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Enhancing Medical image transmission in IOT Through compression

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Abstract— *The Internet of Things (IoT) is a network of physical devices, vehicles, buildings and various other items- embedded with electronics, sensors, actuators etc. that enable these things to collect and exchange data. If one thing can prevent the IoT from transforming the way we live and work, it will be a breakdown in Security. Traditional security mechanisms like Configuring Firewall, Intrusion Detection and Prevention Systems are deployed at the Internet edge. These mechanisms are used to protect the network from external attacks. Such mechanisms are no longer enough to secure the next generation internet. The borderless architecture of the IoT raises additional concerns over the network access control and software verification. In order to maintain the integrity of the data sent and the confidentiality of the data collected, security must be built into the design of the devices and systems to create trust in both the hardware and the integrity of the data. Considering the rapid growth of the IoT, the project proposes an improvised framework for the future development of security and privacy standards in the Internet of Things.*

Keywords—*image compression and decompression, Transmission, Prescription.*

I INTRODUCTION

Specialized advances in interactive media and broadcast communications have empowered human services administrations to achieve more individuals. Telemedicine arrange foundation gives a vital correspondence interface between restorative specialist co-ops and patients in a way not constrained to geological areas [1]. Remote systems of various sorts serve target clients with various necessities, from universally useful purchaser hardware to telemedicine supporting a differing scope of social insurance applications, incorporating basic lifesaving missions with significantly more stringent prerequisites. Correspondingly, there are distinctive execution and dependability necessities for various circumstances.

Applications for example, remote patient observing, restorative record recovery, therapeutic meeting for rustic ranges, and continuous on scene paramedic bolster furthermore, tele-finding, all have distinctive levels of resistance to postpone and benefit quality. To address the significance of system dependability in telemedicine, nature of flexibility has been embraced [1]. By understanding different normal variables that cause arrange interruption, the degree of system execution debasement can be anticipated also, preemptive moves can be made to alleviate the danger of a connection blackout [1].

Two major Challenges are been observed one is To begin with, catastrophes are rare, and the area, correspondences necessities, and detecting requirements of the following catastrophe can't be anticipated. Existing WASN frameworks frequently fill specialty needs, like specific concoction location, that are sick suited for general organization. Different arrangements. Second challenge A moment challenge includes scale and institutionalization. Little calamities, similar to a restricted surge, ordinarily include assets from a solitary locale and are sorted out utilizing straightforward promotion hoc summon and control (C2). Bigger debacles, like a sea tempest, may consolidate thousands of assets from scores of purviews. To oversee many-sided quality at this scale, responders regularly compose taking after Occurrence Order Framework (ICS) rules [2].

To work in this troublesome condition, WASNs must give standard models and compos able, versatile systems organized to comply with ICS norms. Remote therapeutic checking (RMM) framework is a remote station

based essential social insurance framework which is an application of the telemedicine. The RMM framework gathers the therapeutic information of patients (MDPs, for example, sound, video, and other data of patients at the essential social insurance (PHC) station of the hazardous situation and transmits the MDPs to the group mind (CC) focus through remote systems. One of the remote systems that can be adequately sent amid debacle recuperation is known as remote impromptu system

(WANET) in the writing . A WANET comprises of a few hubs which can speak with each other, PHC station of the hazardous situation, and CC focus. A WANET is said to be associated if all hubs can come to the CC focus by means of one or various bounces.

As such effective disaster management system is required to handle with effective image compression technique which remains subsequently other major task.

The below article presents a medical image System for disaster management. Total five sections have been used in article writing. Medical Compression Scenario is been presented as represented in [3] research work as depicted in figure 1.

