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Review on Cloud and Big Data used for Healthcare Cyber-Physical System

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ABSTRACT

Nowadays, a rapid progress on healthcare technologies has been witnessed by information technology. Due to larger healthcare data by new technologies made it hard to analyze and process. Within a short period various devices creates data, these data are quickly and easily created and uses various formats to store which can be considered as a huge problem to a extent. Using Cloud and Big Data, a cyber-physical system is proposed known as Health-CPS which is provides services and applications related to patients. It includes three layers for distributed storage and parallel computing. It enhances the performance for humans to use several various smart services and applications of healthcare.

Keywords: Body Area Networks, Big Data, Cloud Computing, Cyber-Physical Systems (CPS), Healthcare

I. INTRODUCTION

Information technology is used in medicine by past two decades [1]. The enhancement of availability, traceability and also liquidity of data by Electronic health records (EHRs), database of biomedical and health of public [2].

It is easy to recognize that many works in the past were concentrated on healthcare data analysis [8], [12] or implementation and deploying for healthcare system based on cloud computing. The main constraint to build a comprehensive healthcare system and in that handling the heterogeneous healthcare data from various sources.

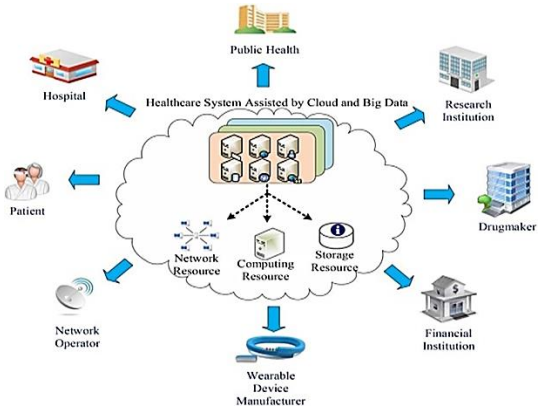

Figure. 1. Example of healthcare system.

II. REVIEW OF LITERATURE SURVEY

To study and analyze more about the Cloud and Big Data in Healthcare-CPS the following literature survey has been done.

In [1], Based on the review of big data on the background and state-of-the-art, introduced the common big data background and report on similar applications. Big data mainly focuses on four phases and each phase's overview is introduced. To provide an overview and a clear picture to readers it examines the several representative applications of big data.

In [2], Growth in the interest of emerging applications due to advanced wireless technologies in vehicular networks, leads to increased change in the evolution from a network of vehicular to cloud using context-aware vehicular cyber-physical systems. It introduced architecture with multi-layer and two basic service components. By highlighting the cloud using architecture and logical flow an application was proposed for parking services. Finally, try to get solutions for the limitations such as safety, dynamic routing and cloud.

In [3], To connect with nearby devices various short range wireless communication application is proposed. Each mobile device act as service provider or requester in the cloudlet constructed. Cloudlet is cost efficient but still the service mode is a theoretical infancy. To achieve flexibility a new cloudlet service mode is introduced known as Opportunistic task scheduling over Coocated Clouds (OSCC). Analysis of OSCC is performed to minimize the problem. Application capability analysis and effectiveness is verified. Results show that the output of execution is smaller in size.

In [4], A healthcare system for personal use is proposed to enable the storage of daily lifestyle data on cloud. Using healthcare data mining, information related to user's lifestyle and health condition are extracted which is embedded big data. The validity of extracted data is verified by volunteer users of this system.

In [5], Being an important radio frequency identification technology, it has developed a lot. To overcome the problems of first generation RFID a second generation RFID was proposed characterized by encoded rules. This improves scalability by performing the operations for various objects in different scenarios. To enhance the effectiveness of existing system, an e-healthcare management system was proposed. In future the 2G-RFID may support smart applications.

In [6], By the introduction of 5G in the world, people can connect without any constraints. It may introduce more difficult applications and interactive services. To overcome this challenge mobile cloud computing (MCC) is used, this has the potential to support the intensive services. To provide affective computing and emotion aware services, a framework known as EMC was proposed. The MCC architecture was modified to achieve the requirements along with EMC. The negotiation of communication and EMC computation is solved using a partitioning design.

In [7], Due to global aging ubiquitous is getting more importance, cloud computing is used for its characteristics. There are several challenges in using cloud, to achieve these specific requirements private cloud architecture is proposed with six layers in it. A mechanism for communication is used by each layer and message queue is used as cloud engine. Semi-structured or unstructured data are accessed and a framework is used by cloud architecture. This system is robust, stable and efficient.

