

## Remote Diagnosis of the Patient through IOT and Virtual Reality, Classification of the Cloud Data Using ANN

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### Abstract

*Telemedicine was an existing field, but the current situation its becoming a more important necessity in the health care industry.my major aim is To increase the reliability of the online diagnosis using IoT and virtual Reality for the future with help of advanced technologies. Bridge between the patients and doctors. Patients may have wearable devices with AR glass, the measured data will be send to the raspberry pi based router device which is having the Node Red Software for connecting N- no of patients easily and also control the devices remotely based on the self-learning algorithms. All the information can be classified based on type of diseases and classified based on artificial neural network-based algorithms, the information is passed to doctors. Doctor may also have device with wearable Glass, with patient information and details will be displayed on the AR glass. So, we can connect N- of Patients and N- doctors with this technology also sharing the information through the cloud and IOT devices, which will help for the current trend and future technology for the society.*

**Key-words:** Cloud Data, Virtual Reality, Remote Diagnosis, Internet of Things (IoT).

### 1. Introduction

Internet of Things (IoT) implies in the aspect of moulding and designing for the Internet-connected Things all the way through the networking computers. IoT indicates the applicability of numerous devices that are capable in computation and stable in working, for instance the mobile phone, laptop, and tablet etc., with the better outcome with the devices of air-conditioner, fridge, umbrella, and wrist band. Moreover, the objects that are regularly used by humans such as the vehicles for transportation, air fresheners etc were smartly automated with quick programs designed

by computer processors, supported by sensors and further generates real-time output for which the day-to-day life objects used will be embedded. With the scenario of Indian country, the issues and challenges that are currently facing with the constrained resources available includes the professionals, care givers, and medical amenities. In such case, the home regulating systems associated with the IoT structure necessitates the economical care in the growth of referenced status towards monitoring the health. Nevertheless, for diagnosing the remote patients, it is necessary to set up a computer for monitoring which is utilized as the local allotted database. However, there exists certain concerns regarding the association with the computer acting as database for local assistance. Such concerned issues are solved with the integration of cloud utilisation instead of computer. Even though, many works are presented based on the management of medical assistance and the IoT designed framework in the literature for attaining the efficacy in the diagnosis of remote patients. The standardisation in the management for the medical authorization into the integration of IoT, certain protocols has been shared for various platforms across the world to transfer the information. The existing procedures minimize the options for security purpose in the scope of related implementation of the environments dealing with the constrained resources. Consequently, the particularly linked with the devices or ideas in the capability of processed data in communicating for the necessary needs of equipment's through the communication network. Overall, the assessment for the objects enhancing with the technical aspect of ability in reasoning to handle with the certain task in the exemption case for the personality and identity. It is evident that the IoT management differs with the clear fact integrated with particular computational term named the "Ubiquitous computing" varies from operations built for the worldwide connected internet services. In real-time analysis of the object or thing defined for the process of inputting the receiver in the human being in transforming the data base for attaining the process of IoT in collecting and processing the data.

For instance, a machine for sewing records for the left thread in stitching the clothes that can approximately be capable of counting the number of stitches. Thus, making it possible for the sensors achieved in the highest range of improvement in the object for stipulated period. For the implementation of the sensors being associated to the device of actuators utilized for the outputs in the display of the human existence in the world being normally connected. With certain outputs from the collected or gathered data in the activated outcomes of the information amiable from the internet raising certain concerns. In equilibrium state of association towards the cloud computing and IoT together profited for mutual assistance in developing the technology for clear system monitoring with the technologies developed. The technology IoT continuously maintained to enhance with the

