

Healthcare Monitoring System using Cloud and Machine Learning



T.Raghunathan, N.Abimanyu, N.Arun Kumar, J.Jegadheesan

Abstract: The prototype is a working model, incorporating sensors for measuring human parameters like body temperature, heart beat rate. A Raspberry pi microcontroller board is used to analyze the patient's Temperature, heartbeat inputs. This project offers a system that will track the crucial parameters a patient's condition to track continuously. If a patient experiences some critical situation, the unit also triggers an alarm in a patient's close relative and to the doctor in various methodology. This is very useful for future analyzes and review of the health condition of patients. This project can be adapted for more flexible medical applications, by integrating dental sensors and announcement systems, As a very effective and devoted patient care network, it thus makes it useful in hospitals. The world is facing a widespread problem in recent years, which is increasing the number of elderly people. The home-care dilemma for the elderly is something that is very important. In this, Wireless section is becoming a major platform for many services & applications, Web page tracking is also used here, but also a controller. Paper introduces a standardized health monitoring framework as a step towards the progress that has been made in this department to date.

Index Terms: cloud,health care,patient data.

I. INTRODUCTION

With the Quick development of internet services, the Internet of Things (IoT), and portable devices, a smart phenomenon in the field of health monitoring has been shown in recent years. Most hospitals are already using mobile phone applications to manage procedures, investigate electronic medical records, as well as the results of exams. In this project different measurements are used to track the condition of the health of the patients such as patients' pulse rate, temperature and blood pressure. Hospital stays are costly, tiresome, and it is sometimes observed that patients only need to stay in the hospital for routine physical condition monitoring. Healthcare professionals monitor vital signs such as heart rate, blood pressure, body temperature, especially during these tests. Patients feel ease from being both at home and within the medical findings. In another event, access to ICU are strongly discouraged, which acts as a barrier to effective and clear communication between both the patient and the relatives concerned.

Revised Manuscript Received on April 30, 2020.

* Correspondence Author

T.Raghunathan*, Sri Krishna College of Technology, Coimbatore (Tamilnadu), India

N.Abimanyu, Sri Krishna College of Technology, Coimbatore (Tamilnadu), India.

N.Arun Kumar, Sri Krishna College of Technology, Coimbatore (Tamilnadu), India.

J.Jegadheesan, Sri Krishna College of Technology, Coimbatore (Tamilnadu), India.

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

In addition to these, heart disease and to-use, supervised machine learning algorithm which can be used to solve classification and regression problems. The KNN one-third of all global deaths Remote patient monitoring Algorithm stroke are the reason for the failure of roughly The K-nearest Neighbors (KNN) algorithm is a simple, easier- innovation can highlight these challenges. This system uses unorthodox ways to track a patient. It increases access to healthcare, helps to reduce hospital stay costs, lowers hospital traffic, wastes time and helps healthcare providers solve staff shortages. The cloud computing architecture can be represented as a service collection: applications, platforms, infrastructures and servers which allow data virtualization and data storage. Certain cloud computing platforms may be private, public or hybrid according to classification [12]. Through this device, a patient's body condition is monitored from a distant place by medical personnel or patient relatives using wireless technology [14-18]. Data might be automatically saved to the cloud and will be visible to the medical persons. Remote health surveillance systems are rising rapidly in the Healthcare field today. This is the technology that is very common in developed Parts of the world but the facility is very unstable in developing countries like Bangladesh.

II. RELATED WORKS

Measurement of wireless body temperature was implemented within the project in which LM-35 was used as a temperature sensor is used to collect data in real-time. Measured blood pressure, pulse and temperature of the body

[4] values have been programmed in our implementation to send them to the cloud and by granting the cloud access the data can be transferred to the desired location

The cloud computing architecture can be divided into two front-end parts (client segment of the cloud computing system) of the back-end (all infrastructure needed for cloud computing services-data storage systems, virtual machines, surveillance mechanisms, infrastructures, deployment models, servers) [19] framework is shown in Fig. 1.

