Securing the Personal Health Records in Cloud Using ABE and Analyzing them using Rule Based Classification in Data Mining

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ABSTRACT: *Securing one's personal data has become precisely important these days. Bio data, banking details, medical records, pan card, passport are some of the examples of the personal data. One among those is the Personal Health records of the individual, as these records store the personal information related to the patient, they have to be secured properly. In this paper these health records are stored at the third party, called cloud providers. Here the cloud acts as server in order to store the health records of the individuals. Even though they are stored in the cloud, these PHR have a wide range of private concerns as they can be exposed to unauthorized users. Many techniques have emerged to secure these health records from the unauthorized usage; one among those is Attribute based encryption. And analysis is done through Classification rule in mining; it is applied on the data to accurately predict the target records for each case in the data. In this paper we discuss the techniques to secure the data and the techniques to analyze the secured data.*

Keywords: Personal Health Records, Cloud Computing, Attribute Based Encryption, Classification rule in Mining.

I. Introduction

Health records stores the information regarding the medical details of the individual. Security to Personal Health Records of an individual has emerged as Patient Centric method to share their information[1]. The PHR's service allows the user to create, update and manage their data from any place through web. These services store and share the record information more effectively. As the patient they make use of their PHR's, they can share their information on wide range. Due to this high maintenance the PHR's data centers are outsourced to the third party, called cloud provides[2]. It's good to have PHR services to everyone but the problem exists when the question arises as 'Can the third party be fully Trusted?' There are reasons to support the above asked question: as the cloud providers are not usually covered entities. We have question whether the data in them will the data be safe or not. And also as the maintenance of PHR is sensitive issues it can undergo a lot of malicious attacks. There are certain incidents to support it like Department of Veterans Affairs database maintaining the Health Records of 26.5 million military natives, even including their social security numbers was stolen by an employee without authorization which caused a great Threat to their country [2].

So to overcome these threats we use Attribute based encryption technique to save the data so that no other can access the data stored in the database. In this paper we discusses the techniques to secure the data in cloud and also application of rule classification in data mining to obtain the categorized results the user required.

II. Literature Survey

Maintaining the personal health records means a lot the individual. As the data stored in the records is confidential it can't be left without any security. In order to secure those records the whole data is outsourced to the third party, cloud providers. Here the cloud is used as the server to store the data of health records. But as the cloud providers are not completely secured as the maintenance of PHR is a sensitive issue, there could be many malicious attacks. So for securing the data of these records Attribute Based Encryption is used. To categorize the data and to predict future data trends classification in mining is done on the health records.

1.1. CLOUD AS SERVER: Cloud is defined as the usage of the network of remote servers. Where the servers are said to be hosted on the internet to store and manage the data and the stored data is meant to be centralized[5]. Cloud is meant to share the resources, software and the information on the network.

Cloud computing is simply defined as use of computing resources (software and hardware) that has delivered as a service on the internet. An example is to store and share your personal files online than storing it in your personal computer and sharing the file using external devices. The cloud provide infrastructure, software, platform as service unlike on site hosting, so it is cost effective[4]. As the cloud is used to share the information via network it has universal access. Cloud provides the updated software's so that one can make use of them effectively. Most importantly cloud allows the access and pay on demand, which means the user can pay only for what he use.

