International Journal of Technical Innovation in Modern Engineering & Science (IJTIMES)
Impact Factor: 3.45 (SJIF-2015), e-ISSN: 2455-2585
Volume 4, Issue 4, April-2018

Review on Power Efficient, Reliable & secure Body Area Network using Clustering

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Abstract— Healthcare systems use a medical text mining which have been increasingly facilitating health condition monitoring and disease modelling. System works on the Personal Health Information (PHI) of the user. and analysis, which can hardly afford the dynamic health condition fluctuation Healthcare system grant users access to range of health information and medical knowledge. In proposed system I basically created the database of 150 to 200 diseases with their precaution suggestions. System will output the next highly probable disease by narrowing down the number of diseases from the list of diseases according to the related symptoms either entered by the users or captured by the different sensors nodes. Benefit of the system is all the information about disease, precautions and healthcare are store at one place. Unfortunately, delegating both storage and computation to the untreated entity would bring a series of security and privacy issues. One of the controversial issues for PHI is how the technology could threaten the privacy of patient health information. The proposed system focused on fine-grained privacy-preserving static medical text access

Keywords— WBAN, WSN, Cloud Computing, K-Mean Clustering Algorithm

I. INTRODUCTION

Normal experienced doctors classify diseases based on the different diagnosis [2] method. This involves narrowing down the diseases to the root disease out of the list of diseases which shows similar symptoms. This is done using their knowledge and experience, and it is then confirmed by performing various tests. Especially in some areas, the problem of lack of trained and experienced doctors leads to intensification of this problem [3]. So we are trying to build this process of differential diagnosis to make this rather tough task a lot easier.

In proposed system I basically created the database of 150 to 200 diseases with their precaution suggestions. System will output the next highly probable disease by narrowing down the number of diseases from the list of diseases according to the related symptoms either entered by the users or captured by the different sensors nodes. This system can also be used as Cloud server by centralizing the Data Base used in this system. Cloud computing is most recent advanced rising innovation that provides every kind of service to its users. Using all these, and by database having a medical history of the user, the probability of disease occurrence may get calculated, despite of the various unknown variables. The system will output the disease from the symptoms entered by the user and also gives the next highly probable disease, and thus, the most effective course of action to be performed can be determined. System works on the Personal Health Information (PHI) of the user. Unfortunately, privacy and security issues have significantly impeded the wide adoption of healthcare systems, since the physical health information disclosure and mistreatment would bring about extremely serious privacy leakage for the patients.

The system, using various techniques mentioned, will in twist display the root disease along with the set of most likely diseases which have similar symptoms. This system will give the list of diseases that the patient has maximum probability of suffering from. This, in turn, will help to recommend specific tests corresponding to diseases in the list, thus reducing the number of non consequential tests and thus resulting in saving time and money for both the doctor and the patient

II. LITERATURE REVIEW

Ivan Kholod, Konstantin Borisenko "Distributed Execution Environment for Data Mining as Service" 978-1-5090-0445-4/16/$31.00 ©2016 IEEE.

It representation of a data mining algorithm as functional expression makes it possible to divide the algorithm into functions of FB type (functional blocks). Such a splitting of data mining algorithms into blocks helps to map its to handlers of any distributed environment. We implemented this approach as Java framework. It possible to construct different variants of parallel data mining algorithms and to implement different execution strategies for various conditions and distributed environments. Single entry point allows to manage setting and execution of a data mining algorithm. It can be used as a service for distributed data mining. As future work we plan to extend distributed environments for Actor model, MapReduce and other.

Reza Sadoddin , Osvaldo Driollet "Mining and Visualizing Associations of Concepts on a Large-scale Unstructured Data" 2016 IEEE Second International Conference on Big Data Computing Service and Applications.