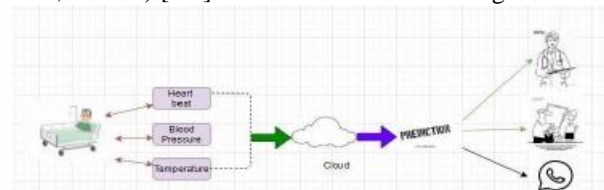


Fig. 1. HealthCare Monitoring System

1. Load the information..
2. Initiate the K to your selected neighbours number.
3. For every example of the data

Healthcare Monitoring System using Cloud and Machine Learning

- 3.1 Calculate the distance between the example problem and the current example from the data.
- 3.2 Add in ordered range
4. The distance and the comparison purposes index. List the distance ordered and the distances in the dice sequence from the shortest to the largest (in increasing order) Pick first KNN operates by calculating the distance between the two the request and all examples of data, choosing the number examples listed (K) nearest to the query, then voting for the most common label of the question (in the case of classification) or the average label (in the case of regression).

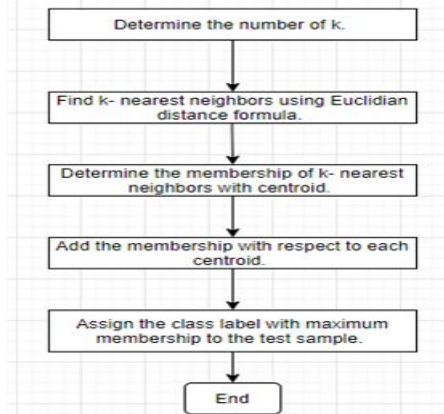


Figure 2: Classification Process

The dataset consists of four columns Temperature, Pulse, Blood pressure and the fourth column is the condition at all three column values. The status field consists of two classifications which predict the final performance. The warning message will be passed based on the results. KNN is one of many (supervised learning) algorithms used in information extraction and machine learning, a classifier technique that extracts "how near" data (a parameter) from another[13].

Temp	hb	bp	status
21	99	73	good
22	100	66	good
10	98	78	bad
33	26	56	bad
55	10	12	bad
53	12	40	bad
21	20	33	good
18	33	45	good
15	44	32	bad
44	20	89	bad
100	0	89	bad
21	99	73	good
22	100	66	good
10	98	78	bad
33	26	56	bad
55	10	12	bad
53	12	40	bad
21	20	33	good
18	33	45	good
15	44	32	bad
44	20	89	bad
100	0	89	bad

Figure 3: KNN Dataset

III. CLOUD

Cloud computing, also known as an on-demand computing, is a kind of internet-based computation. Under which computers and other devices are equipped with shared resources and information on query. It is a model to allow omnipotent and omniscient Connect on demand to a shared database of customizable computer resources. Cloud storage and storage platforms. offer different features for consumers and enterprises to store and process their data in cloud services of external parties. This relies on the sharing of information to achieve clarity and efficiencies, comparable to the use of the network (like the electricity grid). The wider idea of converged networks and shared services is at the heart of cloud technology.



Fig. 4. Basic structure of a cloud technology

III. IMPLEMENTATION

Detailed implementation of the proposed system, three basic units, the pulse rate, body temperature and blood pressure measuring unit, were added individually. The output was then sent to the Raspberry pi unit for all three devices.

A. Heart rate measurement unit

The basic heartbeat sensor is a light emitting diode and a sensor such as a light detector resistor or a signal generator. The pulse rate trigger a difference in blood flow to different parts of the body. When a body is activated by a source of light, i.e. lighting produced by the led, it either. The Raspberry Pi pulse sensor is not digitally readable so we need an analog-to-digital converter. Such an ADC allows the Raspberry Pi read analog signals since. Unlike the Arduino, the Pi has no analog IO pins built into it.



Fig. 5. Heartbeat Sensor

A. Body temperature measurement unit

Now we need a sensor for reading Person Temperature. Temperature sensor LM35 will be used here. Temperature is usually expressed in "Fahrenheit" or "Centigrade." The "LM35" sensor provides output in Centigrade degree.

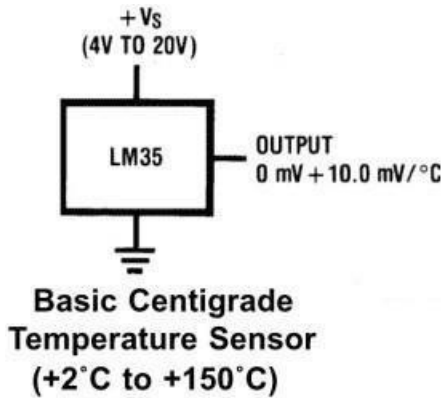


Fig. 6. LM35 Temperature Sensor

C. Blood pressure measurement unit

The piezo vibration sensor is used for measuring the human body's vibrating rate. The vibration sensor is typically used for sensing an object's vibration and shock. The precise vibration rate of the body can be calculated by using this sensor.