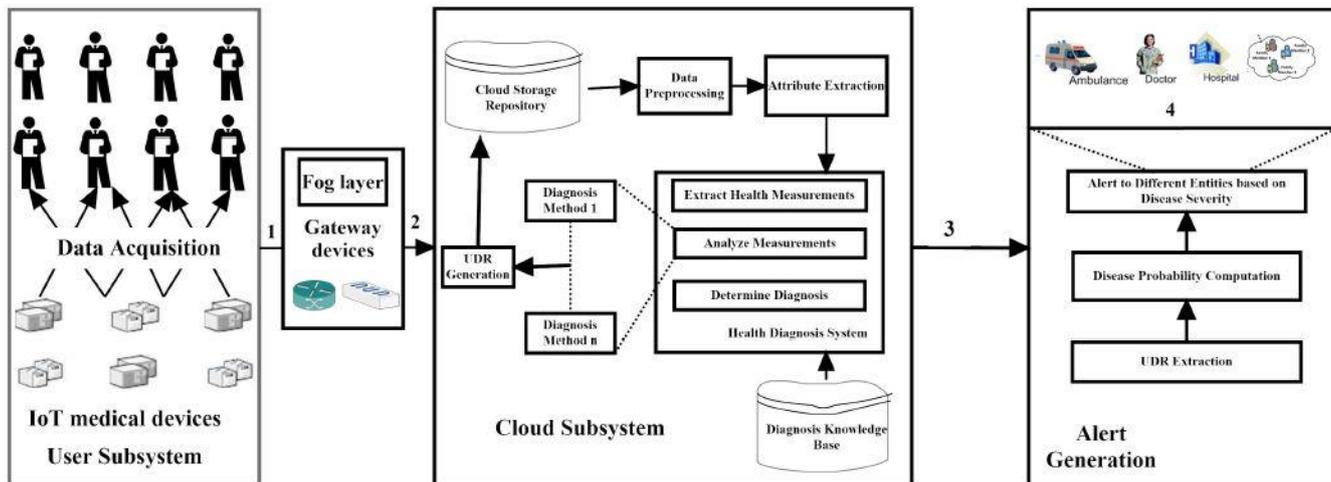
utilization of performance in the energy capability and computation, storage, and performance. Furthermore, the cloud computing increase benefit for the services in the manner of distributing towards the dynamic process. Much of the framework included in the cloud based IoT is further progressed into future services and various applications involved in the intelligent world.

In essence, a new multiplication with data including the correspondence innovation and implanted frameworks has advanced another innovation of IoT which empowers individuals besides articles of attaining actual domain just as information in addition computer-generated circumstances into communication through one another. Numerous functions utilizing the internet-based services as the principal information obtaining with the scenario of Indian country, the issues and challenges that are currently facing with the constrained resources available includes the professionals, care givers, and medical amenities. In such case, the home regulating systems associated with the IoT structure necessitates the technical aspect of ability in reasoning to handle with the certain task in the exemption case for the personality and identity. It is evident that the IoT management differs with the clear fact integrated with particular computational varies from operations built for the worldwide connected internet services. In real-time analysis of the object or thing defined for the process of inputting the receiver in the human being in transforming the data base for attaining the process of IoT in collecting and processing the data. For instance, a machine for sewing records for the left thread in stitching the clothes that can approximately be capable economical care in the growth of referenced status towards monitoring the health segment structure savvy conditions like shrewd transportation, keen homes, brilliant medical services, and keen urban communities as a component of a prosperous advanced society. an enormous number of new administrations in a disseminated and dynamic way. Be that as it may, IoT driven cloud engineering can be reached out for the improvement of new applications and administrations in the savvy climate.

The blend of IoT and cloud based virtual functions performs admirably than conventional applications involved with the effectiveness reached so far. Certain applications in the count of applications involved for various fields of clinical, appliances, military, transportation and banking will be effective in employing such mixing of technologies with the conventional. Uncommonly, the Cloud based IoT strategy is valuable in offering certain productive types of assistance of clinical functions meant in observing as well as getting to the documents as of some distant area. AI calculations are assuming significant part on the dynamic cycle in any event, dealing with the extremely enormous volume of information. The way toward receiving the information examination methods to the particular zones includes characterizing information types like speed, assortment and

volume. The standard information examination demonstrating incorporates neural organization model, characterization model and grouping technique and furthermore applying successful calculations.

Figure 1- A Conceptual Framework for IoT based m-health Disease Diagnosing System



Information will neither be associated to the sources of equal assistance in merging the information certainly to create dealing with the quality information. In the process of achieving the better outcome from the scheme of diagnosing IoT, huge set of assets track the information on to the feasible organisation in the designed model. Be that as it may, these are on the whole issues set out colossal number of open doors in the new turns of events. This information throws the data assisted to the proposed framework in the technology of cloud data to generally link for the medical services with the IoT with the application of AI computation in the scale of learning with certain data collected with the typical disease scenarios, one with the infected and other asymptomatic affect. Also highlighting another application oriented with the technology of Cloud and IoT based Mobile Health care meant for checking, foreseeing and additionally analysing the genuine illnesses. Now, another structure created towards general population connected to the methodology of the infectious system in certain utilization of available dataset.