In this paper, we proposed a framework for mining and visualizing the associations between concepts using a text corpus as our reference knowledge. We addressed several aspects of this problem, including the scalability issues of solving it for a large dictionary, the effects of choosing the association measures, and also the visualization and analytics benefits of using a scalable graph database. Particularly, we proposed pruning techniques which can be used to find associated concepts in a linear scan of the dictionary. We presented different correlation measures which can be used for finding associated concepts, and showed that a variant of the PMI measure can outperform the standard PMI in finding pairs of associations in a gene disease dataset. The proposed framework can be improved in several aspects. An interesting relevant problem to investigate is to find *type* of associations using more specific data sources on the domain of study (in addition to or instead of Wikipedia as a general source of knowledge). Another interesting area of research is to compare the proposed techniques in this work with some traditional methods in Machine Learning field such as KNN-based methods or data structures such as KDD trees.

Peter Wlodarczak, Jeffrey Soar, Mustafa Ally "Multimedia Data Mining using Deep Learning" ISBN: 978-1-4673-6832-2©2015 IEEE.

The big advances in multimedia data mining in the past years have multiplied the applications of DL. DL has proven to be suitable for problems where shallow learners didn't provide satisfactory results. Deep learners were particularly successful in problems that in the past proved to be very difficult in Artificial Intelligence research such as object recognition and descriptive language generation. New trends in data mining such as data mining for social good have been emerging. Areas such as smart healthcare, social sensing, smart cities and open Government data mining will even widen the application field of DL for multimedia mining. They have the potential to make human lives more healthy and efficient and thus attract a lot of attention from academia, Governments, and the industry. The combination of Conv Nets and RNN has yielded very promising results in many domains. However, one drawback is that these methods mostly used supervised approaches where large corpuses of labeled training data are needed. However human and animal learning is not supervised, we learn mostly from observation, not from labeled objects. Whereas some studies used unsupervised DL methods, we expect to see more research in this area in the near future. Ultimately, it is expected that Artificial intelligence will go beyond simple descriptions and will be able to understand whole documents and will even be reasoning.

Hubert Kordylewski [5], Daniel Graupe [6] in 2001 describes the application and principal of a large memory storage and retrieval (LAMSTAR) neural network. The LAMSTAR was specifically useful for application to problems having very large memory that contains many different categories or attributes, like where some of the data is exact while other data are fuzzy and where, for a given problem, there may be some data categories are totally missing. The LAMSTAR network is fast and can shrink/grow in dimensionality without any reprogramming. LAMESTER network is a self organized map (SOM) with link weight between two neurons of this SOM module. The network also having features of forgetting and of interpolation and extrapolation, thus being able to handle partial data sets. Applications of the network to three specific medical diagnosis problems are described: two from nephrology and one related to an emergency-room drug identification problem.

Dejan Dinevski, Peter Kokol, Gregor Stiglic, Petra Povalej [7] elaborates the use of self organization to combine different specialist's opinions generated by different intelligent classifier systems with a purpose to raise classification accuracy. Early and accurate diagnosing of various diseases has proved to be of vital importance in many health care processes. In recent years intelligent systems have been often used for decision support and classification in many scientific and engineering disciplines including health care. However, in many cases the proposed treatment or the prediction or diagnose can vary from one intelligent system to another, similar to the real world where different specialists may have different opinions. The main aim here is to imitate this situation in the manner to combine different opinions generated by diverse intelligent systems using the self organizing abilities of cellular automata. Because most ensembles are construct using definite machine learning method or a combination of that method, but the drawback being this is that the selection of the appropriate method or the combination of that method for a specific problem must be made by the user. So, to overcome this problem an ensemble of classifiers is constructed by a self-organizing system applying cellular automata (CA).

Jenn-Lung Su, Guo-Zhen Wu [8] introduced the concept of database has been widely used in medical information system for processing large volumes of data. Author says that numeric and symbolic data will define the need for new data analysis techniques and tools for knowledge discovery. In his paper three popular algorithms for data mining which includes Decision Tree (DT), Bayesian Network (BN), and Back Propagation Neural Network (BPN) were evaluated. The result shows that Bayesian Network had a good presentation in diagnosis ability.

