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IoT Enabled Sensory Monitoring System for Fog Optimal Resource Provisioning Method in Health Monitoring System

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Abstract— Fog is data management and analytics service. In this paper gains and most effective novel approach to provide IoT enabled services in healthcare application using Fog Computing. In this research the data is collected from Google Scholar, Science Director and MEDLINE database. IoT based Fog Computing techniques are proposed for delivering quality of services to the user. Optimal Resource Provisioning method is proposed to find edges, service level agreements and administration services for IoT client. The DeepQ residue information processing technique is applied for connecting data centre of the cloud and computing paradigms technique is finding the depth reference of Fog levels. The proposed Optimal resource provisioning algorithm is examining the dataset and TensorFlow tool is used for simulating environment. Fog computing layer consist of IoT sensor data inputs, data centres for the cloud and connected layers for simulations. The Deep belief network is generated based on above inputs using 256 X 256 X 3 layer system and 5000 trained data, 1000 test data are taken for simulations. Each dataset simulation is recording using supervised and unsupervised learning methods. Based on above results IoT enable Fog Computing data management and analytics systems provided 95% accuracy and the compared with existing computing techniques our proposed systems shows better efficiency with respect to safety and convenience.

Keywords: IoT, Resource Provisioning, Fog Computing, Deep Learning, TensorFlow

I. INTRODUCTION

Cloud computing is the current technology to holds the IT infrastructure as flexible manner. The resource can be access from any place with the support of internet. The remotely stored data accessed by accessed by cloudlet services. It is demand based services and resources are accessed based on user requests. Resources may be software, application, storage and computing levels. Data Management is the major important component to manage the cloud data and security. The end user accesses the cloud resources by using desktop, laptops, smartphones and other devices. It is the delivering and wearable technology which handles the application what and whenever required [1].

As in current scenario many organizations are moving towards Industry 4.0 such as Internet of Things, Cloud Computing, Big Data and Deep Learning. The huge volume of data or dataset are processed and accessed. So, we need to access the data more quick and efficient manner [2]. The concepts of Fog computing will play the important role to access the data from cloud and do the big data analytics operations. The cloud services can be accessed by different computing devices and each device are represented as edges. Saleforce.com is started fog computing trends with combination of cloud, IoT and Data analytics process for healthcare applications [3].

Current situation healthcare applications are growing tremendously. Lot of online based consulting and medicine facility are coming and most of the persons are using the online services effectively. In Google survey mentioned that past two years more the 3 billion of people are used online healthcare services. The home-based services are adopted and supported by government also introduced door by door vaccination process with automated services. It is the smart model with IoT enabled services to monitor the patients and periodically check the status. All the monitoring process are documented and recorded [4].

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II. RELATED WORK

The challenges are to implement blockchain to the real time applications tedious process and need to familiar tools or else supported platforms to design the emerging trends. Distributed ledger technology is already available for major issue is in already distributed so anyone can stole the data and change or modify the contents [11]. Yaga et al, proposed peer to peer network model is available to remove the centralized controlling systems. Each transaction has repository based indexing method to select the blockchain information and model the system via collaborative nature [12].

Hassan et al, CryptoHash function is proposed to model the network and provide multi object traceable operation polices to predict the contents. To strengthen this process each transaction protocols can be submitted via smart contract polices which is capable to utilize the signed or modelled transaction features. The third party information or user information repository is not to be maintained at any place. Each transaction history has to be processed via unique chain code optimizer [13].