Fig. 7. Pressure Sensor

All the sensor data obtained are stored in the ThinkSpeak cloud and the prediction is made using the KNN algorithm. The data stored can be accessed by the doctor and relatives as long as the value meets the fixed threshold value the warning message is sent to the doctor and close relatives.

IV. EXPERIMENTAL RESULTS

The following graph show the analyzed data that collected from development kit using various sensor.

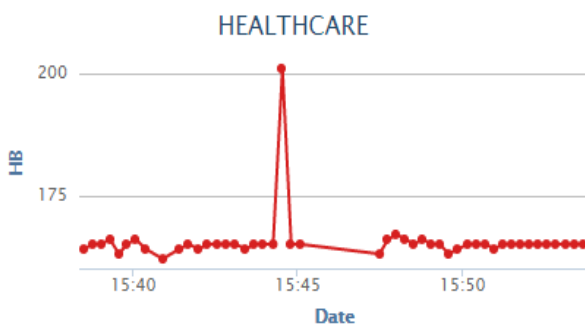


Fig.6.Heartbeat Data analysis

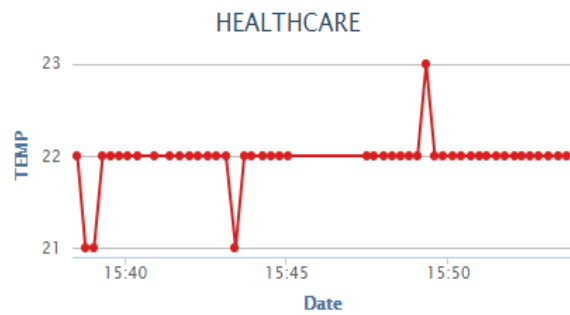


Fig.7.Body Temperature Data analysis

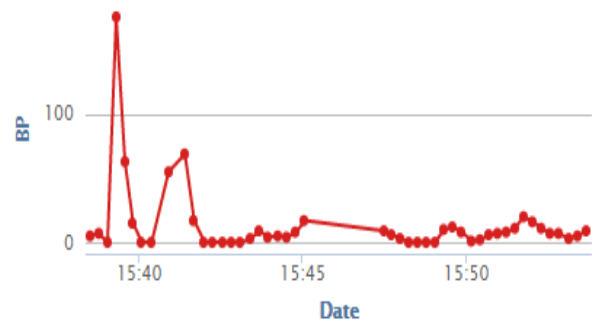


Fig.8. Blood Pressure Data analysis

The above figure's have some threshold value for the respective collected data .Once it reaches the threshold value automatic it will send the alert message to the respective doctor and relative as SOS message and mail.

V. CONCLUSION

The use of cloud computing technologies for healthcare costs lead to lower prices for tracking of patients.Cloud services are pay-per-use systems and have bulk rates for a large number of queries for services.

The advantages of using cloud-based healthcare are:

- Storage space for big data physiological sensors
- Disponibility of information
- Information protection and security by architecture
- data processing and Predictive prototyping;
- data interpretation and analytics;
- decision in support of health acts;
- reduce expenditure of hospital and caregiver expenses.

VI. FUTURE ENHANCEMENT

Further expansion of the design might be the addition of the ECG and the current units of the respiration rate monitoring unit. The system proposed is a practical solutions for densely populated countries in the world such as Bangladesh where the doctors are not always easy to get.The hope is that, in our conventional medical market, this scheme will bring positive reform.

REFERENCES

1. J. K.Mazima,M. Kisangiri, & D. Machuve, "Deign of low cost blood pressure and body temperature interface",2013
2. R. A. Ramlee, M. A. B.Othman, M. I. B. A.Aziz & H. A. bin Sulaiman, "Low cost heart rate monitoring device using
3. Bluetooth", In:Proceedings of the 2nd IEEE International Conference on Information and Communication Technology (ICoICT), pp. 42-46,2014.

