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A CLOUD BASED APPROACH FOR HEALTH CARE MANAGEMENT

K. SHANTHA SHALINI*, R. SHOBANA, S. LEELAVATHY and V. SRIDEVI

Department of Computer Applications, Aarupadai Veedu Institute of Technology,
Vinayaka Missions University, CHENNAI (T.N.) INDIA

ABSTRACT

This paper focuses on a health care monitoring using a new class of technology named Internet of Things (IoT). IoT is the internetworking of things like mobiles, laptops, sensors etc. IoT is used to sense the current health status of the humans from anywhere at any time and to store the results in the cloud. The existing health care system is available with temperature sensor, blood pressure sensor, heart rate sensor etc. The proposed work is used to implement the existing sensors along with a new brain sensor. This brain sensor reads the mind waves of the human brain through a technique called electroencephalography (EEG). EEG is the recording of electrical activity along the scalp. EEG measures voltage fluctuations resulting from ionic current flows within the neurons of the brain and it will upload the mind waves to the internet (Internet of Brains).Once there occurs an issue or damage to the brain of a person, whose brain waves are already uploaded, using this technology we can bring back the person into the normal mode. In the course of time, this technology is going to play a vital role in the field of medicine.

Key words: IoT, Cloud, Sensors, EEG.

INTRODUCTION

In recent years, we have observed the use of Internet for various health care related reasons from the perspective of end-users, especially patients. The users, who when being ill-used to depend only on the doctor and his treatment, now want to take control over their health and the healing process. We have seen a rising interest in sensors and today several devices are commercially available for personal health care, fitness, and activity awareness. In addition to this, researchers have also considered applications of such technologies in clinical applications in remote health monitoring systems for long term recording, management and clinical access to patient's information.

*Author for correspondence; E-mail: shanthashalini@gmail.com, shobanasenthil29@gmail.com

Now a days health care industry is growing enormously. A health care becomes a big issue due to lack of availability of doctors.Some healthcare organizations have started using wireless senor networks to remotely monitorpatient health. Many healthcare organizations and insurance companies have also started using the electronic medical record (EMR) system by which the medical records are maintained in a centralized database in the form of an electronic record and the records are stored in the cloud.

This type of system is capable of generating EMR of patients which will play a beneficial role for patient's diagnostic and rapid improvement process as well as for medical practicing doctors who need vast medical cases for their own study purpose. The paper proposes an approach where the health status of a patient is retrieved and delivers health-promoting messages. The proposed system focuses on collection of patient's vital health parameters and generates alert to care takers, doctors so that immediate action can be taken in case of emergencies. The data is then stored in cloud so that data can be accessed via Internet from anywhere anytime.

EXPERIMENTAL

Literature review

Data mining and cloud computing

Data mining and cloud computing are the rising trends in the current world of information technology. Data mining is a process of extracting information from the raw data. Data mining has been a successful tool to analyse data from different angles and getting useful information from data. It can also help in predicting trends or values, classification of data, categorization of data and to find correlations, patterns from the data and Cloud computing provides scalable and flexible infrastructure, which provides everything as a service. Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, services) that can be rapidly provisioned and released with minimal management effort or service provider interaction Cloud computing is the delivery of computing and storage capacity as a service to a community of end recipients.

Cloud computing entrusts services with a user's data, software and computation over a network. Integrated data mining and Cloud computing provides agility and quick access to technology. The result of such integration will create the conditions for the efficient mining of large amount of data from various data warehouses. In this approach the history of the patients like blood pressure, sugar will be first stored in the cloud. The user can be patients or care takers. Patient's details can be stored in the form of text or images like scan reports, x-

rays in a secured manner. Mining algorithms can be used to retrieve the patient's data whenever required. Patients need not required carrying their medical reports wherever they go; everything can be retrieved from the cloud by the nearby doctors with the help of registered users. Even the patients can store their insurance details that will help them during emergency.

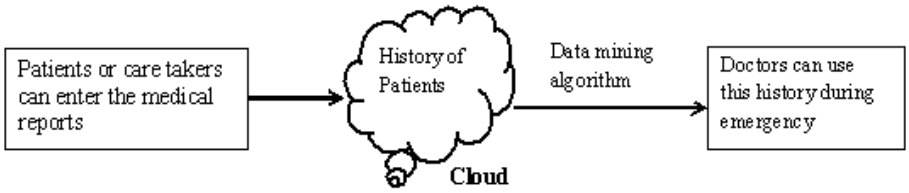

Fig 1: Integrated data mining and cloud computing

Internet of things

Integrated data mining and cloud computing method is used to store and retrieve the electronic medical records whenever needed. But, technology plays the major role in healthcare not only for sensory devices but also in communication, recording and display device. It is very important to monitor various medical parameters and post operational days. Hence the latest trend in health care communication method using IoT is adapted. Internet of things serves as a catalyst for the healthcare and plays prominent role in wide range of health care applications.

IoT is generally considered as connecting objects to the Internet and using that connection for control of those objects or remote monitoring. IOT is creating a brilliant, invisible network, which can be sensed, controlled and programmed. The products developed based on IOT include embedded technology, which allows them to exchange information, with each other or the Internet. IoT (Internet of Things) is used to alert the care takers or doctors when the patient is in critical condition. IoT refers to any physical object to create a more efficient hardware system in terms of time, energy and cost.

By embedding IoT enabled devices in medical equipment, health care professionals will be able to monitor patients more effectively and use the data gleaned from the devices to figure out who needs the most hands on attention.

IoT is the networking of devices like laptops, sensors, mobiles etc. It is mainly used for unconscious patients, patients in ICU and ambulance, babies in incubator and so on. If the patient crosses their threshold level in (heart rate, BP, temperature) an alert message will be sent to registered doctors for further treatment.