RebeckCarvalho, Amiya Kumar Tripath, Rahul Isola [9] introduced the concept of Medi-Query. Paper says that traditionally the huge quantities of medical data are utilized only for clinical and short term use. Medi-Query gives idea to use this huge storage of information. so that diagnosis using this historical data can be made. There are systems to predict diseases of the heart, lungs, and brain based on past collected data from the patients. Paper focus on computing the possibility of occurrence of a particular ailment from the medical data by mining it using algorithm which boost accuracy of diagnosis by combining Neural Networks, Bayesian Classification and Differential Diagnosis all incorporated into one single approach. The system uses a Service Oriented Architecture (SOA) wherein the system components of diagnosis, information portal and other miscellaneous services provided are coupled. It will also help the medical society in the long run by helping them in getting accurate diagnosis and sharing of medical practices which will facilitate faster research and save many lives.

Shucheng Yu, Cong Wang, KuiRen, Wenjing Lou in their paper "Attribute based data sharing with attribute revocation" [10] addressed an important subject of attribute revocation for attribute based systems. In particular, they considered practical application scenarios in which semi- trustable proxy servers are available, and proposed a scheme supporting attribute revocation. The Ciphertext-policy attribute based encryption (CP-ABE) was used to propose the system. CP-ABE is a public-key cryptography primitive that was proposed to resolution the exact issue of fine-grained access control on shared data in one-to-many communications.

Fully homomorphic encryption (FHE) is also widely studied and obviously provides a believable solution to secure outsourcing computation. However, some intrinsically unsolvable problems significantly obstruct its wide application in practice. Most existing work is mainly based on the polynomially bounded hard problems in lattice and the plaintext has to be encrypted bit-by-bit. Recently, Jung et al. proposed a privacy preserving data aggregation supporting multivariate polynomial evaluation without secure communication channel, respectively in one aggregator model and participant's only model. However, when it is applied to out sourced medical text mining, it only suggests static statistics computation, leaving the patient's dynamic health condition monitoring that can more precisely reflect her/his suffering status untouched. Moreover, the addition aggregation and multiplication aggregation are achieved in independent mechanisms, which lead an additional load on power-restricted users. Hsu et al. proposed an image feature extraction in encrypted domain with privacy-preserving scale-invariant feature transform (SIFT) [11], by exploiting Paillier's cryptosystem. However, it cannot be used in outsourced medical image feature extraction.

Healthcare systems have been increasingly facilitating health condition monitoring, using medical text mining and image feature extraction. The paper by Jun Zhou [12] gives a privacy-preserving dynamic medical text mining and image feature extraction scheme PPDM. Here author talks about the security and privacy issues of the user's Personal Health Information (PHI). Therefore, he designs a secure and privacy preserving outsourcing medical text mining with image feature extraction. By using one way trapdoor function, a fully holomorphic data aggregation is conduct which shows the basis for proposed privacy-preserving protocol for dynamic medical text mining. Next, an outsourced disease modeling and early interference is achieved, respectively by devising a privacy preserving function correlation matching from dynamic medical text mining and designing image feature extraction.

III. PROPOSED WORK

The Proposed System consist of 2 phases

1) Training phase
2) Testing phase

3.1 Training Phase

In training phase we create a database by applying fuzzy rules on the various symptoms collected either by sensing nodes or entered by users with the help of expert doctors. Our proposed methodologies may contain 150 to 200 symptoms various diseases.