The signed transaction is other major issues which can be deployed based on the network lifetime and predefined feature selection. Here the smart contract can be executed based on involvement of cost and associated by system transaction results. Swan et al, the huge cost as well as third part representation can be monitored by some cyber systems which leads or reduce the overall performance. As the survey report the Accenture invested more the 80 billion USD for implemented or forcing the blockchain based smart audit processing system to the user [14-15]. From the Table.1 based on literature we need an effective decision making and predicting method to handle the automated smart construction dataset.[16]

III. FOG BASED OPTIONAL RESOURCE PROVISIONING METHOD

Fog computing is data management services that collect data from multiple remote servers, such as unstructured data, multimedia data, dataset, and NoSQL database. The user can use different computing devices and access the resource using different mobile applications. Select or consult a doctor, order medicine and token booking. Data is stored on a web server or cloud server. From the healthcare industry to a person from a hospital, they can access services regarding server inputs. In healthcare, an IoT-enabled sensor unit will handle data operations, while a service unit provides data analytics for decision-making.[17]

Data is collected from edge devices and sensors detect input and access resources. At the top of Figure 1, one edge of the sensor from the side of the patient's body to collect raw data and save it to the server. Custom programs work and create an optimal procedure to support the adoption of data analysis resources. Data can be processed and responded to based on time. Fog nodes are created using the following procedure.

The Fog node can analyze the raw data received from the edge device, and sensitive data is marked The data management process takes care of data modeling, association, clustering and normalization. The least sensitive or redundant data is removed and the contents of the fog node are analyzed. The service is IoT-enabled, so data can be collected from multiple sources, and the fogging process is applied across all edges, nodes, and cloud platforms.

Figure 2 shows how raw data can be received from a patient and transferred to a web or cloud server. Patient data such as temperature, blood pressure levels, and other factors are received by an edge device such as a transmission medium such as Wi-Fi or Bluetooth-based technology. Raw data is stored in a repository. The cloud server processes the data and applies a decision-making process to measure performance.

IV. RESOURCE ALLOCATION AND MONITORING

An optimal method of providing resources for processing fog data and measuring the accuracy coefficient is proposed. In data management, we need to take care of data throughput, minimum delay value, real-time interaction ratio, distribution values, mobility index and business continuity. The data should be analyzed on the server and the best performance value should be chosen as the index. The process diagram below shows that the data management process is carried out using an optimal resource provisioning method.

The proposed system focuses on the integration of IoT and fog computing to process the dataset and implement the sensing system. From this optimal resource provisioning method, there is a node module, a detection system, a power protection system, and a detection module. The efficiency calculation algorithm is proposed below,

Input: (P,Q) ≡ P:Training and test data set 256 X 256 X 3 layers

Output: Data management – Accuracy ratio of optimalresource provisioning

Step 1: Each value is recorded based on the fog data and the DeepQ process is applied

Step 2: Calculate DeepQ(P,Q) = (1/N) ∑_(i=0)^(p-1) G 〖F(i)- ∑(i-0)^(p-1) X [V(i)- V(minx)]]

Step 3: Find The accuracy factor is measured by DeepQa= ∑(i=0)^(p-1) G / ((V(i)-S(i)/N))

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Step 4: Write down the stored value and repeat the process until n<0

The optimal resource provisioning method has fuzzy Markov predictions that select user demand parameters such as cloud service provider representation, fog server value, and services X is the service and the suppliers are P (p1, p2 ... pn) The data sampled from the cloud service provider and the Markov prediction are represented as

$$F \infty \{SP \leq X(P) / SP(Y) * P(Y)\}$$

The ranking mechanism is applied to the data management process, which has decomposition, aggregation and prioritization. Membership is calculated as

$Ax = \{x \epsilon P;\ A(x) \geq SP\}$ for any $N \epsilon [0, 1]$
$Ay = \{y \epsilon P;\ A(y) > SP$ for any $N \epsilon [0, 1]$

The accuracy is calculated using the membership value and the amount of entropy. This is the average value measured over the transmitted information.