Healthcare Monitoring System using Cloud and Machine Learning

4. W. J.Li, Y. L.Luo, Chang & Y. H. Lin, "A wireless blood pressure monitoring system for personal health management", In: Proceedings of the IEEE Annual International Conference of the IEEE Engineering in Medicine and Biology, pp. 2196-2199,2010.
5. H.Boudra, A.Obaid & A.M.Amja, "An intelligent medical monitoring system based on sensors and wireless sensor network". In: Proceedings of the IEEE International Conference on Advances in Computing, Communications and Informatics (ICACCI), pp. 1650-1656,2014.
6. D.U.Zhanwei & Y.Yongjian, "Semi-automatic remote medicine monitoring system of mobile users. China Communications",Vol.12 No.11, pp.1-9,2015.
7. N.T.Bugtai, S.U.Chan-Siy, J.E.Chua, J.A.Flores & J.L.Wang, "Development of a Portable Heart Monitoring System". In: Proceedings of the TENCON Region 10 Conference, pp. 1-6, 2012.
8. J.Chen, K.Hu, Q.Wang, Y.Sun, Z.Shi & S.He, "Narrowband internet of things: Implementations and applications", *IEEE Internet of Things Journal*,Vol.4 No.6, pp.2309-2314,2017.
9. N. V.Panicker & A.S.Kumar, "Development of a blood pressure monitoring system for home health application", In: Proceedings of the IEEE International Conference on Circuits, Power and Computing Technologies [ICCPCT-2015] pp. 1- 4,2015.
10. R.M.Aileni, S.Pasca, & C.Valderrama, "Cloud computing for big data from biomedical sensors monitoring, storage and analyze". In: Proceedings of the IEEE Conference Grid, Cloud & High Performance Computing in Science (ROLCG) pp. 1-4, 2015.
11. H.Mansor, M.H.A.Shukor, S.S.Meskam, N.Q.A.M.Rusli N.S.Zamery, "Body temperature measurement for remote health monitoring system", In: Proceedings of the IEEE International conference on smart instrumentation, measurement and applications (ICSIMA), pp. 1-5, 2013.
12. Cloud computing tutorial, Tutorials Points, pp.12-25
13. K.Chandrasekaran, "*Essentials of cloud computing*". CrC Press,2015.
14. Sathya Bama S., Irfan Ahmed M.S., Saravanan A. "A mathematical approach for improving the performance of the search engine through Web content mining" in Journal of Theoretical and Applied Information Technology, Vol 60 pp 343-350.
15. Dr.A.BalaMurugan,P.Tamije Selvy,S.Hindumathy,
16. "Automated lung lesion detection using effective machine learning techniques" in International Journal of Scientific and Technology Research, Vol 8, pp 2604-2607.
17. Dr.P.TamijeSelvy,M.Anitha,"Performance Analysis of various machine and deep learning algorithms for Alzheimer's disease prediction in Paideuma Journal, Vol 12 pp 629-636.
18. N.K Sreeja , A.Sankar , "Pattern matching based classification using Ant Colony Optimization based
19. feature selection" Applied Soft Computing Journal pp. 91-102,2015.
20. Ms.A.Sunitha nandhini,Dr.P.Vivekanandhan,"A Novel Security and Energy Efficient Data Aggregation for Medical Internet of Things using trust" in Journal of Medical imaging and Health Informatics, Vol 10 pp 249-255.
21. Mr.A.MuthurajaBoopathy,Ms.P.Kalpna,"Reputation based Trust Management for Cloud Services" in International Research Journal in advanced Engineering and Technology , Vol 3 .pp 2454-4744.

T. Raghunathan, Sri Krishna College of Technology, Coimbatore (Tamilnadu), India. Email: raghunathan.t@skct.edu.in

AUTHORS PROFILE



T.Raghunathan has obtained his Master of Engineering from Regional Campus Trichy, and Bachelor of Engineering from Maharaja Engineering College, Coimbatore. His area of research includes Cloud Security, Networking, Data Mining, Artificial Intelligence.



N.Abimanyu pursuing Final Year BE CSE. at Sri Krishna College of Technology . His field of interests include Cloud Computing, Artificial Intelligence.



N.Arun Kumar pursuing Final Year BE CSE. at Sri Krishna College of Technology . His field of interests include Networking, Data Mining.



J.Jegadheesan pursuing Final Year BE CSE. at Sri Krishna College of Technology . His field of interests include Internet Of Things, Cloud Computing.