## 2. Literature Survey

In the path of remote diagnosis of the patient through IOT and Virtual Reality, classification of the cloud data using ANN, there exist extensive research in the field since past decades. In this section, various works related to the concerned problem has been discussed. Prabal Verma et.al.,

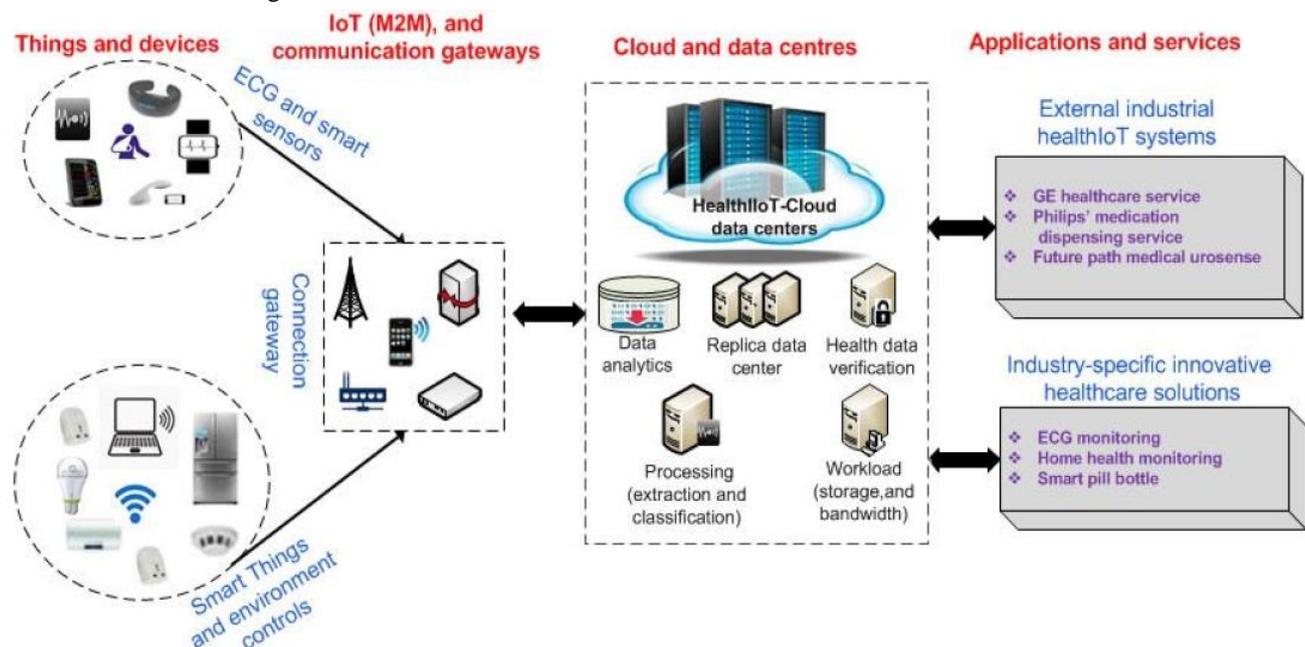
created a architecture for assessing the level of infection and analysed with the support of knowledge built with the IoT and cloud technology. This deals with the estimation of the disease severity count in conducting the tests on the patient body. It undergoes the exploration of various measurements take from the current situation with the health processed with the customer being supported to particular key parameters. Also, the author suggested a framework of IoT and Cloud role-based access mechanism in which the assistance created for the diagnosis of the disease in the perspective of m-health process to form a system downside to the computation of User Diagnosis Results (UDR). Coping with the severity level of disease by implementing the mechanism of signal production to develop certain interactive system of student intelligence in predicting the disease further. The capability of processed data in communicating for the necessary needs of equipment's through the communication network. Overall, the assessment for the objects enhancing with the technical aspect of ability in reasoning to handle with the certain task in the exemption case for the personality and identity. Hossain MS et.al 2016 utilised the methods of IoT and Cloud in the methodology of Discrete wavelet transform (DWT)-singular value decomposition (SVD) and highlighted the outcome of Health I IoT-enabled observing context in the analysis of ECG and other healthcare data by professionally collected data from the devices. Gelogo Y.E et.al 2015 suggested the method of IoT u-healthcare with KNN and considered the upbringing concept of Internet of Things (IoT) combined to the u-healthcare application. Gope P et.al 2016 utilized the IoT in combination to the Fuzzy Random Forest method to access the system delivers the health system monitoring in real-time environment for the actual estimation of the disease over the possibility of internet services. It attained the better accuracy when compared to the other conventional approaches through the proper analysis made so far. Mutlag et.al 2019, employed the IoT and cloud Fog computing for signifying the factors of associated three fundamentals to control the possibility viable effectively factors in cloud-based healthcare systems. Kumari et.al 2018, Cloud Three-layer patient-driven Healthcare addressed the challenging situation in fog computation for architecture of three-layer healthcare architecture for real-time applications to be feasible in future implementation over applications. García-Valls et.al 2018 used the techniques of Cloud in togetherness of clock get time method in proposing the framework of fog computing-based to step up the patient's response in integration to the mobile. Farahani et.al 2018, IoT big data analytic methods on recent focus of IoT in e-health research. Thus, introducing a systematic IoT in e-health ecosystem in both the implementation of (hardware and software) with proper tasks and potential directions for IoT in e-health. List security issues in IoT devices and networks. Low accuracy against vulnerable to attack. Ahmadi et.al 2018,