In [8], There is a lot of burden due to heavy demands of healthcare service; to reduce this problem wearable computing devices are proposed for medical care and health monitoring. To have an affective interaction human mechanism is required and this could be a serious challenge. Architecture with three components is proposed known as Affective Interaction through Wearable Computing and Cloud Technology (AIWAC). For wearable computing interactions with emotions, a practical mechanism is designed due to the architecture proposed, it presents AIWAC testbed.

In [9], In future, vehicles are expected to perform computation, communicate and store the resources. To solve this Vehicular Cloud Computing (VCC) by merging Vehicular Ad Hoc NETwork (VANET) with cloud computing. There is no perfect architecture for VANET with cloud computing till date, so taxonomy for this is presented. It is a best effort of VANET with cloud and it is divided into three architectural modules. This gives different security and privacy.

In [10], To control and self-monitor the glucose level in blood is a crucial part of diabetes. Technology which has short range and small in size can help the diabetic patient in the daily routine usage. There is no study or evaluation on this technology therefore it could be a bit difficult to adopt this technology. Evaluation on blood pressure and diabetic patient was carried out using mobile monitoring. This gives technical issues related to blood pressure and diabetic patient.

In [11], The cost for healthcare is a major critical issue which is caused by many reasons and the main reason is unhealthy and poor lifestyle. Tools to support changes in behavior are used to reduce the healthcare cost known as Personal health system (PHS). Lifestyle changes from one person to another therefore PHS is used accordingly and several health technology related system are integrated with it. There was a study on the employees with poor lifestyle and the study revealed that activity usage of mobile was more than other technology. But the usage varied from one person to another and some used it more were as some didn't use it all. To get successful technology PHS should be able to identify users who benefit from this technology.

In [12], Mobiles and web based technology are used to store the data of individual's daily routine to extract and monitor the pattern of lifestyle by data-mining. Using internet, data is uploaded on server via mobile and web application. Server evaluates the data and let user know the detail of the data via mobiles and suggests rules for healthy lifestyle. Some rules are known after automated data mining of stored data is performed, even the fat index is known.

In [13], A technology known as Radio frequency identification (RFID) is used and its tag is embedded into sensitive objects. Wireless sensor networks are integrated with RFID. To get more flexible and efficient framework design, a key is identified and then it is proposed along with sensors known as a sensor and an RFID integration framework (SARIF). SARIF act as middleware for RFID and WSNs and proposes a design which manages resources efficiently and flexibly.

In [14], In a wireless sensor network (WSN), mobile agent systems have lot more importance in inference and surveillance. To get flexible applications and collaborative signal and information processing, mobile agent systems are employed to migrate codes for this. It is extra flexible and conventional based on a model computing client-server. A survey on mobile agent leads to a key design. The framework design is divided into four components which lead to creation of component based and efficient mobile agent system design for a lot of applications. To achieve flexibility, a specific applications requirement for each component can be designed.

In [15], As the demand for content downloading increases in cellular networks, direct communication for user D2D (direct-to-direct) communication was proposed. It utilizes all available cellular networks to increase performance of content downloading. Buffer-aided protocols have a lot of benefit for D2D communication but the challenges for it are not yet understood. An optimized framework is used to analyze constrained buffer, investigation on different buffering policy. A study reveals the good correlation and best system performance and also opportunity for bandwidth conversation. Challenges are limited D2D communication and transmission delay increased.

In [16], Traffic per device and number of connected device increases wireless data traffic. As the users demand increases, wireless network are clogged as it is below 6GHz. The solution used for this is to increase bandwidth using one of the methods but frequencies for spectrum is not available. 60 GHz spectrum is selected as new spectrum and wireless personal and LAN are completed. 60 GHz band physical layer is presented; the results are accessed and compared.

II. CONCLUSION

Technologies for analysis are more powerful for modern healthcare. Evolution in medical diagnosis leads to patient centric treatment and big data is used more frequently for healthcare systems. The Big data can act as guide, tool and source of innovation for lifestyle, decision making and healthcare systems respectively. It proposed a smart healthcare system using cloud and big data. It includes 1) Integrating resources and personal devices, a layer of unified data collection, 2) Data storage of multisource heterogeneous healthcare and analysis, platform with data-driven enabling cloud, and 3) Unified interface for developers and users. Several applications and services to support traditional healthcare are developed. In future several applications are focused to develop to provide a better and good environment to human interaction.

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