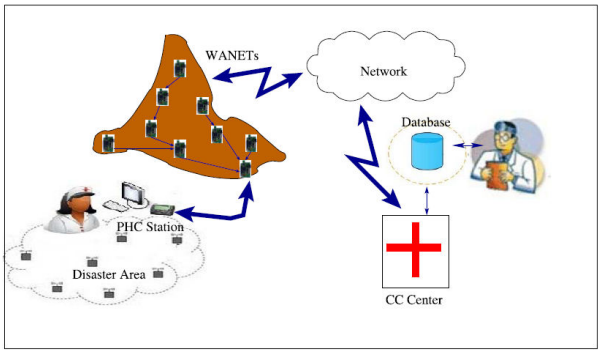

Figure 1: presents Medical Compression Scenario

In this paper, section 2 is dedicated for literature review of past works. Section 3 describes the proposed methodology and Section 4 discusses the results and evaluation of the proposed technique. Finally Section 5 concludes this paper with future extension possibilities.

II LITERATURE REVIEW

Scholar **[1]** presents a remote specially appointed system (WANET) is a sort of remote system meant to be sent in a hazardous situation all together to gather information of patients and enhance medicinal offices. WANETs are made out of a few little hubs scattered in the hazardous situation. The hubs are fit for sending (remotely) the gathered medicinal information to the base stations. restricted battery energy of hubs and the transmission of tremendous restorative information require a vitality proficient way to deal with save the nature of administration of WANETs. To address this issue, we propose an optimization based therapeutic information pressure strategy, which is vigorous to transmission mistakes. propose a fluffy rationale based course determination strategy to convey the packed information that amplifies the lifetime of WANETs. The procedure is completely conveyed and does not utilize any land/area data.

Research work **[2]** presents health management system for optimizing telemedicine system. Optimized network is been designed based on prognostics approach. Prognostics are especially imperative for remote telemedicine systems since these systems must work dependably independent of suddenly evolving working conditions keeping in mind the end goal to bolster life-sparing missions.

Work **[3]** focuses on national crises like earthquake and tsunami for this advanced disaster management and recovery system have been setup. Medical emergency system is highly required. Medical support in emergency is necessary and no effective system exist that could handle data efficiently. This work presents a medical support system with lesser infrastructure to identify emergency cases, allocate emergency doctors. Focus of work is to present prototype system for acute stage large emergency disaster management. Future System could extend for dynamic vehicle to vehicle communication.

Diabetes diagnosis is been addressed in **[4]** where faster diagnosis is been done using image capturing. This research work address image compression .retinal image compression technique is been done. This methodology addresses reversible color space transformation. Lesser image compression technology is been implemented and scope of future work is development of better and general image

[5] Focuses on effective image compression technique using bayer color filter array . loose compression technique is been used in image compression. The research work is simulation based and as such real time implementation is future scope of work. Future lesser complexity generation is scope of work

[6] Quality of services has been addressed in delivering health mining system for telemedicine scenario. Wireless scenario is prone to failures and as such effective data handling is been required. Proposed System with MIT-BIT arrhythmia database presents effective medicine system and guarantee QOS in telemedicine domain.

Wireless Routing protocol for data routing is been presented in Medical domain by **[7].** It has been observed that AODV has better System performance. AODV presents better network linkage ,lower memory overhead utilization . better coverage ratio has been observed in with AODV protocol

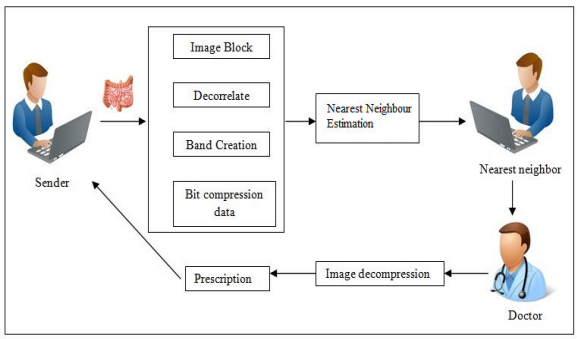

Figure 2: Proposed Sytem Overview

III PROPOSED METHODOLOGY

Proposed methdology of image transmission and geeting the prescription for the tranmissted image is defined under disaster circumstances is elaborated with the below mentioned steps and its overview can be view in figure 2.

Step 1: Here in this step sender first takes the medical image and then he/ she subject the image for compression. As the first step of image compression proposed methodology selects the image to be compress . And read the image into bufffered image object.This represents the image in terms of matrix. Then this matrix formed buffered image object is subjected to divide into blocks to store in a vector.

