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Stroke Healthcare System using (ANN) Artificial Neural Network

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Abstract - *This paper gives the identification framework based on the Multilayer Perceptron and Artificial Neural Network to support the medical teams in daily. We create stroke healthcare system for detection of the two types of stroke. First is ischemic stroke and second is hemorrhagic stroke. (ANN) Artificial neural network is useful for classifying two types of the stroke. It is android application so that it is easy to use by the patients. It consists of two types of module client side and server side. The patient just needs to login into the system add his medical history and upload the laboratory test result. So, using multilayer perceptron the patient will come to know about the type of stroke.*

Key Words: Artificial Neural Network, Cloud Computing, Multilayer Perceptron, Stroke detection.

1. INTRODUCTION

Information technology has been increased extensively in medicine industry over the last two decades. Data have become bigger and more challenging to handle since the data are created from different source of devices within a short time period. Therefore, it has become a concern to deal with the big data problem considering the fact that properties of such data are stored in different formats with the importance and they are also created quickly and correctly. This uncertainty must be handled, especially when patient is doing an activity remotely. Thus, a fast and reliable stroke detection system is desired so that patients have the opportunity for early stroke treatment. A result of the ischemic stroke is 3.0 million deaths and 3.3 million deaths from hemorrhagic stroke. In the research it is find that about half of people who have had a stroke live less than one year this is the real condition. Stroke occurred in people age 45 and older and also in two third occurs in 68 years old patient. Information technology has been utilized extensively in medicine over the last two decades. Providing a more convenient service and environment of healthcare has become one of the most important topics to handle in the domain of healthcare applications and services. Information technology has been utilized extensively in medicine over the last two decades. Accordingly, data have become bigger and more challenging to handle since the data are created from different source of devices within a short time span. Therefore, it has become a concern to deal with the big data problem considering the fact that characteristics of such data are stored in Different formats and they are also created quickly. Providing a more convenient service and environment of healthcare has become one of the most important topics to handle in the domain of healthcare applications and service. In our day, mobile healthcare investments have been on the rise so that the patients can have agency and control over their health status. Ischemic stroke happens when a blood vessel that carries blood to the brain is obstructed by a blood clot. This situation causes blood not to reach the brain. High blood pressure poses a major risk factor for such type of stroke. Ischemic stroke happens 87%approximately among all other types of the stroke. The others are being cardio embolic and cryptogenic stroke. Stroke is a chronic disease that is a cause of major public health crisis globally. About 795,000 people experience a new or recurrent stroke every year and there are about 130,000 deaths due to stroke. Stroke happens to be the fifth foremost reason for death. The following facts are also revealed by researches: stroke happen every 40 s and someone dies from stroke every 4 min. In addition, about 80% of stroke cases can be prevented.

2. RELATED WORK

Very few researchers have investigated the possibility of wearable stroke detection systems. Mobashsher et al and Mohammed et al developed microwave-based stroke detection systems; however, the use of microwaves for a wearable device has problems with safety and portability. On the other hand, the possibility of stroke detection in the acute stage from blood samples has been shown however, such methods need blood sampling. Recently, an application area of HRV-based analysis has been expanded due to advances of a wearable sensing technology and machine learning algorithms. Related to security another

issue at stake is confidentiality in health reports. This study is conducted by Li, Yu, Zheng, Ren, and Lou (2013). Since personal health record is often outsourced to be stored at a third-party confidentiality and privacy become an emerging concern in health information exchange. To ensure the patients' control over access to their own personal health record, encryption of such records is a solution offered as a scheme for dynamic modification of access policies or file attributes and relevant stuff. They present the assurance of scalability, security and efficiency as a result of their study.

3. METHODS

The purpose of this paper is to develop an stroke detection system using ANN and MLP Algorithm. The information is available in the "cloud" from which it can be processed by stroke patients, expert systems and/or distributed to medical staff. ANN is used for training data and determining the new data of an individual patient. Client application is developed for Android mobile devices. For these reasons, Android is considered to be the world's most popular mobile operating system. Our method is based on the steps specified below:(a) Demographic information, medical history, results of laboratory test, treatment and medication data are to be entered into system. (b) Such data will be utilized for the identification of stroke subtypes for the patient healthcare, and related information is to be collected by Android based mobile phones. (c) Stroke patients will be informed on their health condition and lifecycle developed on cloud, which provides an ANN application programming interface. (d) The process of collecting, processing and making a decision based on the patient's data, from Android mobile phone is ensured.

