Bigdata Analysis For Healthcare Applications Using Cloudlet And Mcc

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Abstract --- *Healthcare Information Technology (HIT) hascreated the ability to electronically store, maintains, and move data across the world in a matter of seconds and has the potential to provide healthcare with tremendous increasing productivity and quality of services. It permits each provider to have his own database of patients' Electronic Medical Records (EMRs). The pervasive lifestyle incentive management can be used for paying healthcare expenses and other healthcare charges. Mobile Cloud Computing (MCC) is set to benefit the cloud-healthcare system.MCC healthcare system was built to capture and analyze real time biomedical signals, such as ECG and blood pressure from users in different locations. On the mobile devices, a personalized healthcare application is installed and health data are synchronized into the healthcare cloud computing services for storage and processing. In this proposed work, the effective mechanism has been created to create the health care communications through the mobiles with the cloud system. It is well-known that healthcare applications require large amounts of computational and communication resources, and involve dynamic access to large amounts of data within and outside the health organization leading to the need for networked healthcare. It is concentrated with the data fetching and storage in cloud through the big analytics approach to manage the large amount of data.*

Keywords: *Electronic Health Records, Big Data, Mobile Cloud Computing, Healthcare Systems, Cloudlet.*

I. INTRODUCTION

Nowadays, technology has rapidly risen from sticking to a single working area to variable locations depending on many factors including comfort and high speed table internet connection. Those factors emerge the use of mobile computing for an easier life. Therefore, mobile computing continues to be a main service in data communication and networking technologies [1].

Mobile Computing is a technology which allows sending and receiving data to any other wireless enabled device without having to be connected to a fixed physical link. As shown in Figure (1), mobile computing include using small size portable computer to run standalone applications through wireless networks or 3G, 4G technology [2].

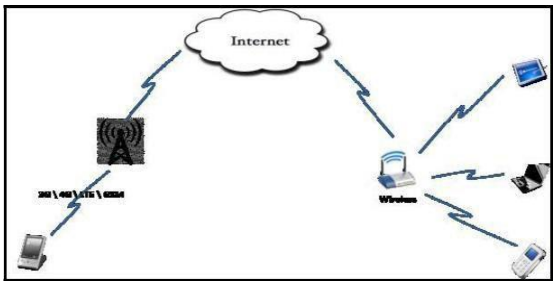


Fig 1: Mobile computing

Another recent raising technology trend is the cloud computing that integrates different technologies to build a new type of the organizations IT infrastructure. In cloud the technology is used when you need it and for as long as you need it without installing it on your machine. All resources you need (hardware and software) are provided for you as a service by another vendor and accessed over the Internet in an efficient and easy way [3] as can be seen from Figure 2.

Fig 2. Cloud Computing

The cloud computing environment contains set of scalable resources that include hardware infrastructure, storage, computation platforms, software and applications, which can be provisioned as a service to the user reducing the cost and application hosting and storage [4]. Examples of cloud computing infrastructures and platforms are Microsoft Azure, Amazon EC2, and Aneka [5]. Also, the cloud services might be deployed as public, private, hybrid or community cloud [6], allowing access to the stored information from anywhere at any time. So, in conclusion, cloud computing can be used in environments that require cost and time efficiency, backup and recovery, and enhancing productivity [7].

The revolution in healthcare data size is another problem in today's Healthcare Information Systems (HISs). This revolution is not just about the massive size of healthcare data, but we also witness an exponential increase in the speed in which this data is generated and a complex varieties of data type (i.e., structured, semi structured, unstructured). The Development of new technologies such as capturing devices, sensors, and mobile applications is a major source of healthcare data. Additional sources are added every day; patient social network communications in digital forms are increasing, collection of genomic information became cheaper and more medical knowledge/discoveries are being accumulated

In this paper, we introduce efficient and secure Mobile Cloud Computing (MCC) model that is based on the Cloudlet scheme. In the new model, the mobile devices don't need to contact the cloud server and instead contact the Cloudlet. This will allow users to connect directly to cloud resources using cheaper technologies such as Wi-Fi.

