International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 06 | June 2021 www.irjet.net p-ISSN: 2395-0072

Patient Physical Condition Analysis System using Different Classifiersfor Physiological Data

Nidhi G. Dahatkar[1], Prof. Jiwan Dehankar[2], Dr. Narendra Chaudhary[3]

[1]*Post Graduate Student, Department of CSE, Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur, India*

[2]*Professor, Department of CSE, Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur, India,*

[3]*Professor, Department of CSE, Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur, India,*

Abstract - *In Disease Diagnosis, the organized provision of medical care to a community or individuals, it is mandatory to always monitor the patient's physiological parameters. Doctorscannot monitor more than one patient at a time, but the Wireless Body Sensor Network (WBSN), can be used to make a patient monitoring system which offers the ability to move and pliability to analysis patient's health condition. Some systems prediction might not be accurate all the time and hence causeFalse Positive Rate (FPR). During this paper, for the disease prediction, we use K-Nearest Neighbor (KNN) and Convolutional neural network (CNN) machine learning algorithm for accurate prediction of disease. For disease prediction required disease symptoms dataset. during this general disease prediction, the living habits of person and checkup information consider for the accurate prediction. The accuracy of general disease prediction by using CNN is 84.5% which is over KNN algorithm. and also the time and also the memory requirement is additionally more in KNN than CNN. After general disease prediction, this technique ready to gives the chance related to general disease which is lowerrisk of general disease or higher. In machine learning, validation of the model is remarked because the procedure where a trained model is evaluated with a testing data.*

Key Words: Wireless Body Sensor Network (WBSN), K-NN, C-NN, Machine learning, Classification Algorithms

1. INTRODUCTION

The medical area where the foremost clinical and natural experts are abusing new learning through their examinations yet with the movement of the data development things have changed rapidly. Research in the medical space as refined with information development and now the pros within the information mechanical space have started their investigation on the most ideal approach to use information advancement to improve the medical zone and therefore the social protection division and this zone of research has progressed as prosperity informatics ask about.

Wireless Sensor network (WSN) has most traditional services in industrial applications, environmental monitoring, transportation and logistics, Precision agriculture and animal tracking, Urban terrain tracking and Civil structure monitoring and lots of more. The amount of aging population is increasing so there's need of an honest patient health care system for this population in future also. WSN may be a boon to anyone's lives. The system takes physiological data from the quality database [2] as an input and offers related results. The computational system has taken place on mobile devices to figure efficiently within the WBSN area [3,4]. WBSN system communicates with a physician via Short Message Service (SMS) gateway, Global Positioning System (GPS) or heterogeneous protocol about the movement attention of patient is required for the critical situation [5, 6]. WBSN system uses a wise device to communicate with care center such that patient can go around without restrictions [7]. On the idea of information coming from the patient, the assorted researchers have tried to create a framework for the signal and processing it by comparing with medical practitioner's database [8, 9].

Today machine learning is present everywhere in order that without knowing it, one can possibly use it again and again every day. CNN uses both the structured and unstructured data of a hospital to try to to classification. While other machine learning algorithms only work on structured data and time required for computation is high also they're lazy because they store entire data as a training dataset and uses complex method for calculation.

1.1 METHODOLOGIES

Several efforts administrated to style the wearable medical system, within the 1973 mobile technology i.e. wireless technology came within the market, now every day increasing the mobile and wireless sensor network because it can support the health care monitoring system. Wearable body area handheld device more beneficial to the emergency condition patient. Now every day many researchers can take plenty of effort to reinforce the architecture of the wireless body area sensor network system the most approach of the WBSN system is that the to investigate the sign and symptoms of the patient health care condition [10,11] to

extend the effectiveness of the information collection require the automated risk situation algorithms, therefore the doctor can easily work on great deal patient data.

2. PROPOSED RESEARCH METHODOLOGY

We present a pliable framework that performs analysis of physiological dissimilar parameters to watch patient's health state. We've taken physiological data which is captured by sensors.