3.1 Application of ANN

Medical information systems in different clinical and health settings have become more widespread. This trend, on the other hand, has come along with its major complications and issues as well in terms of extracting useful information for decision support systems. This system utilized in the current study address medical data and knowledge domain in diagnosing patients' conditions as well as recommending appropriate treatment modes for the patients. Traditional manual data analysis has become inefficient and new methods like the using of ANNs for efficient mobile-based analysis are very important for diagnosing illnesses. In this study, three layered Multilayer Perceptron (MLP) feed forward neural network architecture has been utilized. The network consists of the different connections, each connection providing the output of one neuron as an input to another neuron. Every connection has a certain weight associated which indicates the importance. The given architecture of the neuron has multiple input and output values. The outputs in the ANN model are cardio embolic and cryptogenic stroke.

3.2 Application of MLP (Multilayer Perceptron)

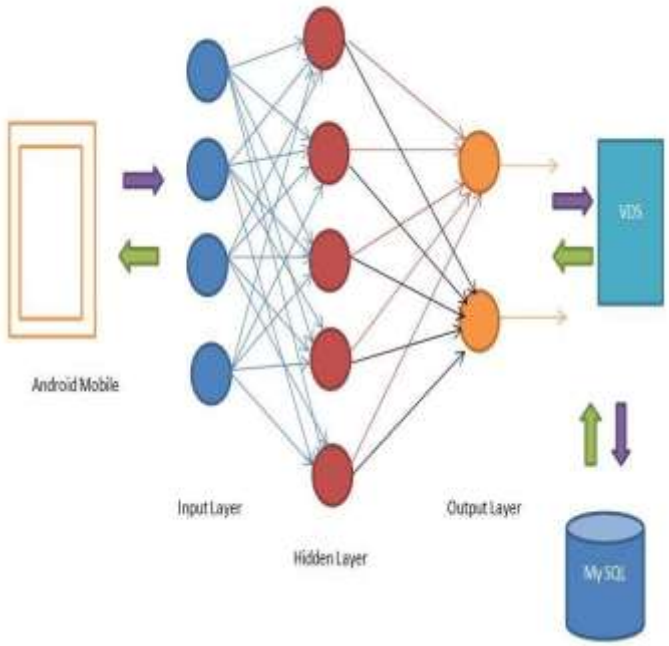

Figure.1. MLP Algorithm for stroke healthcare system

The MLP model for diagnosing the two of the stroke subtypes. A multilayer has the three set of layers. A Cloud computing provides big data set of services that enable applications or data to be accessed from any platform via the Internet. Data analysis is very fast because the cloud computing service has a high processing power. In this study of ours, Transmission Control Protocol (TCP) socket structure is utilized for the communication between mobile and cloud. The TCP socket structure provides complete input of data using the Client Server architecture for communication implementation and input layer, a hidden layer and an output layer. Each neuron uses its linear activation function except the input layer. Non-linear and multiple layers are distinguishing multilayer perceptron from a linear perceptron. User-generated content is made up of data nodes and adapters for Android based mobile telephone data from the Internet, which provides a unified system access interface. Through this, stroke data can be classified so that the availability and security of the data transmission can be good.

4. EXPERIMENTAL RESULT

This part of the study is concerned with theory and calculation in formation and implementation process of the Stroke Diagnosis Healthcare System.

