IOSR Journal of Engineering (IOSRJEN) **www.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
Special Issue || March. 2022 || PP 08-13
National Conference on Innovations and Research in Science & Technology (NCIRST-22)

A Unification Model of Mobile Cloud Computing & Big data for Health care Systems

Mrs. Shwetal K. Patil[1], Dr. Satish N. Gujar[2], Dr. Pradhnya M. Wankhade[3]
[1](Research Scholar in Computer Engineering, JJT University, India)
[2, 3](Research Guide in Computer Engineering, JJT University, India)

Abstract: *In today's health care Era Massive amounts of structured, unstructured, and semi-structured data have been generated by a variety of institutions around the world, and this data is collectively known as big data. Big data analytics enable extracting value from data having four Vs: volume, variety, velocity, and veracity and Challenges in Big data analysis about Health Care. Again Mobile cloud computing integrates mobile and cloud, it's nothing but computing to on-demand ease of use of computer system resources, storage, power and benefits and overcomes their limitations, such as restricted memory, CPU command, and battery living. This paper examines the importance of mobile cloud computing and big data analytics in enabling network health care. This study also introduces MCC and the hierarchical model, through which this system achieves a respectable routine of healthcare services at any time and at any location, while also maintaining the privacy and security of the consumer's private information (patient).*

Keywords*: Big Data Analysis, Mobile could computing, Big data analytics, Healthcare systems, Mobile cloud computing.*

I. Introduction

Cloud computing is the delivery of lot of services through the Internet. These resources consider tools and many applications like data storage, servers, databases, networking, and software. In Cloud computing consider a large collection of systems are connected in all networks. The use of this technology, the cost of computation, application hosting, content storage and delivery is reduced significantly. The difference that cloud computing brings compared to traditional concepts of "grid computing", "distributed computing", "utility computing", or "autonomic computing" is to enlarge horizons across organizational boundaries[4]. Mobile Cloud is a combination of two services which are mobile development with cloud-based services. Storage, mobile applications, mobile computing, and mobile services are all offered via cloud in the context of mobile cloud. Despite the fact that mobile devices have native apps and resources, practically all of the processing is done on a remote cloud server, and every application is accessed through the browser rather than locally. They are part of our everyday routine to assist us with a variety of tasks such as determining our location, time management, image processing, hotel bookings, selling and purchasing online, and staying in touch with others. Also, there are mobile applications to help you measure and manage your health through applications for blood pressure, walk, exercises, and weight loss [3]. The mobility of mobile devices (Figure 1) has revolutionized the way people use various technologies all around the world. They provide remote systems & process inputs, enterprise app-store, public/private cloud platforms, mobile middleware MEAP, ligancy enterprise IT infrastructure enterprise security policies and business users in multiple roles. All these features of mobile devices and integrating them in our life speed up the transition towards smarter cities Moreover, integrating the mobile devices with cloud computing to utilize the boundless service provided by the cloud through the mobile device results in what is known as Mobile Cloud Computing[6]. Rather than focusing just on mobile, a firm can benefit from combining a mobile approach with a more mobility-centric approach.

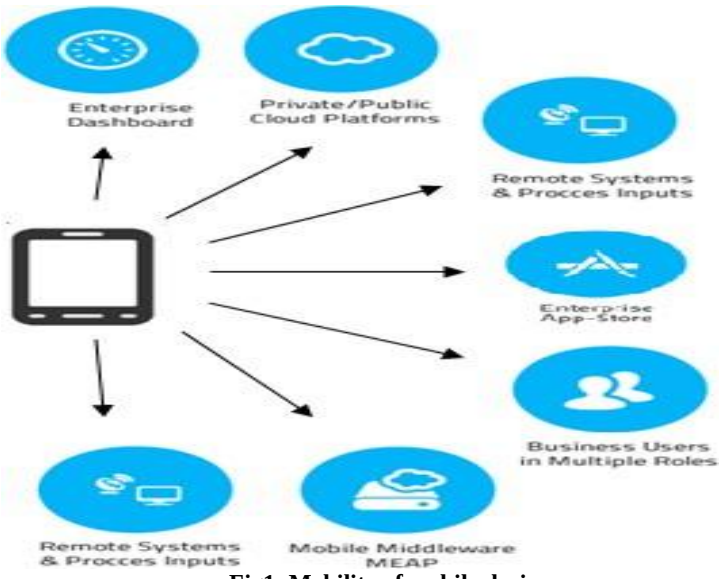

Fig1: Mobility of mobile devices

When mobility and mobile are combined, the larger context of mobility allows the mobile infrastructure to be more comprehensive and adaptable. It's critical for organizations to adapt to changing workplace attitudes, particularly in terms of mobility and mobile devices, or risk being left behind. Businesses will manage mobile issues with a stronger focus on their overall company impact if they adopt a mobility-centric approach. Businesses will just create mobile technology without any context if they do not adopt a mobility approach.