2.1 Architecture Overview

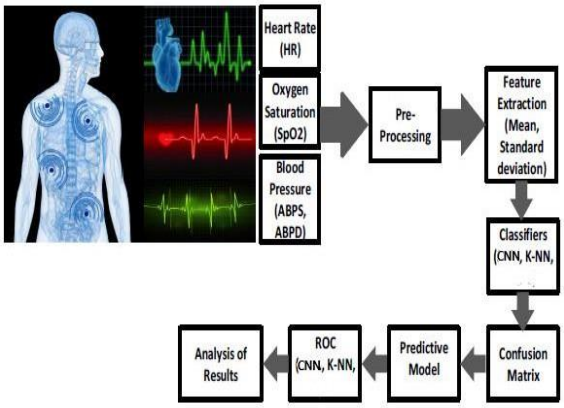

Fig 1. System Architecture

Initially we take disease dataset from UCI machine learning website and that is in the form of disease list with its symptoms. After that preprocessing is performed on that dataset for cleaning that is removing comma, punctuations and white places. And that is used as training dataset. After that feature extracted and selected. Then we classify that data using classification techniques such as KNN and CNN. Based on machine learning we can predict accurate disease.

2.2 Preprocessing

Data preprocessing is data cleaning process, by using different wear able sensor data is collected but sometimes because of external interference collected data become noisy to get rid of this noise data preprocessing could be a important step. The most purpose of the information preprocessing is that the remove the noise and to urge the proper information [14].

2.3 Feature Extraction

Mean and variance are two statistical features are wont to feature extraction of physiological data, we extract the subsequent features.

Mean: The mean feature measures the

$$\text{Mean} = \mu = \frac{1}{n} \sum_{i=1}^{N} xi \qquad (1)$$

Standard Deviation (SD): It is the dispersion of a set of data from its mean. It's determining the variation between each data points relative to the mean.

$$\text{SD} = \boldsymbol{\sigma} = \frac{1}{n} \sum_{i=1}^{N} (xi - \mu)^2 \qquad (2)$$

2.4 Algorithms Used

1) K-Nearest neighbor (KNN)

Common Distance Metrics:

Euclidean distance (continuous distribution):

d(a,b) = √Σ(ai – bi)2

Hamming distance (overlap metric):

bat (distance = 1)

toned (distance = 3)

Discrete Metric (boolean metric):

if x = y then d(x,y) = 0. Otherwise, d(x,y) = 1

Determine the class from *k* nearest neighbor list

Take the majority vote of class labels among the k-nearest neighbors

Weighted factor:

w =1/d (generalized linear interpolation) or 1/d2

***2)** Convolutional neural network (CNN)*

Step 1: The dataset is converted into the vector form.
Step 2: Then word embedding carried out which adopt zero values to fill the data. The output of word embedding is convolutional layer.
Step 3: This Convolutional layer taken as input to pooling layer
and we perform max pooling operation on convolutional layer.
Step 4: In Max pooling the dataset convert into fixed length vector form. Pooling layer is connected with the full connected
neural network.
Step 5: The full connection layer connected to the classifier that is softmax classifier.

3. RESULT AND DISCUSSIONS

3.1 Experimental Setup

1) All the experimental cases are implemented in Java in congestion with Netbeans tools and MySql as backend, algorithms and techniques, and therefore the competing classification approach together with various feature extraction technique, and run in environment with System having configuration of Intel Core i5-6200U, 2.30 GHz Windows 10 (64 bit) machine with 8GB of RAM.

2) Dataset
Patient disease dataset downloaded from UCI machine learning website.

3.2 Comparison Results

This section presents the performance of the KNN and CNN classification algorithms in terms of time required and accuracy. Fig 2 Shows accuracy Comparison of KNN and CNN algorithms for various Threshold. X-axis shows Algorithm & Y-axis shows accuracy in %.

