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Medical Data Analytics in Internet of Things : A Survey

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ABSTRACT

This paper discuss about Big Data could be used in order to help the improvement of other fields except for the telecommunication field. Due to the Health field, the Big Data technology could to give in order to achieve with the aim to help for the purpose of analysis and management of the huge amounts of health data. The main objective of this research proposal is an analytical study of the technologies IoT, Cloud Computing (CC) and large scale data (Big Data) solve various issues facing by the health sector in relation to these technologies. The purpose of the research proposal is the collection of medical (e-health) big data in real time. Sensor devices and actuators will perform the collection, which will wear patients who suffer from various ailments, The data through a network to a cloud server. Additionally, these data will be processed in the cloud, which makes its analysis so as to become meaningless. By the analysis of these data is done the data mining. Finally, to address the various problems in the health sector, the transfer of the analyzed health data will be held by the devices of the relevant persons. Also , in our study, we will deal with the security of medical data which be a part of personal data and must be protected.
Keywords: Big Data, Cloud Computing, IoT, Healthcare

I. INTRODUCTION

The Internet of things (IoT) is the network of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, actuators, and network connectivity which enable these objects to connect and exchange data. Each thing is uniquely identifiable through its embedded computing system, but is able to inter-operate within the existing Internet infrastructure.The word "Internet of Things" has two main parts, internet being the backbone of connectivity, and ”Things” meaning objects (or) devices .

Cloud computing is a term used to explain the storing and access data and applications through the internet.
Big data is a massive volume of both structured and unstructured data that is so large it is difficult to process using traditional database and software techniques.On the one hand, in the health sector, we are faced with many problems, for which they come to give solutions the IoT and the new technologies. Some of these problems is the rapidly aging due to the low birth rate in demography problem, the chronic diseases due to the increasing aging of the population such as hypertension, heart failure, diabetes mellitus, etc. The rate diseases e.g. Alzheimer’s disease, the hereditary diseases, the lack of health personnel and the health infrastructure, the difficult treatment of emergency cases ,the organizational problem, the patients with mild disease that they need no monitoring and binding site on the already congested hospitals’ infrastructure, and also, the corruption of information over time.

On the other hand, the rapid development of IoT and CC has brought the rapid growth of data. So , we are faced with major challenges related with the management, the analysis, and the transfer of such data. These challenges of large-scale data mainly concern their representation, reducing the redundancy that exists in them , the quality and the variety, the management of the life cycle, the confidentiality, their expendability, the energy management, the heterogeneity, the speed and the accuracy, the privacy and the security, the storing of them, the extracted

knowledge from them, the creation or development of their analysis tools and algorithms or techniques as well as, other serious issues that need total improvement.

The latest findings therefore show us that there are some "gaps" in the way in which such data are transmitted through the levels of management, analysis, and transportation, but also, some problems that arise from their use, and which we will try to optimize by proposing new techniques and new algorithmic solutions.

The tools we will use for the development and implementation of this research will be the use of Big Data software technologies, IoT, and CC, as well as algorithms for the creation of platforms, both in code form and in flow chart form.

II. LITERATURE SURVEY

Andreas P. Plageras, Kostas E. Psannis, Yutaka Ishibashi, and Byung-Gyu Kim proposed a loT -based AII4Health architecture. In this the architecture will be split into three layers Specifically, first, they focus on the topology we should use, for the connection between the sensors, the actuators, and the cameras. We saw that all nodes are connected to each other with links, so they can communicate for the data and the video transferring. This is what we call network topology. We have decided to use the mesh topology, which can be the future of loT communications. In mesh topology the network nodes can connect and communicate with each other without requiring an internet connection.

D. Tomtsis, S.Kontogiannis, G.Kokkonis, I. Kazanidis, S. Valsamidis, C. Stergiou & K. E. Psannis ,Hilbert, M., & López are proposed the new era of technology of a new and popular term is called "Large Scale Data or Big Data". This term is used to describe the amazingly rapid growth of structured, unstructured, and semi-structured data formats as well as, the large and complex data sets that traditional data processing applications are insufficient to manage them, analyse them , and transfer them.

Andreas P. Plageras, Kostas E. Psannis, Yutaka Ishibashi, and ByungGyu Kim, Tuan Nguyen Gia, Amir-Mohammad Rahmani, Tomi Westerlund, Pasi Liljeberg, and HannuTenhunen, are given detail explanation about IOT and big data with sensor devices like the increasing use of the Internet by more and more users and the advanced networking technologies, lead us to the "Internet of Things". The sensor data can be environmental, medical, geographical, accounting, astronomy, are useful only when are analyzed. From all Big Data that are collected, those generated by IoT devices have different characteristics, some of which are the heterogeneity, the variety, the unstructured or semi-structured feature, the high redundancy, the noise, so for maintaining sensor objects the IoT data will be the most important of the Big Data.

C. Stergiou , K.E. Psannis, B.-G. Kim, B. Gupta, G. Kokkonis, S. Kontogiannis, D. Tomtsis "Cloud Computing" (CC) is a new developing trend that will meet the needs of users to manage, store, access, and analyze Big Data and its' applications. The Big Data are stored in a remote location outside of the computer and can be accessed through an Internet service from anywhere there is available link. The Cloud Computing and the Big Data are two technologies closely related. The use of huge computing and the storage resource management is one of the goals of cloud computing, so that it can provide computing capacity in Big Data applications. Also , according to researchers, there are several solutions for the processing and the storage of large scale data provided by the use of cloud computing. The management of these data may be processed efficiently from the cloud, using the distributed storage technology. The efficient collection and analysis of big data can also improve the cloud, using the technology of parallel computing capacity. So, we can say that the significance of the IoT data are hidden in the effective integration of large-scale data technologies and cloud computing.