II. Related Work and Terminologies

D.West.at el [3], In this paper, Authors proposed a technology for mobile cloud computing. It check our blood pressure, heart rate, and other vital signs using mobile devices and sensors. As a result, people may check their health conditions from the comfort of their own homes. As a result, mobile cloud computing technologies are gaining traction in the creation of health-care apps. The use of big data logistics in health care is also becoming more common's. Kumar et al [5] This article discuss the effect of big data in healthcare and the various Hadoop tools available to handle it. We also look at the big data analytics for healthcare conceptual architecture, which includes the data collection history of several branches, the genome database, electronic health records, text/imagery, and a clinical decision support system. This article gave an in-depth definition and a brief review of big data in general and in the healthcare system, which plays an important role in healthcare informatics and has a substantial impact on the healthcare system and the four Vs of big data in healthcare. We also proposed using a conceptual architecture for solving healthcare problems in big data using Hadoop-based terminologies, which entails the use of big data generated by various levels of medical data, as well as the development of methods for analyzing this data and obtaining answers to medical questions. E.-M.Fong, W.-Y.Chung at el [7] A mobile device is utilized as a mobile monitoring terminal to observe and analyze ECG data in real time. Furthermore, a tailored healthcare assistant is installed on the mobile device, which includes many healthcare functions such as health status summaries, medication QR code scanning, and reminders. Health data is synchronized into the healthcare cloud computing service (Web server system and Web server dataset) to ensure a seamless healthcare monitoring system with network coverage available at any time and from any location. Medical data can be conveniently accessed by medical professionals or family members via a Web page application. Web page performance was assessed to verify that Web server latency was kept to a minimum. The solution demonstrates improved off-site and real-time patient data availability, which can aid in early detection of health issues and keep older patients out of the emergency room, resulting in a better and more comprehensive healthcare cloud computing service.

III. Challenges in Big Data Analysis About Health Care

3.1 Predictive Analytics in Healthcare:

Predictive analysis has been familiar as one of the major business intelligence approaches, but its real world applications extend far beyond the business context. Text analytics and multimedia analytics are two examples of big data analytics methodologies. However, one of the most crucial categories is predictive analytics which includes statistical methods like data mining and machine learning that examine current and historical facts to predict the future. Predictive methods which are being used today in the hospital context to

determine if patient may be at risk for readmission. This information can assist clinicians in making critical patient care decisions. Predictive analysis requires an understanding and use of machine learning, which is widely applied in this approach.

3.2 Machine Learning in Healthcare:

The concept of machine learning is very similar to that of data mining[4], both of which scan data to identify patterns. Machine learning uses data to increase the program's understanding rather than extracting data based on human understanding, as data mining tools do. Machine learning identifies data patterns and then alters the program function accordingly.

3.3 Electronic Health Records in health care:

The electronic health record (EHR) is the most widely used big data application in healthcare. Each patient's medical records contain information such as their medical history, allergy diagnosis, symptoms, and lab test results. Patient records are shared with healthcare providers via a secure information system in both the public and private sectors. These files are editable, allowing doctors to make adjustments over time and incorporate new medical test findings without having to rely on paper or duplicate data.

3.4 Avoidance and Detection of Frauds:

Health-based insurance companies used numerous paths to discover fraud activities and develop methods to avoid medical fraud in the early days of big data analytics. Companies utilize Hadoop to identify fraudsters by using data from prior health claims, voice recordings, earnings, and demographics to create apps based on a prediction model. By combining real-time Hadoop-based health apps, authentic medical claim bills, weather forecasting data, voice data recordings, and other data sources, Hadoop's NoSQL database can assist detect medical claim fraud at an early stage.

3.5 Big data privacy and security:

Important issues towards big data analysis in healthcare and medicine are security and privacy of the individuals/patients. All medical data are very important and different countries consider these data as legally possessed by the patients. To address these security and privacy challenges, the big data analytics software solutions should use advanced encryption algorithms these software solutions should provide security on the network level and ensure privacy and security for all users involved, as well as establish sound governance norms and practices.

IV. Four Vs of Big Data In Healthcare

Four primary attributes (shown in Fig. 2) that are associated with big data: volume, velocity, variety, and veracity.

4.1 Volume:

Big data is a term to referring to large volumes of collected data. There is no set limit on the amount of data that can be stored. Typically, the term is used with respect to massive- scale data which must be managed, stored, and analyses using traditional databases and data processing architecture [14]. The volume of data generated by modern IT and the healthcare system has been increasing, owing to lower storage and processing costs, as well as the need to extract meaningful insights from data to improve corporate processes, efficiencies, and consumer services.