This has been observed during the experiments that the CNN gives more accurate disease prediction than KNN.

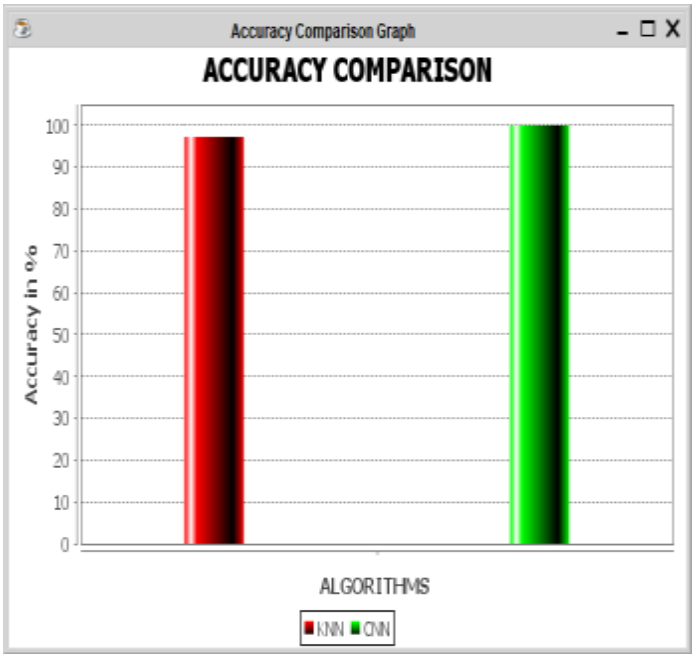

Fig. 2: Accuracy Comparison Graph

Fig 3 shows the Time comparison of KNN and CNN algorithms for various size. The X-axis shows algorithms and Y- axis shows Time in ms. The CNN takes less time than KNN for classifying large dataset.

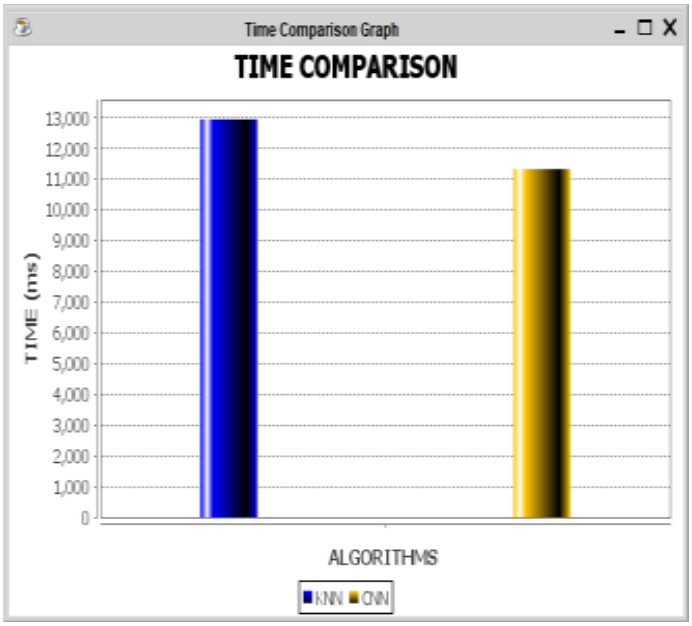

Fig. 3: Time Comparison Graph

4. CONCLUSION

We proposed general disease prediction system supported machine learning algorithm. We utilized KNN and CNN algorithms to classify patient data because today medical data growing very vastly which has to process existed data for predicting exact disease based on symptoms. We got accurate general disease risk prediction as output, by giving the input as patients record which help us to know the extend level of disease risk prediction. Due to this method may leads in low time consumption and minimal cost possible for disease prediction and risk prediction. We compare the results between KNN and CNN algorithm in terms of accuracy and time and also the accuracy of CNN algorithm which is more than KNN algorithm and time required for classification for CNN is less than KNN. So we are able to say CNN is better than KNN in terms of accuracy and time.