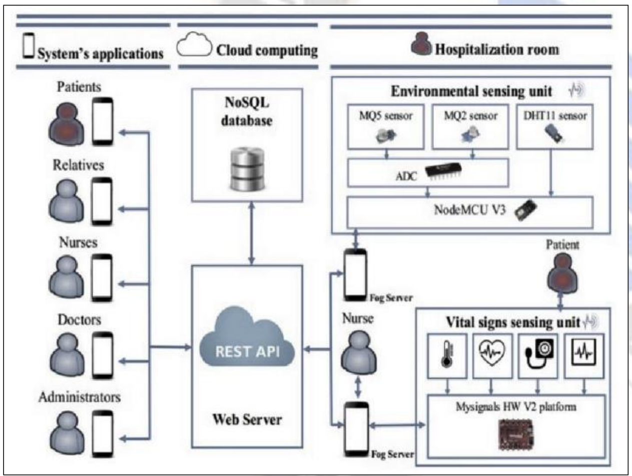

Figure 1: Fog Application Server - Selection Module

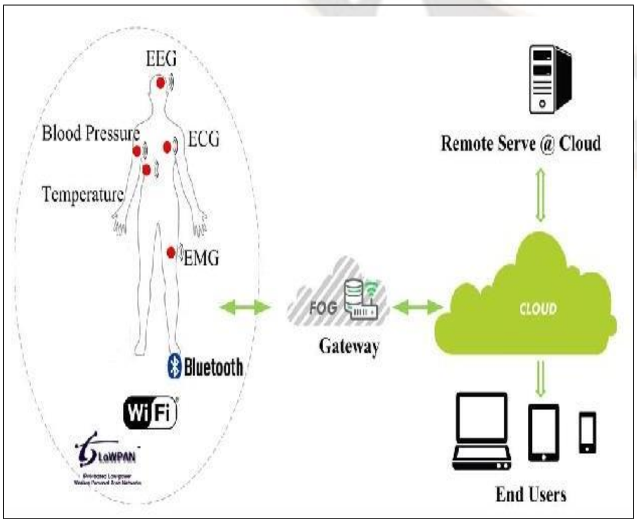

Figure 2: Fog Data Processing System

Figure 3: Flow Diagram – Monitoring System

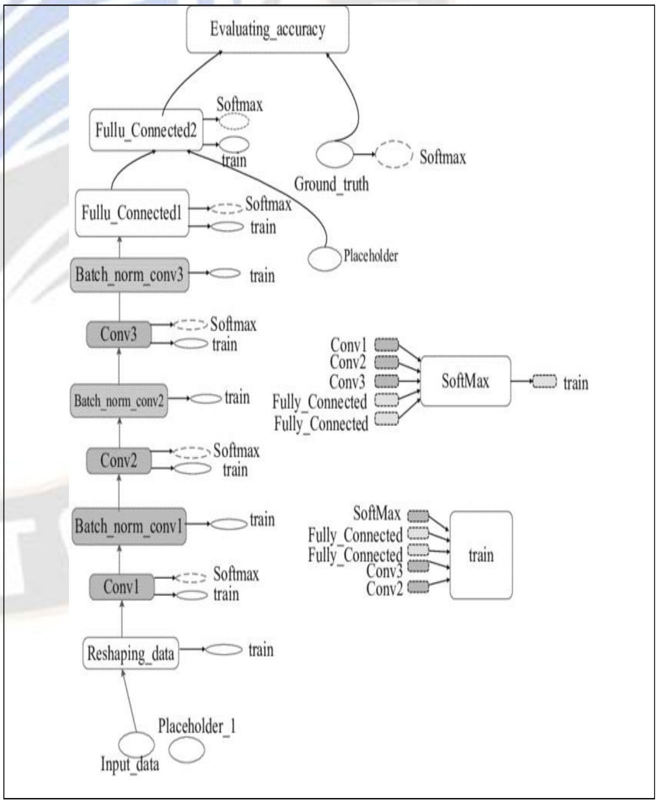

Figure 4: Deep Convolution Neural Network – Result of Connected Graph

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TABLE 1: RESULT OF ACCURACY AND PRECISION FACTOR USING TENSORFLOW

Iterations	Hidden values	Dimensions	Accuracy	Precision	Recall	Measure
1	8,16,32,64	500,250,100,10	0.99,0.98,0.94,0.95	0.13,0.15,0.14,0.16	0.88,0.87,0.84,0.85	97,98,97,94
2	8,16,32,64	500,250,100,10	0.88,0.89,0.92,0.91	0.20,0.21,0.24,0.21	0.89,0.88,0.87,0.83	96,97,94,96
3	8,16,32,64	500,250,100,10	0.98,0.92,0.91,0.91	0.19,0.22,0.16,0.18	0.81,0.79,0.82,0.94	92,88,89,91
4	8,16,32,64	500,250,100,10	0.92,0.91,0.94,0.92	0.21,0.17,0.19,0.14	0.82,0.81,0.79,0.82	93,92,91,92
5	8,16,32,64	500,250,100,10	0.92,0.93,0.94,0.95	0.18,0.14,0.15,0.18	0.92,0.91,0.87,0.91	93,94,94,94
6	8,16,32,64	500,250,100,10	0.90,0.91,0.94,0.92	0.21,0.17,0.19,0.14	0.83,0.81,0.79,0.82	92,92,91,92
7	8,16,32,64	500,250,100,10	0.88,0.92,0.91,0.91	0.21,0.22,0.16,0.18	0.82,0.79,0.82,0.94	92,88,89,91
8	8,16,32,64	500,250,100,10	0.87,0.91,0.94,0.92	0.21,0.17,0.19,0.14	0.82,0.81,0.79,0.82	92,92,91,92
9	8,16,32,64	500,250,100,10	0.92,0.93,0.94,0.95	0.15,0.14,0.19,0.18	0.92,0.91,0.87,0.91	92,94,92,94
10	8,16,32,64	500,250,100,10	0.92,0.89,0.92,0.91	0.21,0.21,0.24,0.21	0.82,0.88,0.87,0.83	93,97,94,96
11	8,16,32,64	500,250,100,10	0.92,0.91,0.94,0.92	0.18,0.17,0.19,0.14	0.82,0.81,0.79,0.82	92,92,91,92
12	8,16,32,64	500,250,100,10	0.89,0.91,0.94,0.92	0.19,0.17,0.19,0.14	0.82,0.81,0.79,0.82	92,92,91,92
13	8,16,32,64	500,250,100,10	0.88,0.91,0.94,0.92	0.21,0.17,0.19,0.14	0.82,0.81,0.79,0.82	93,92,91,92
14	8,16,32,64	500,250,100,10	0.92,0.98,0.94,0.95	0.22,0.15,0.14,0.16	0.88,0.87,0.84,0.85	96,98,97,94