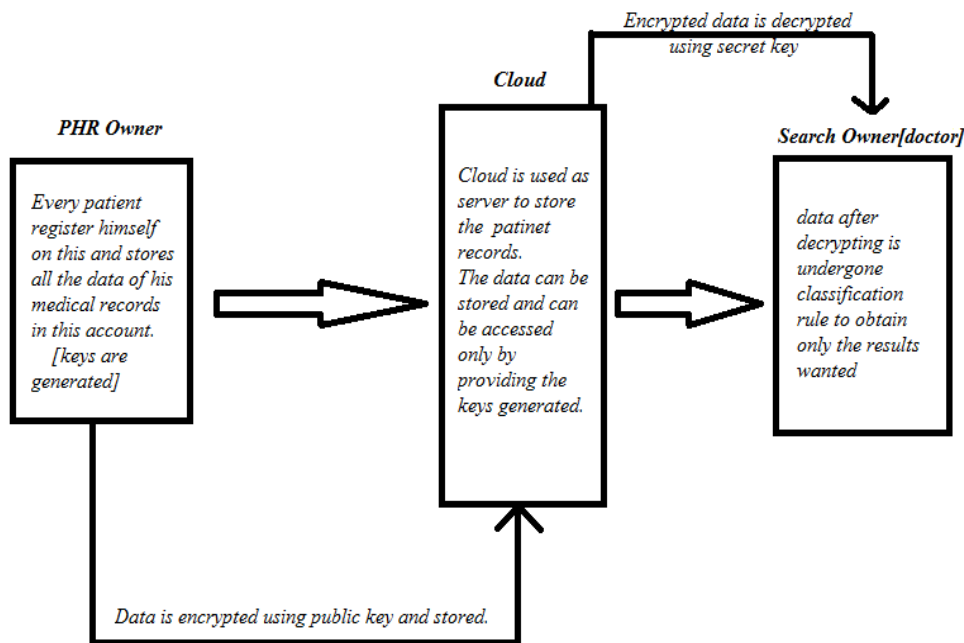### 1.2. Attribute Based Encryption

Attribute Based Encryption provides security to the data stored in the base. This technique ensures the security by encrypting the data and then storing it. To access the data decryption is to be done on encrypted data.

This technique is defined as public-key encryption in which the generated keys secret key and public key of a user depends on attributes used. The Public key generated is used to encrypt the data, by using this public key one can only encrypt the data but can't see it[3]. The Decryption technique completely is possible if and only if the secret key is provided, without the secret key one can't access the encrypted data or perform any operations to modify the data. Finally security is to personal health records is provided by this ABE technique (Attribute Based Encryption), which enables the PHR owner to store the data to the share the selectively[7].

1.3. Classification rule in mining:

Mining is the process of examining the data in the database and to process it to extract the wanted information. It is usually preformed on large data sets. Classification in data mining is a function to categorize the data items. It is used to extract the models of the data based on the category and to predict the future trends on that data[9]. Here we use the rule view to categorize the data and to perform the related task.

III. Architecture Of The Work

IV. Work Done

Storing the data regarding the personal health records of a patient means a lot to them. So those health records are to be secured properly. Here we stored in those records in the cloud environment. Attribute Based Encryption is used to store and secure the data in the cloud.

The health records are stored in the cloud via the web interface. First the PHR's owner has register himself along with his medical records, so that data can avoid ambiguity. Each individual receives a unique id during the registration. The user after registration, the details of him are stored in the cloud. The public key, the secret key are generated and are send to the mail given by him during the registration. So that he can make use of them securely. After obtaining the keys the PHR owner can save his medical records in the cloud using public key, this public key then encrypts the data entered by the owner and then stores it on the cloud. As the data is encrypted the unauthorized parties can't access the data. In this way the health records are secured on the cloud

using ABE. After encrypting if the data in the cloud is needed then they have to provide the secret key assigned to him. This private key is used to decrypt the encrypted data, without this one can't access the data stored in the cloud. This makes the health records on the cloud secure.

Mining is defined as an analytical process of exploring the large amounts of data. Classification in mining is to categorize the data according to the classes [8]. The Health record owners while uploading the medical record file into the cloud he fills the details which help them to further proceed the search. Disease, Duration of the disease, Treatment status, Age of the patient is needed.

After filling these details the file is uploaded. The Search Owner enter the disease he want to view to obtain the details of it in the search box. The results related to the disease is displayed with the status 'BEST', which means based on the attributes used the rule view of classification is done on them and the file with the best treatment if filtered from the rest and is displayed.

There can also be the some data other with BEST status but as the rule view is specified the result is obtained according to it. For example the rule view of above stated is

> **If   (disease ='cancer') & (treatment status= 'successful') &**
> **(duration = '2years') then status = 'BEST'**

Here based on the classification rule all the other data is filtered leaving the results with the status 'best'. After checking on the results the user can download the file which contains the info regarding the treatment using the secret key. Here as the results doesn't expose the patient information it is safe and secure. The end user downloads the file and can use it as the reference to treat the patient effectively.

V. Conclusion

Maintaining the personal data online without getting it affected by the unauthorized attacks is a great issue these days. If the data has undergone malicious attacks then there is great problem. So to Secure the Personal Health Records on the cloud Attribute Based Encryption is used. As to upload and download the data requires the keys the data can be secured effectively. To categorize the data to obtain the results wanted the data the classification rule in data mining is performed. In this way the data in the cloud is secured and analysis of the data is done through the classification to get the categorized data.

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