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A Survey on a Modified Approach for Context Aware Assisted Healthcare

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Abstract: ***Context-aware monitoring is an emerging technology that provides real-time personalized health-care services and a rich area of big data application. The system propose a knowledge discovery-based approach that allows the context-aware system to adapt its behavior in runtime by analyzing large amounts of data generated in ambient assisted living (AAL) systems and stored in cloud repositories. The proposed model facilitates analysis of big data inside a cloud environment. It first mines the trends and patterns in the data of an individual patient with associated probabilities and utilizes that knowledge to learn proper abnormal conditions. The outcomes of this learning method are then applied in context-aware decision-making processes for the patient. A use case is implemented to illustrate the applicability of the framework that discovers the knowledge of classification to identify the true abnormal conditions of patients having variations in blood pressure (BP) and heart rate (HR).***

Key words: Assisted Healthcare, Context-awareness, Knowledge Discovery, Data Mining, Association mining Algorithm.

I. INTRODUCTION

An ambient assisted living (AAL) system consists of heterogeneous sensors and devices which generate huge amounts of patient-specific unstructured raw data everyday. Due to diversity of sensors and devices, the captured data also have wide variations. A data element can be from a few bytes of numerical value (e.g. HR=72bpm) to several gigabytes of video stream . For example, if we assume a single AAL system generates 100 kilobytes data every second on average then it will become 2.93 terabytes in one year. According to IBM data scientists, big data can be characterized in four dimensions: volume, variety, velocity, and veracity ("the 4 V's") .Our model also satisfies these four V's because the context-aware data we are referring to have massive variations (e.g. health data, activity data), is large in volume(several petabytes), continuous in terms of velocity and accurate to satisfy veracity. Such data also have great value and high impact on future healthcare infrastructure. The predictive analyses over large historical data provide robust solutions for disease prevention. This also simplifies the tasks of healthcare professionals and doctors by assessing the causes of any anomalous situation at an early stage and improving the quality of life of a patient.

II. LITERATURE SURVEY

R. Agrawal and R. Srikant[2] has proposed the system in which Apriori hybrid algorithm is use for increase the transaction number and size in the database. It gives a frequent item set in transactional database as an output. It's an efficient algorithm for fining frequent items. It require Generate large number of candidate item set and Repeatedly scanning the transaction databases R. Rastogi and K. Shim [3] has proposed Pruning and graph search algorithm is used for Disjunction over uninstantiated attributes are permitted in association rule. Arbitrary number of uninstantiated attributes are allowe in association rules.These attributes can be either numeric or categorical. While decision trees classify quickly, the time for building a tree may be higher than another type of classifier.

Decision trees suffer from a problem of errors propagating throughout a tree. A very serious problem as the number of classes increases B. P. McGrath [4] was used Sphygmomanometer cuff to measure the blood pressure for every 15 to 30Minutes . In this paper Ambulatory Monitoring system is used. Automatic blood pressure readings obtained from portable monitors do not induce any alerting reaction or presser response in the patient. The assessment of 24-hr blood pressure and heart rate variabilities is less accurate

J. Dean and S.Ghemawat [5] was proposed application which is large cluster of Machine resource and fit large computational problems in the Google using map reduce. For this Map reduce technology is used. Map-reduce is the patented software framework given by Goggle in 2004. It is a programmable model and associated implementation for processing and generating large data sets parallel manner. Its computational is specified in terms map and reduce function. Map takes an input and gives output in form of key/value pairs and map-reduce function take one key/value pair and give a list of new key/value pairs as output. All map operations are independent of each other and fully parallelized. For the datasets either have many short transactions with less frequent items or large database with larger transaction having many frequent items, proposed method has good performance. It is performance is good when large data intensive computation is required and ceases as data decreases.

Fahim Sufi and Ibrahim Khalil [6] In this paper simple but highly efficient data mining-based solution that recognizes different CVDs from the compressed ECG with clustering-based data mining techniques used. System plays an important role in reducing the delay by performing diagnosis directly from the compressed ECG. This technique can be placed within a wireless monitoring facility to alert the emergency personnel in an event of cardiac abnormality of a subscribed patient.

Markos G. Tsipouras, Costas Voglis, and Dimitrios I. Fotiadis[7] In paper a framework for the automated generation of a fuzzy expert system (FES) is proposed. The application of the proposed methodology is not limited to medical domain problems and can be extended to other domains for problems having the same structure, i.e., decision based on a set of rules.It is not easy to express the fuzzy inference model to a close form. It is limited to applications that are based on crisp rules. It greatly depends on the selection and the quality of the initial set of rules.

All these contributions have motivated to develop this cloud-enabled system with big data. The unique advancement of model is to learn user specific anomalies accurately in an assisted living system and take immediate context-aware actions. The robust learning methods reduce unnecessary false alerts to the monitoring systems.