4.2 Velocity:

Velocity, which represents primary reason for the exponential growth of data, refers to how fast data is collected [14]. Healthcare systems are generating data at increasingly higher speeds. Because of the volume and variety of structured and unstructured data collected, the speed with which this data is generated after processing necessitates a decision based on its output

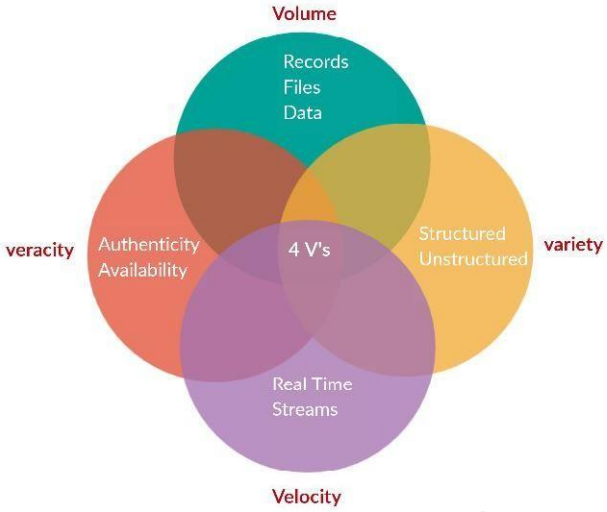

Fig.2: Big data's 4Vs in healthcare.

4.3 Variety:

The form of the data, whether unstructured or structured, text, medical images, audio, video, or sensor data, is referred to as variety. Structured data information includes clinical data (patient record data), which must simply be collected, stored, and processed by particular device. Structured data comprises just 5% to 10% of healthcare data. Unstructured or semi-structured data includes e-mails, photos, videos, audios, and other health related data such as hospital medical reports, physician's notes, paper prescriptions, and radiograph films.

4.4 Veracity:

The degree of assurance that the interpretation of data is consistent is known as data veracity. The data credibility and trustworthiness of different data sources varies[9]. In healthcare, however, unsupervised machine learning algorithms create decisions that are employed by automated machines based on data that may be worthless or misleading[4]. The goal of healthcare analytics is to derive relevant insights from this data in order to treat patients and make the best decisions possible.

4.5 Mobile Cloud Computing Infrastructure For Health Care:

The MCC healthcare system was designed to record and analyze real-time biological signals from users in various locations (such as exercise, weight reduction, and blood pressure). A personalized healthcare application is loaded on the mobile device, and health data is synchronized with the healthcare cloud computing service for storage and analysis. [7]

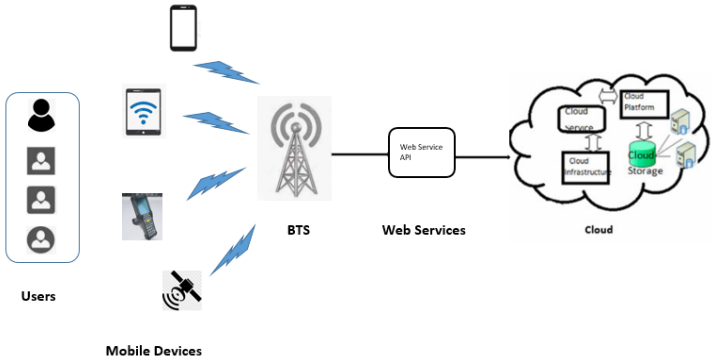

Fig3: Mobile Cloud Computing Infrastructure for Health Care

MCC improves the capabilities and relevance of mobile devices while also overcoming their restrictions, so users won't be concerned about memory size or required CPU power when performing intense operations that use a lot of energy. Multimedia applications, which are known to be among the most common applications in today's mobile devices, allow users to share and create images and video. Despite all of the advantages of adopting mobile cloud computing, there are certain drawbacks, such as the delays experienced when mobile devices access cloud services from a distance, which are primarily due to/from the mobile devices. The use of the cloud concept between the cloud and the mobile device is thought to have a positive impact on connection latencies and battery consumption[12]. There are numerous mobile cloud computing infrastructures