Andreas P. Plageras, Kostas E. Psannis, Yutaka Ishibashi, and ByungGyu Kim, Mirjana Maksimovic, Vladimir Vujovic and Branko Perisic, describes about The ability of objects to communicate with each other, but, also with the humans and the internet, will affect the health sector, and in particular, healthcare. The most amazing object of IoT is a sensor node. The sensors can communicate, perceive, and process data, and also, can convert data such as health data to digital form. Appeared new challenges in terms of data security issues that are transmitted and used in above

those standards. That has resulted as need for further research on safety issues in the transport and management of data associated with both, the Big Data and IoT, and the CC.

Yogesh Kumar, Rajiv Munjal and Harsh Sharma, Randeep Kaur & Supiya Kinger, S. Veluru, Y. Rahulamathavan, B. B. Gupta, M. Rajarajan describes algorithm to provide and establish a secure communication via the communication network, there have been developed encryption algorithms which play an important role in data security. Most of the encryption algorithms use a unique key for the encryption, which only the user knows and so only he/she can decrypt the data. Based on research done until now, we observe that the most widely used encryption method, which is used by several encryption algorithms, is the method of symmetric key. One of the most known encryption algorithm types is the AES algorithm.

III. IMPLEMENTATION APPROACHES

Existing System Approach

In Existing System pervasive data "came" to "stay", and to improve health care, with more accurate diagnoses, with shorter delays for the patient's treatment, and with fewer obstacles for patients when making treatment. Storing and retrieving will make more delay, will lead to lose the vital time, if the time is not reduced.

IV. PROBLEM STATEMENT

Data Storage: With the growing of datasets, data mining tasks has significantly increased. This is another big challenge for big data. While dealing with large datasets, data reduction, data selection, and feature selection are used. The size of the data is increasing very rapidly by various means such as mobile devices, aerial sensory technologies, remote sensing etc. Some useful data may be deleted as there is no space to store such heavy data. Therefore, the first challenge for big data analysis is storage mediums and higher input/output speed. The prime reason is being that, it must be accessed easily and promptly for further analysis. To overcome this limitation, the concept of solid state drive (SSD) and phrase change memory (PCM) was introduced.

Data Analysis: Big Data analytics is the process of examining large and varied data sets i.e bigdata to uncover hidden patterns, unknown correlations, market trends, customer business decisions. It describes the massively parallel, distributed storage and processing framework as provided by Hadoop HDFS and Map Reduce. Big Data analytics of huge volume of structured data. Furthermore, there is combine between data warehousing and the Hapdoop type Big Data architecture. Unstructured data from sensors, M2M devices, social media and Web applications can be stored in Hadoop and be Map Reduced later for meaningful insight. Data warehouse can be a data source for complex Hadoop jobs, simultaneously leveraging the massively parallel capabilities of two systems. Real-time location data from GPS or smartphones can be combined with historic data from the data warehouse to provide real-time insight for marketers to promote products targeted to the individual customer based on real-time location data and customer profile.

V. PROPOSED APPROACH

The collection of medical large-scale data in real time, by sensor devices sensors and actuators, which will be worn on patients wearable devices who suffer from chronic diseases. The collected data will then be transported through our network to a Cloud Server, and subsequently will be processed in the CC, which makes its analysis to mine knowledge from these IoT data which have no significance if they are not analyzed. Finally, the transfer of the analyzed health data will be held into the devices of the relevant persons to address problems in the health sector.

VI. PROPOSED ARCHITECTURE

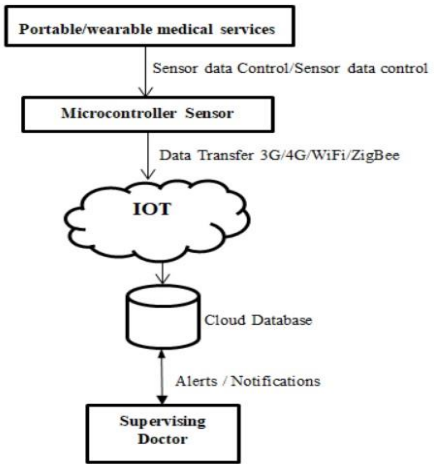

Figure 1. The architecture of the proposed system

In the above architecture it provides to the relevant people and in real time, via sensors and other devices, medical information related to the health of a patient, so as to monitor the state of health out of the hospital, freeing thereby places (such as a hospital bed) and resources of the hospital (such as food), and further savings and provide more comfortable environment for the patient.

At the same time, in this way, we will have the directly information of the patient for the state of his/her health, the timely information of the doctor-nurse about the state of health of the patient, the remote patient monitoring, the timely information of medical personnel for emergencies in order to correctly and quickly prepare for an emergency, the direct conversation of the patient and the doctor so that there is no distortion of information by playing the "broken telephone", as well as, the better organization records of physicians so that the information will not be altered with the passage of time.

VII. CONCLUSION

The analysis and management issue of the large scale data in the Health field, a new type of technology could be used in order to help. The main objective of this project proposal is an analytical study of the technologies IoT, Cloud Computing and Big Data with the aim to resolve the various issues that we are facing in the health sector, in relation to these technologies. The main purpose of the project proposal is at first the collection of medical big data in real time. The collection performed by sensor devices and actuators, which have been wearied by patients who suffer from various ailments. Subsequently, takes place the transfer of these data through a network to a cloud server. Furthermore, these data are processed in the cloud, and then analyzed in order to gain some meaning for the user. By the analysis of these data takes place the data mining procedure. Finally, the transfer of the medical data that already analyzed will be provided by the devices that will be worn by specific persons, in order to address the various health problems. Also, the security of these medical data, which constitute personal data, and must be protected. For this reason , applying innovative methods in their coding regarding their security.

VIII. REFERENCES

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