III. IMPLEMENTATION

Proposed System Modules:

1 Ambient Assisted Living (AAL) Systems

The big data producers of model are a large number of AAL systems. The low level setup of each system varies according to the requirements of the patient. The sensors, devices and software services of each AAL system produce raw data that contain low level information of a patient's health status, location, activities, surrounding ambient conditions, device status, etc.

2. Personal Cloud Servers (PCS)

Each AAL System is connected to a personal cloud server. This is a virtual server in the cloud that is highly scalable and managed by trusted entities. It has secure storage facilities to store patient-specific information (e.g. Amazon S3,Microsoft Health Vault) such as the profile (e.g. age, sex, BMI), recognized patterns of his/her daily activities(e.g. smoking habits), identified threshold values of different vital signs, Medication times, disease treatment plans, prescriptions, preferences, emergency contacts and personal medical records.

3. Data Collector and Forwarder (DCF)

Traditional context-aware systems process the low level data and perform the computation in a local server or mobile device and then forward the high level context data to the cloud. But the lack of storage and power in wearable sensors and mobile devices limit them to process large volume of sensor data using decent computational methods. In proposed model, the job of a local server (which can be a mobile device) is only to collect the low level data (e.g. accelerometer data, ECG data, BP Monitor data,

GPS coordinates, RFID status, captured images) from the AAL system and forward them directly to the CA (when processing is required) or to the PCS.

4. Context Aggregator (CA)

The job of the context aggregator (CA) is to integrate all the primitive contexts in a single context state using a context model. Sometimes a single context attribute value as an individual has no meaning if it is not interrelated with other contexts.

5. Context Providers (CP)

The context providers (CPs) cloud is the main source for generating contexts. The CA distributes the low level data collected from different AAL systems to multiple CPs. Each CP applies well-known techniques to obtain primitive context from the low level data.

6. Context Management System (CMS)

A Context Management System (CMS) is the core component of the framework. The CMS consists of a number of distributed cloud servers that hold the big data. It stores the context histories of millions of patients. In existing system a supervised method is used for data mining which need the training data set to detect the normal and abnormal states of the patient. Now a days an unsupervised method is used for the data mining which has many advantages over existing supervised and unsupervised methods. Unsupervised method becomes an effective approach in the current era of data mining. Proposed model takes the input data from the patient activity logs or reading some patterns. After getting the all details preprocessing is done to select the data aggregation features. After preprocessing main and important task of knowledge acquisition. In knowledge acquisition proposed method runs to learn the features of the data at runtime. After knowledge acquisition method performs the clustering using unsupervised method to perform the classification of data. Depending upon the classified data the decision making process get started. In decision making the different decisions are taken based on the patient's data.

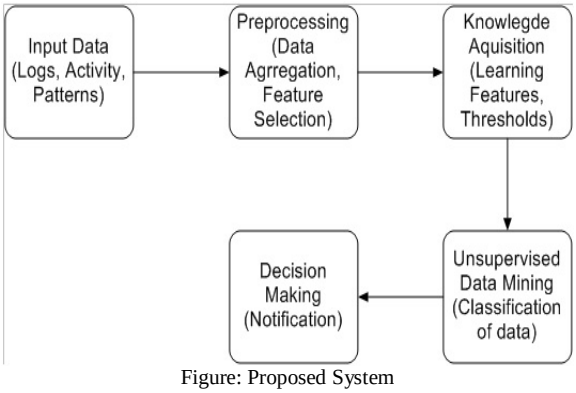

Figure: Proposed System

Proposed Association mining Algorithm:

Input: CjT and Smj for all AAL system j

Output: Decision vector Uj for all AAL system j

1. For each AAL system in parallel do

2. Q number ofcontext attributes inCjT

3. For all S in Smj

4. Find the Threshold value Th for all attributes q

5. For all context CjT

6. For all attributes q

7. If(Val(q) < Th(q))

8. Then Uj Normal value

9. Else Uj Abnormal value

10. End for

11. End for

12. If (Any new data item arrives)

13. Repeat the above procedure for decision vector

14. Return Uj for all contexts.

IV. CONCLUSIONS

The proposed system facilitates analysis of big data inside a cloud environment. It first mines the trends and patterns in the data of an individual patient with associated probabilities and utilizes that knowledge to learn proper abnormal conditions. The outcomes of this learning method are then applied in context-aware decision making processes for the patient. A use case is implemented to illustrate the applicability of the framework that discovers the knowledge of classification to identify the true abnormal conditions of patients having variations in blood pressure (BP) and heart rate(HR). The evaluation shows a much better estimate of detecting proper anomalous situations for different types of patients. The accuracy and efficiency obtained for the implemented case study demonstrate the effectiveness of the propose model.

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