available for a variety of applications, including healthcare applications. As shown in Figure 3, MCC infrastructures consist of a collection of cloud resources that may be accessed remotely by users of various types of devices via the Internet. The widespread use of mobile applications in all aspects of people's lives has generated in vast amounts of data that must be processed and analyzed quickly in less time and with less power, necessitating the development of new competitive MCC models in addition to the classic ones. The cloud infrastructure can be thought of as a closer cloud that offers numerous benefits and capabilities while avoiding the drawbacks of a distant cloud. As a result, a cloud with limited resources will not help and may have a negative influence on performance. As a result, it is thought that the cloud scheme, which serves as a bridge between the cloud and the mobile device, has a strong chance of overcoming MCC's issues, such as power consumption. The mobile user has no alternative but to connect to the EC directly. When a mobile device needs to update data stored in the Enterprise Cloud or request services that aren't available in the Cloud, this happens. The writers were inspired by the cloud concept and created a mobile cloud system that may be used in a variety of applications, including institutions. Different sensors are used by these systems to carry out data in a variety of jobs. We developed a cloud MCC paradigm that allows mobile users to communicate directly with the cloud rather than the business cloud. Their system can be used in a variety of settings, including hospitals, where large amounts of data must be saved and analyzed. All medical care services, as well as doctors, hospitals, pharmacies, laboratories, and other maintenance items, are grouped together as healthcare services. These services have progressed in stages, starting with traditional healthcare and ending with cloud healthcare. As illustrated in figure, cloud computing and forces are future services that have yet to be exposed (4).

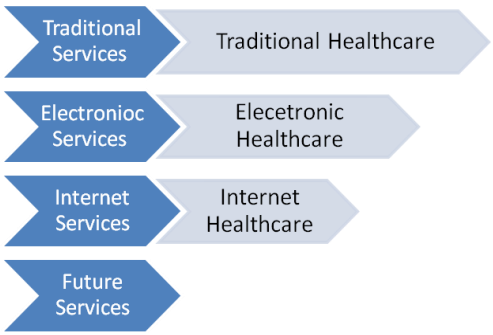

Fig 4: Hierarchical Model

With the integration of cloud and mobile computing, service accessibility has become much more flexible. The approach to healthcare, mobile computing, and cloud computing begins by connecting all wireless devices to the Internet via wireless service, which is connected to a cloud service provider that provides all required applications. The client can access his or her healthcare needs function via his or her mobile device(s) wherever he or she is, at any time, and then receive his or her request via a web browser. The ability to process and store data is being repositioned from mobile devices to powerful and centralized computing platforms in the cloud, where the user is unconcerned with the method or technology used to obtain what they require.

V. Conclusion

Patient Healthcare are very important applications to be modified via mobile cloud computing approach. The inconsistent from traditional healthcare model to consumer driven healthcare model is a very important portion in this approach in which is moving forward to establish a straight private connection to the consumer patient model. This move toward achieves a respectable routine of healthcare services anytime anywhere for both privacy and security of protecting private information of the consumer (patient). This topic opens a innovative future field of computing that lacks resources, including flexible architecture, adapted protocols, privacy and security, real time processing, huge storage, online services.

Acknowledgement

We express our sincere thanks to Dr. Satish N. Gujar for his kind co-operation and Valuable Guidance. We also express our sincere thanks to Dr. Pradhnya M. Wankhade for her kind Cooperation in research work.

References

[1]. A. Gandomi and M. Haider, beyond the hype: Big data concepts, methods and analytics, International Journal of Information Management, vol. 35, no. 2, pp. 137–144,2015.

[2]. LO'AI A. TAWALBEH, RASHID MEHMOOD3," Mobile Cloud Computing Model and Big Data Analysis for Healthcare Applications,IEEE Access, 2169-3536,VOLUME 4, 2016

[3]. D. West, ``How mobile devices are transforming healthcare," Issues Technol. Innov., vol. 18, no. 1, pp. 1_11, 2012.

[4]. L. Qian, Z. Luo, Y. Du, and L. Guo, ``Cloud computing: An overview," in Proc. IEEE Int. Conf. Cloud Comput., Dec. 2009, pp. 626_631.
[5]. Sunil Kumar et al.,"Big Data Analytics for Healthcare Industry: Impact, Applications, and Tools" , SSN222096- 0654 l l05/06l lpp48–57 Volume 2, Number 1, March 2019 DOI: 10.26599/BDMA.2018.9020031
[6]. K. Bahwaireth and L. Tawalbeh, ``Cooperative models in cloud and mobile cloud computing," in Proc. 23rd Int. Conf. Telecommun. (ICT), 2016, pp. 1_4.
[7]. E.-M. Fong and W.-Y. Chung, ``Mobile cloud- computing-based healthcare service by noncontact ECG monitoring," Sensors, vol. 13, no. 12, pp. 16451_16473, 2013.
[8]. Blagoj Ristevski1 / Ming Chen2, "Big Data Analytics in Medicine and Healthcare", Journal of Integrative Bioinformatics. 2018; 20170030
[9]. A. Yassine et al.," Mining Human Activity Patterns from Smart Home Big Data", VOLUME 5, 2017
[10]. Tomar D., Agarwal S. A survey on Data Mining approaches for Healthcare. Int. J. Bio-Sci. Bio-Technol. 2013, 241–266. doi: 10.14257/ijbsbt.2013.5.5.25.