensure the healthcare monitoring system to works in orderly manner. For example, using sensors to detect temperature and well-being of elders on daily basis propagate finest results throughout the whole process (Ranjitha Pragnya et al., 2013). Coding based design was a benefit in producing a sophisticated healthcare monitoring system. For instance, in (Peng et al., 2017) designing and constructing a linear network coding into healthcare monitoring system will ensure that the system able to generate linear independent coding combination for producing a convenient working space in installing patients' data. The instalment pre-requisite in order to meet the organization requirements. Each organization system differs to each other thus require a different stand-alone system to support their issues.

4. Conclusion

Each type of computational intelligence possesses different standard and usage. Some might interfere with machine learning and others includes mathematical induction. Fuzzy logic initially computes a true and false with precise decision as it counts every false decision as well as truth decision. Since the healthcare monitoring systems associate with mathematical indication, fuzzy logic stands out the most. Compared to neural network, the mathematical are more complex and implicit. The system cannot be easily interpreted or modified. Whereas for fuzzy logic, it can verify and optimized very easy and efficient.

Double-loop feedback theory is one of the software development lifecycles that comprises of agile methodology. Since the system are bound to construct and designed in a good proportion, the methodology is suitable as it proposes an incremental phase. The phase will ensure the productivity of the system at fullest condition. The whole process from designing to maintenance would not suffer any maximum loss since the bugs can be inspect since the early stage.

Healthcare system will keep the patients' data confidential. Lymphatic treatment of leg pain are associates in medical field thus fits the requirement of the topics. Patients' data will consist of personal and important medication information. Those details are required to be safe and secure in a system where it can protect the availability, confidentiality and integrity of data.

Healthcare monitoring system depicts important roles in determining what factors that needed to be monitor. Details in healthcare monitoring system for lymphatic treatment of leg pain required some attributes to be monitor and controlled in order to detect their condition.

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