4.1 Theory/Calculation:

When stroke patients do not have sufficient information about their illness and health status, it is not possible for them to have an effective communication with their physicians. When the patients are incapable of carrying out the control of their own health, or when they neglect their health, it is possible that they encounter conditions such as severe even death or harm. We suggest solution as Stroke Diagnosis Healthcare System that is the system allows the patient to conduct the control of his/her own illness. In this way, the patient becomes more aware of his/her status and can direct himself/herself towards preserving his/her life quality. Stroke patients need tools which are easy to use available for them at any time during their daily lives. Smart and efficient clouds which are user-friendly in terms of programmability and productivity will be helpful in this respect. In this study, we have preferred the cloud computing because today's digital technology can provide data analysis over time via devices equipped with high processing power. Knowledge-based Oriented Stroke Healthcare System is the most representative big data application, which is supported by data mining and machine learning technique, termed as ANN. It is also possible to identify and train as well as test Stroke data diagnosis and dependence. Cloud and big data are regarded as important techniques and they have also become the trend in healthcare innovation. Currently, medicine relies upon specific data collection and analysis techniques more than ever. Cardio embolic and cryptogenic stroke patients will be informed regarding their diseases before they meet up with their doctors. The information and knowledge base can be enriched and shared by physicians via the cloud. The stroke patients can also participate in medical activities assisted by big data in an active way. The medical right is to be enjoyed by the patients through the use of mobile phones as well as cloud computing.

4.2 Work flow

Steps to be followed by the Client in the server as the user:

- The patient enters the system from the screen with his/her user name, e-mail address as well as the password.
- The server performs the identity verification of the patient who wants to log into the system. The patient can monitor the patient data (analyses, etc.) about his/her history.
- If the patient is not registered in the system, he/she registers/signs up the system through the user screen.
- The server gets the new patient register information and adds it into the database.
- The patient who signs up recently for the system has their patient data, and it is by the doctors as up-loaded into the system.
- The patient data uploaded onto the system is trained by the server. (In order for the training procedure to be performed, ANN algorithm will be utilized).
- The user will receive a message concerning the subtype of his/her stroke disorder in the system, and for the patient who will be sign up.
- A result, the type of the disorder regarding the patient data trained by the ANN algorithm is identified and this result is sent to the patient in the form of a message.
- Patient can compare the results of the analysis by displaying the information of previous years result.

Server-Side Steps

- More than one patient (client) can access to the system at the same time.
- Reminder messages will be sent to the patient for his/her doctor examinations/follow-up visits.
- The past disorder data and recent information concerning the patient should be stored in the server (cloud) system.
- The patient details should be kept confidential in the server.
- It is possible that the patient has uploaded his/her data in-accurately to the system.
- For the patient to update his/her in-formation, the patient should be permitted to do changes/arrangements in the system once again for the correction.
- The patient may have loaded data on the system incorrectly. In such a case, permission is required to do following requirements,

4.3 Final Requirements:

The patient logs out from the system. If the patient does not do any transaction for 5 min while he/she is still in the system, he/she is automatically logged out. The patient may have incorrectly loaded data on the system. In such a case, permission is required to update the patient in-formation.

5. IMPLEMENTATION:

Step 1: The implementation of the ANN model on Virtual Dedicated Server.

1. Android based mobile phone user interface is provided by Android operating system.
2. Stroke Diagnosis Healthcare System provides a software with healthcare services supported by a window cloud-assisted system, and communication to the stroke patients by proof of concept.
3. Cloud healthcare system ensures a rich networking, computing and resource for sensory data analysis and health modelling.

Step 2: Mobile Application for the client stroke patient Mobile application is the client application that the patients can register and send their new analysis information/data. Server application, on the other hand, consists of two main modules: ANN module and server module. Server application also saves the data that come from the patients.

Step 3: Using and storing patient information for ANN Train ANN module has been used to train the data. After the training, the module to get result of data which belongs to a registered patient is to be used. MPL algorithm is used in ANN module. Configuration properties such as learning rate value can be configured for the system.

Step 4: Identification of subtype and tracking based on the server-client The Stroke Diagnosis Healthcare System has 19 input patient attributes. The ANN process is applied for attributes and called 2 output for subtypes of stroke on server. Finally, the result is displayed in the android application.

6. CONCLUSION

Stroke Diagnosis Healthcare System ensures that the patients can learn about their stroke type and also compare the results of the analysis by displaying the information pertaining to previous years. In this way, it will be possible for the stroke patients to have control and agency over their problem, and preserve their life quality accordingly. Stroke Diagnosis Healthcare System will also have an economy related benefit by helping to curtail the costs related to healthcare. As for future direction, our model aims at serving through and web application and it will be run through IOS and PC as well. Moreover, Stroke Diagnosis Healthcare System is to be improved in a way in which it will be able to perform the diagnosis and classification of different disorders at the same time under the name of Diagnosis Healthcare System.

7. REFERENCES

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