IoT and Cloud, Machine learning methods in critical aims for the IoT architecture aspects of health care. Investigate cloud-based architecture role for IoT in healthcare. Consequently, the future implementation of IoT in health certainly enhances the quality, performance, reliability, and accuracy for the contribution towards the poor humans to overcome the struggles. Baker et.al 2017 has described the basic methodology of IoT, AI and machine learning methods to genetically create the analysis for the IoT health care in concentrating with the various actuator and sensors for the procedure to communicate and transfer the information. Converging further into the data storage computation with the review of entire resolution with the sensor resulting low level. Kraemer et.al 2017, Cloud, Machine learning methods, Complete a thorough survey on fog computing for healthcare. Islam et.al 2015 with the IoT based Cloud, and Intelligent collaborative security model has reviewed with the health care systems in which medical industry implemented with the frameworks built keeping into account of certain frameworks. Islam et.al 2020, proposes a smart and automatic health monitoring system with the integration of techniques involved like IoT, Fuzzy creating a sign for patient diagnosis. In this framework, five sensors are utilized to catch the information from clinic climate named heartbeat sensor, internal heat level sensor, room temperature sensor, CO sensor, and CO<sub>2</sub> sensor. Some more estimates which are extremely important to decide a patient's condition like the degree of diabetes, breath observing, and so forth can be tended to as future work. Souri et.al 2020, IoT, introduced methodologies of algorithms like DT, SVM, RF, and MLP through the process of IoT-based student healthcare monitoring prototype for complete checking of student's essential symptoms and identify changes with respect to the aspect of biological and behavioural via technologies of smart healthcare. In this model, essential information is gathered by means of IoT gadgets and information examination is helped out through the AI techniques for distinguishing the plausible dangers of understudy's physiological and conduct changes. The future work of this investigation is to recommend an edge-based information preparing framework to bring calculation and information stockpiling nearer to the patient's area to improve crisis administration's reaction time and save transfer speed in the framework. Akhbarifar et. al 2020 brought up the technology of IoT, and K-star Classification in checking the status of health of patient in estimating the situations met the methodology for analysing the condition overall sensed by the medical applications. In future, intend to contribute the current limitations in lightweight key word dynamic S-Boxes giving a scope of square encryption strategies for advantageous examinations toward this path. Asghari et. al 2013, IoT, created a scenario for the Neural network analysis in the module of effective scheme built for the computation. Wang et. al 2013 started the utilization of Cloud Computing and Machine

learning method for the models developed in various categories and service representations of cloud computing, for further analysis of application expertise in the field medical services and healthcare, and biometrics-based confirmation for evidence safekeeping were obtainable. Security issues need to enhance in avoiding the barriers towards the technology. M.K, Priyan et. al 2018 demonstrated about the collaboration of IoT and Cloud, Fuzzy Neural Classifier, for algorithm developed in diagnosing the infection and its severity level. Forthcoming potentiality in works toward this path could be the demonstration of effective protection system developing novel cryptographical estimates intended for delivering good quality safety measures to the medical information on cloud and IoT data set.