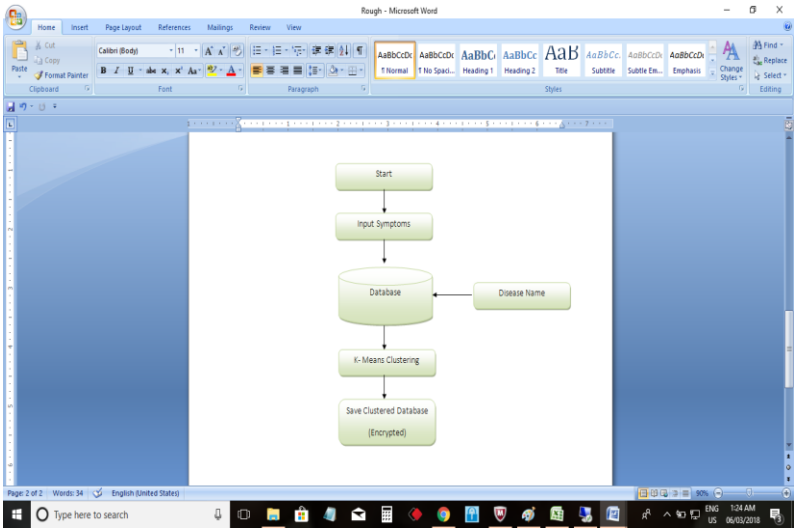

Fig 3.1 Data Flow Diagram (Training Phase)

Algorithm

1. Start
2. Input Symptoms
3. Input Disease name
4. K- Means Clustering
5. Apply Encryption standard to Clustered database.
6. Stop

3.2 Testing Phase

In the testing Phase system will provide the output of the input either entered by the users or captured by the sensors node.

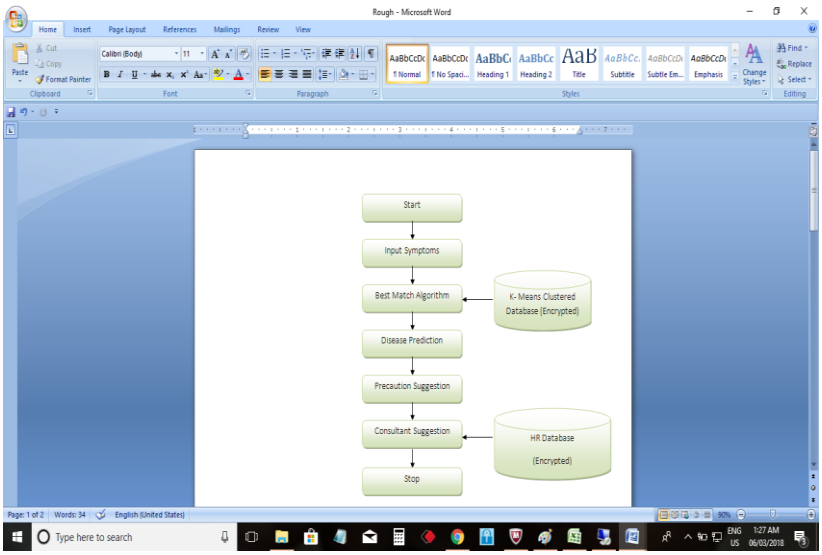

Fig 3.1 Data Flow Diagram (Testing Phase)

Algorithm

K-Mean clustering algorithm.

1. Start
2. Input Symptoms
3. Load Database Clustered
4. Apply Best Fit Algorithm
5. For i=1 to length(Clustered Database)
   Read record (i)
   Dist (i) = abs |record (i) – Symptoms (i)
   End
6. Locate Min(Dist)
7. Declare Min (Dist) as a predicted disease.
8. Stop

In this algorithm we assigning the wattage to occurrences of symptoms of different types of diseases within the range of 0 to 100. And clustering the wattage of different symptom from minimum range and then comparing the clustered data as input with our database of symptoms, name of diseases and suggestion precautions to determine the next highly probable disease.

IV. CONCLUSIONS

A low cost Wireless BAN, using off-the-shelf hardware was built and successfully tested in real time where data was successfully captured and displayed on a website. The BAN collected the pulse rate, the temperature and the location of the patients. The captured data was made available through a graphing application programming interface, where data can be continuously monitored on a website. Future enhancements to safeguard the data, including the encryption of the patient data is under investigation. Currently the BAN is powered using a 9V battery. In the future we plan to investigate the use of body temperature or the physical movement of the patient as means to produce power for the BAN. The captured data was made available through a graphing application programming interface, where data can be continuously monitored on a website

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