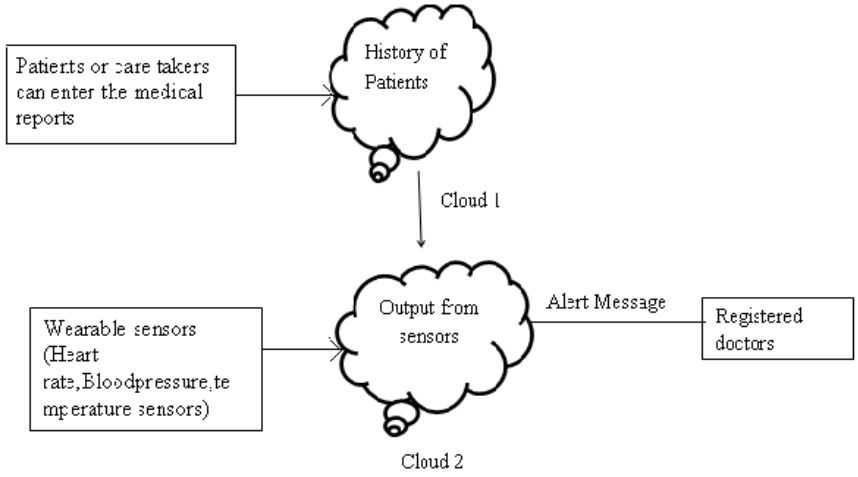

Fig. 2: Internet of things

Methodology proposed

A new brain sensor is introduced, which can be used along with other sensors. This brain sensor will read the human mind waves and upload it to the cloud. While storing the history of patients, mind waves can also be put into the cloud, this can be used in the future if the particular patient's brain is not working (like brain tumors, sleep disorders, coma and brain death). Brain is the main part of our body, which sends electrical impulse to the parts of the body via nerves. These signals are called as synapse. So we use sensors/electrodes to decode that electrical activity over the brain and send it to the device.

Electroencephalography (EEG) is the recording of electrical activity along the scalp. EEG measures voltage fluctuations resulting from ionic current flows within the neurons of the brain. It performs the recording of the brain's spontaneous electrical activity over a short period of time, usually 20-40 minutes [citation needed], as recorded from multiple electrodes placed on the scalp. Diagnostic applications generally focus on the spectral content of EEG, that is, the type of neural oscillations that can be observed in EEG signals.

Brainwave speed is measured in Hertz (cycles per second) and they are divided into bands delineating slow, moderate, and fast waves. The activity measured using EEG can be very detailed and complex, and dependent on the area of the brain the different levels of activity are

1. Delta waves – (0.1-3.9 Hz) - When in a deep, dreamless sleep. New-borns sleep in this stage.

2. Theta waves – (4-7.9 Hz) - Dreaming sleep (REM), this is the goal for meditation or self-hypnosis.
3. Alpha waves – (8-13.9 Hz) - Relaxed, daydreaming and watching TV.
4. Beta waves – (14-30 Hz) - Awake state. Engaged in activities and conversation.
5. Gamma waves – (31 Hz+) -Hyper alert, good for insights and higher learning.

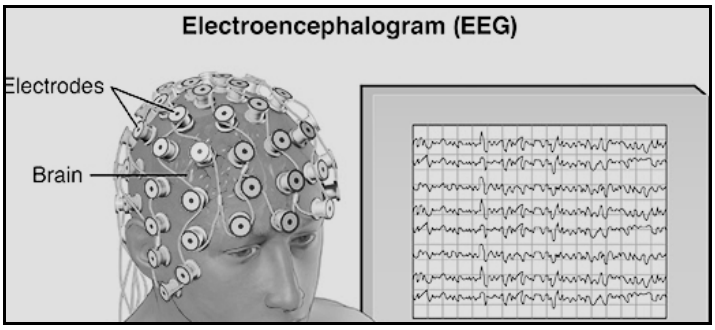

Fig 3: Brain waves

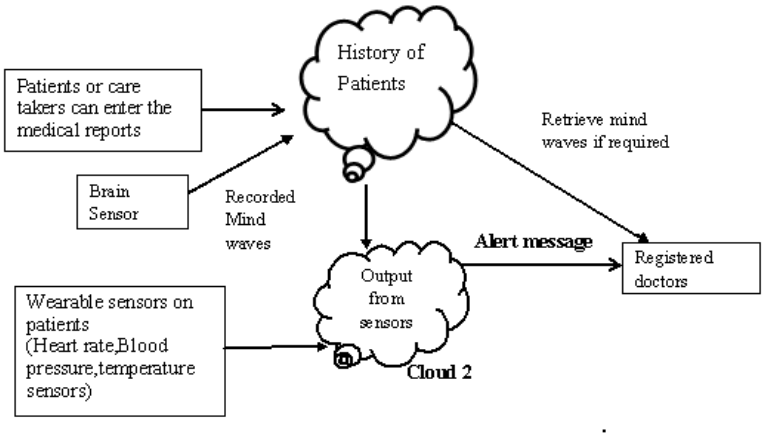

Fig 4: Health care system with brain sensor

CONCLUSION

This paper presents a review of data mining services in cloud computing, Internet of things (IoT) in health care applications. We propose a secure healthcare system in cloud computing environment. It helps to analyse patient data to provide right intervention to the right patient at the right time. The proposed work is mainly to introduce a new generation of healthcare system that are able to provide services of high quality and low cost to the

patients using cloud computing, data mining and IoT, Internet of Brains technologies. This paper also put forwards the idea to carry a wearable headband that is easily connected to any device, which acts as a medium to transfer data to the cloud network for analysis. It provides the ability to use EEG signals for monitoring brain signals, which can be recorded and used when brain has some injury

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