II. RELATED WORK

The authors [8] discuss the emerging sensing paradigms, and formulate an architectural framework for discussing a number of the open issues and challenges emerging in the new area of mobile phone sensing research. The technical barriers are related to performing privacy- sensitive and resource-sensitive reasoning with noisy data and noisy labels, and providing useful and effective feedback to users.

An important challenge in mobile cloud computing is the energy consumption and in most of the mobile devices the energy drains very fast resulting from the battery.

The authors of [9] gave a survey of MCCs which includes: definition, advantages, architecture, and applications (mobile commerce, mobile learning, mobile health care, and mobile gaming). They also describe the MCC issues (low bandwidth, availability, heterogeneity, computing offloading, and enhancing the efficiency of data access), and list the existing solutions.

The author[10] investigates the relationship between the energy consumption of a localization application and the strength of the GPS signal. This is an important focus because location based applications are among the top power-hungry applications.

The results from the measurements of the two applications to derive a mathematical model that describes the power consumption in smart phones in terms of SNR and the TTFF (Time To First Fix). The results from this study show that higher SNR values of GPS signals do consume less energy while low GPS signals causing faster battery drain (38% as compared to 13%).

To the best of our knowledge, this is the first study that provides a quantitative understanding of how the poor strength (SNR) of satellite signals will cause relatively higher power drain from a Smartphone's battery.

The author [11] propose a secure cloud computing model based on data classification. The proposed cloud model minimizes the overhead and processing time needed to secure data through using different security mechanisms with variable key sizes to provide the appropriate confidentiality level required for the data. The proposed model was tested with different encryption algorithms, and the simulation results showed the reliability and efficiency of the proposed

framework. The author [12] focuses on file editing, video streaming and collaborative chatting which are representative enterprise application scenarios

III. PROPOSED MOBILE CLOUD COMPUTING ARCHITECTURE BASED ON THE CLOUDLET SCHEME

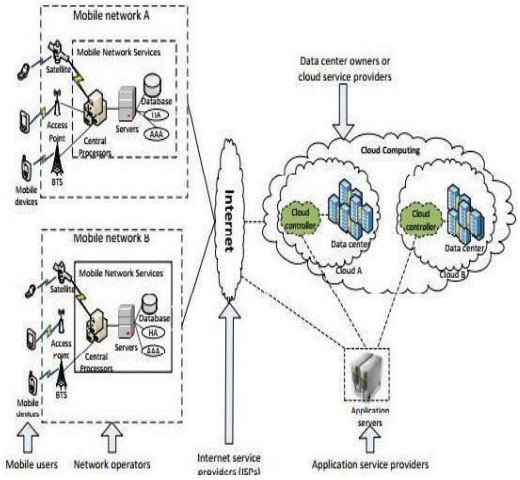
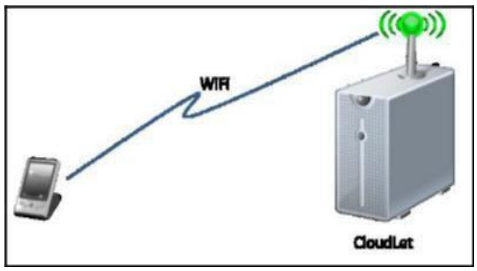


Fig 3: Cloud computing Architecture

Figure 3 shows the classical architecture of mobile cloud computing model. As can be seen from the figure, the mobile devices (can be laptops, Smartphone, or any other mobile device) are connected to the mobile networks through base stations, access point, or satellite by 3G/4G, LTE, WIFI, or GPRS. When a mobile user requests information, the requests are transmitted to the central processors of service providers. The mobile network operators provide mobile user's authentication and authorization and deliver all the requests to a cloud through Internet. Then, the cloud controllers process the requests to provide the corresponding services.

The Cloudlet scheme is proposed to overcome and improve some limitations in the classical mobile cloud computing models. The cloudlet shown in Figure 4 is a trusted, resource- rich computer or cluster of computers which are connected to the Internet and available for use by nearby mobile devices. Thus, mobile users may meet the demand for real-time interactive response by low-latency and high-bandwidth wireless access to the cloudlet [13]. If no cloudlet is available nearby, the mobile device may send requests to the enterprise cloud.