15	8,16,32,64	500,250,100,10	0.93,0.91,0.94,0.92	0.13,0.17,0.19,0.14	0.82,0.81,0.79,0.82	92,92,91,92

IV. PERFORMANCE EVALUATION

The above is a deep convolutional network created using Google TensorFlow input conditions. This method included smart system recommendations and fog-based results. It collects records and applies layer-by-layer strategies. The table below shows that the data analytics values obtained from the fog server and accuracy dependencies with a 256 X 256 X 3 node. From the above table, compare with machine learning and deep learning algorithm with different tools. Our proposed system is simulated using TensorFlow and has the best accuracy rate of 92% on 5000 trained data and 1000 test data with 256 X 256 X 3 hidden layer node values 8,16,32,64. Optimal management of resource provisioning data yields precision versus accuracy and recall with TensorFlow

V. CONCLUSION

This paper proposes an optimal resource provisioning method for precision data management search of medical applications using deep learning. The DeepQ analysis method is used to evaluate the data set and measure the accuracy ratio using the data analysis model. This approach provided a better accuracy rate and compared to existing methods. An IoT-enabled fog server is used to identify the user and record values in the cloud. The training and testing data are simulated using TensorFlow with a 256 X 256 X 3 layer deep belief network and achieved 92% accuracy. In the future, fog computing will be extended for intelligent decision-making approaches.

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AUTHORS CONTRIBUTION

Author 1 implemented the concept specified by the author 2 under the supervision of authors 3 & 4. The authors 3 & 4 drafted the article under the guidance of author 2.

CONFLICT OF INTEREST

The authors declare that have no competing interest.

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