### Classification Performance

Figure 2 - Architecture of Data Flow to Monitor the Health IoT Value Chain



Data classification effectiveness decides the classification of information esteems into seriousness and non-seriousness class. For various infections, different factual measures are incorporated to assess characterization proficiency for the proposed model. These incorporate exactness, particularity, F-measure, and affectability. For various sicknesses, cutting edge standard and better classifiers are consolidated. Results are gotten by contrasting diverse kind of datasets for a specific illness. The illnesses like heftiness and breath list are not difficult to figure from the immediate readings of a couple of traits. Then again, complex sicknesses like irresistible, heart-related and stress list required appropriate grouping techniques. For improved outcomes,

thorough approval approach to be specific 4-overlap cross-approval is utilized to ascertain the measurable outcomes for various infections. Right off the bat, the information are apportioned addicted to folding of four into which the information utilised for the overlapping necessary for testing, and validating.

Each crease of particular information gets an opportunity to test information, the whole cycle is run for multiple times and normal measurable outcomes are gotten for the diverse classifier. The subsequent examination for three illnesses is clarified ahead. In the AI phrasing Classification alludes to a prescient demonstrating issue where the info information is named one of the predefined named classes. For instance, foreseeing Yes or No, True or False falls in the classification of Binary Classification as the quantity of yields are restricted to two names. Likewise, yield having numerous classes like ordering distinctive age bunches are called multiclass arrangement issues. Characterization issues are quite possibly the most regularly utilized or characterized sorts of ML issue that can be utilized in different use cases. There are different Machine Learning models that can be utilized for characterization issues. Going from Bagging to Boosting procedures despite the fact that ML is more than fit for dealing with order use cases, Neural Networks come into picture when we have a high measure of yield classes and high measure of information to help the presentation of the model. Going ahead we'll take a gander at how we can carry out a Classification Model utilizing Neural Networks on Keras.

In particular for the disease affected in the context of infectious and heart-related problems, the classifiers in which division has been made for the analysis using the ANN techniques including are the k-Nearest Neighbour (kNN), Decision tree (DT), Tabu search (TS), Genetic algorithm (GA), Naive Bayes (NB), Fuzzy logic (FL) and Support Vector Machine (SVM). Nevertheless, the basis formed for the test cases applicably achieved the equal classification of the models modified for the system monitored in the instance, foreseeing Yes or No, True or False falls in the classification of Binary Classification as the quantity of yields are restricted to two names. Likewise, yield having numerous classes like ordering distinctive age bunches are called multiclass arrangement issues. Characterization issues are quite possibly the most regularly utilized or characterized sorts of ML issue that can be utilized for following the clear scheme circumstances below: (a) Workability of the diagnosis system: Further clarifies the system diagnosed with the technology associated in the software such as the scikit-learn library. (b) Extendibility of the diagnosis scheme: Further implementation of the algorithm developed with the ML techniques. With easy accommodation of certain methodologies in diagnosing the infection.

### 3. Conclusion

With the extravagant devices of medical environment, the process involved for the diagnosis can be achieved high reliability, and efficiency. The key aspects involved with this paper is to study about the remote diagnosis of the patient through the IoT and virtual reality, classification of the cloud data-based ANN implementation. Moreover, the key conditions, theories, infection identification approach and warning production method has been highlighted. Also, the outcomes in establishing the diagnosis for various scenarios can be assessed in the measurement case under the limited duration in developing the bridge between the patients and doctors. Patients may have wearable devices with AR glass, the measured data will be sent to the raspberry pi-based router device which is having the Node Red Software for connecting N- no of patients easily and also control the devices remotely based on the self-learning algorithms. All the information can be classified based on type of diseases and classified based on artificial neural network-based algorithms, the information is passed to doctors for accurate analysis of health status. Through HealthIIoT, the professional healthcare system attains the accessibility of patient data for storing, analysing the condition in the same process of real-time system for tracking. Therefore, the information of patient and further details on the AR glass is interlinked with the proper assessment. Eventually, it is clear to connect N- of Patients and N- doctors with this technology also sharing the information through the cloud and IOT devices, which will help for the current trend and future technology for the society.

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