.Fig 4: Cloudlet Scheme

The new proposed Cloudlet-based MCC model is shown in Figure 5

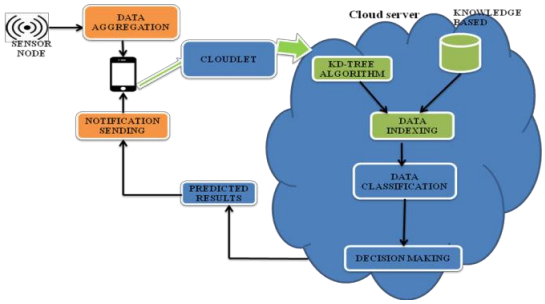


Fig 5: Cloudlet-based MCC Model

In this model we aggregate the details form sensor nodes. it will send to mobile phones. Using of cloudlet infrastructure the details can be connected to the cloud server.

A. *DATA COLLECTION*

The data's can be Senses from Body area network (SENSORS) and it can be Pass information into mobile Phones. It checks Periodically senses &send to the mobile Phones.

B. CLOUDLET

Cloudlet is a gateway which governs and controls a cloud. It consists from group of distributed and connected cloudlets (through Wi-Fi) at the same level. All of these Cloudlets are connected (through Wi-Fi) to the master Cloudlet. In the proposed MCC model, the mobile device makes connection to obtain the cloud services scenarios.

C. INDEXING

In this healthcare application, it provides Speed accessing of data to the cloud users. So provide the speed of accessing and reducing of time delay means of providing the best indexing techniques. So it can give by the "MULTI

ATTRIBUTE DATABASE INDEXING".

In this indexing techniques, we can Performing KD- TREE Algorithm .in this algorithm mainly used for reducing the access of the memory space.

The following shows the algorithm of the KD-TREE

Step 1: For node N with level(N) is even, then every node M under N.llink has the property that

$$M.xval < N.xval$$

and every node P under N.rlink has the property that

$$P.xval \geqq N.xval.$$

Step 2: For node N with level(N) is odd, then every node M under N.llink has the property that

$$M.yval < N.yval$$

and every node P under N.rlink has the property that

$$P.yval \geqq N.yval$$

Where xval and yval denote the coordinates of x and y, respectively. llink and rlink are the pointers to the left child node and right child node, respectively.

D. PREDICTIVE ANALYSIS

In this module we predict the condition of the patients and also predict the treatment type by using of the indexing values of the patients data. The predictions may be the patients either stays in hospital or home, the treatments can be any first aid or it can only provided by the doctors. In this prediction we mainly focus on, the patients either can be in critical stage or normal stage.

In our proposed cloudlet model. It consists from group of distributed and connected cloudlets (through Wi-Fi) at the same level, and all of these Cloudlets are connected (through Wi-Fi) to the master Cloudlet. The Master Cloudlet is responsible for management and in turn is connected to the Enterprise Cloud (EC). In the proposed MCC model, the mobile device makes connection to obtain the cloud services.

II. CONCLUSION

The model overcomes many of mobile devices challenges such as limited storage, processing power and short battery life time. Moreover, in our model, the mobile devices don't need to communicate with the enterprise cloud server and instead contact the Cloudlet. This will allow users to connect directly to cloud resources using cheaper technologies such as Wi-Fi rather than 3G/4G to obtain the cloud services. Using the WiFi results in less network latency, higher throughput, and less energy consumption.

This paper proposes a framework for secure Health Information Systems (HISs) based on big data analytics in mobile cloud computing environment. The framework provides a high level of integration, interoperability, and sharing of EHRs among healthcare providers, patients and practitioners. The cloud permits a fast Internet access, sharing, and provision of EHRs by authenticated users. Big data analytics helps analyze patient data to provide right intervention to the right patient at the right time. The proposed framework applies a set of security constraints and access control that guarantee integrity, confidentiality, and privacy of medical data. The ultimate goal of the proposed framework is to introduce a new generation of HISs that are able to provide healthcare services of high quality and low cost to the patients using this combination of big data analytics, cloud computing and mobile computing technologies.

III. FUTURE WORK

Modelling methods that leverage high performance computing and big data technologies will be required in designing such complex networked healthcare systems. Further studies are needed on the integration of mobile cloud computing and healthcare applications to design realistic networked healthcare systems that are able to provide personalized medicine.

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