ACKNOWLEDGEMENT

I would like to express my thanks of gratitude to my guide “Prof. Jiwan Dehankar” for their able guidance and support in completing my project. I would like to extend my gratitude to the “Dr. Narendra Chaudhary sir” & Our Principle & all professors for providing me with all the facility that was required.

REFERENCES

[1] M. Chen, Y. Hao, K. Hwang, L. Wang, and L. Wang,“Disease prediction by machine learning over big data from healthcare communities”, ” IEEE Access, vol. 5, no. 1, pp. 8869–8879, 2017.

[2] B. Qian, X. Wang, N. Cao, H. Li, and Y.-G. Jiang, "A relative similarity based method for interactive patient risk prediction," Springer Data Mining Knowl. Discovery, vol. 29,no. 4, pp. 1070–1093, 2015.

[3] IM. Chen, Y. Ma, Y. Li, D. Wu, Y. Zhang, and C. Youn, " Wearable 2.0: Enable human-cloud integration in next generation healthcare system," IEEE Commun. , vol. 55, no. 1, pp. 54–61, Jan. 2017.

[4] Y. Zhang, M. Qiu, C.-W. Tsai, M. M. Hassan, and A. Alamri, "HealthCPS: Healthcare cyberphysical system assisted by cloud and big data," IEEE Syst. J., vol. 11, no. 1, pp. 88–95, Mar. 2017.

[5] L. Qiu, K. Gai, and M. Qiu, "Optimal big data sharing approach for telehealth in cloud computing," in Proc. IEEE Int.Conf. Smart Cloud (Smart Cloud), Nov. 2016, pp. 184–189.

[6] Disease and symptoms Dataset –www.github.com.

[7] Heart disease Dataset-WWW.UCI Repository. Com

[8] Ajinkya Kunjir, Harshal Sawant, Nuzhat F.Shaikh, "Data Mining and Visualization for prediction of Multiple Diseases in Healthcare," in IEEE big data analytics and computational intelligence, Oct 2017 pp.2325.

[9] Shanthi Mendis, Pekka Puska, Bo Norrving, World Health Organization (2011), Global Atlas on Cardiovascular Disease Prevention and Control, PP. 3– 18. ISBN 978-92-4-156437-3.

[10] Amin, S.U.; Agarwal, K.; Beg, R., "Genetic neural network based data mining in prediction of heart disease using risk factors", IEEE Conference on Information & Communication Technologies (ICT), vol., no.,pp.1227-31,11-12 April 2013.

[11] Palaniappan S, Awang R, "Intelligent heart disease prediction System using data mining techniques," IEEE/ACS International Conference on Computer Systems and Applications, AICCSA 2008., vol., no., pp.108115, March 31 2008-April 4 2008.

[12] B. Nithya , Dr. V. Ilango Professor, "Predictive Analytics in Health Care Using Machine Learning Tools and Techniques," International Conference on Intelligent Computing and Control Systems,2017.

[13] S.Leoni Sharmila, C.Dharuman and P.Venkatesan "Disease Classification Using Machine Learning Algorithms - A Comparative Study", International Journal of Pure and Applied Mathematics Volume 114 No. 6 2017, 1-10

[14] Allen Daniel Sunny1, Sajal Kulshreshtha, Satyam Singh3, Srinabh, Mr. Mohan Ba, Dr. Sarojadevi H " Disease Diagnosis System By Exploring Machine Learning Algorithms", International Journal of Innovations in Engineering and Technology (IJIET) Volume 10 Issue 2 May 2018.

[15] Shraddha Subhash Shirsath "Disease Prediction Using Machine Learning Over Big Data" International Journal of Innovative Research in Science, Vol. 7, Issue 6, June 2018.