Step 2: In this phase of proposed methodology divided blocks are check for the correlation to create the nodes of similar and dissimilar blocks and finally they gropu together for furher process.

Step 3: Once the different blocks are gathered then all the blocks are been collected to create a band of bytes. And all the similar bands are formed to create a symmetric tree. Once this symmetric tree is created then one part of the symmetric tree is write in the given file format to reduce the size of the image.

This whole process can be view in the given below algorithm 1.

ALGORITHM 1: IMAGE COMPRESSION

Input: Image File
Output: Encrypted file
Step 0: Start
Step 1: Get ByteArray B[ ] of File F
Step 2: Assign sequence of positive integer.{ l1, l2,,,,,,, lk}
Step 3: Define a Tree T
Step 4:Add all nodes into the T
Step 5:Set the priority according to highest probability of bits.
Step 6:Calculate average probability as L(avg)
Step 7:Set bounds as H(s) _ L(avg) < H(s) + 1 , where H(s) is the entropy.
Step 8: Remove first two nodes of higher priority from queue.
Step 9:Create a new node called Nn
Step 10: Add two nodes from step 10 into Nn unmatched probability
Step 11:Repeat steps 10 to 12 till Tree is empty
Step 12: Sort Tree to get Symmetrical form
Step 13: Select part of symmetric tree as t
Step 14:Convert tree t into ByteArray
Step 15: Write the ByteArray into file.
Step 16:Stop

Step 4: As the image is compressed then it is set to transmit over the network to the known nearest neighbour based on the weights assigned. Once the nearest neighbour is finalized then the compressed image is transmitted to that node.

Step 5: As the nearest neighbour receives the compressed image it re-routs the compressed image to the web server. At the web server end the image will be decompressed to its orginal format and then this will be viewed by the desired doctor from the remote location by accessing the web pages.

Once doctor views the medical image he/ she can be prescribe immediate procedures along with the medicines and send it back to the source node immediately. Thus the motivation of the proposed methodology meets its demand of providing medical rescue in distaster time using IOT as the main weapon.

IV RESULTS AND DISCUSSIONS

The proposed methodology of providing immediate relief to the patients in distaster scenario is implemented in java technology. To deploy the system uses Apache Tomcat as web server and Netbeans as standard Development IDE. System is deployed in WIFI scenario by using D-Link standard WIFI router to establish the network with the desired protocols.

Proposed methodology is subjected to analyse the error matrix of mean square error (MSE). Here MSE plays a vital role to identify the collective error between the orignal image and compressed image.

MSE can be represented with by the following equation of 1.

$$MSE= \sum_{i,j}(|r_{i,j}- r'_{i,j}|)^2 / N \quad \_\_\_\_\_(1)$$

Where *ri,j* denotes the original size of the image and *r'i,j* denotes the size of the decompressed image. The result of the experiment is tabulated in the below table 1.

Original Image Size (in kb)	Decompressed Image Size (in kb)	MSE
12	12	0
35	34.7	0.3
66	66	0
44	44	0
52	52	0
61	60.899	0.101
104	104	0
212	211.98	0.02
218	218	0
112	112	0

Table 1: MSE of the System

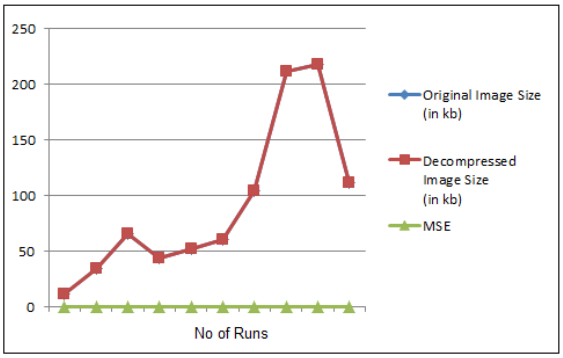

Figure 3: Performance Analysis through MSE

By observing the above plot in figure 3 and values in table 1 it is clear that proposed system yields average MSE of 0.0421 and it is less than 1. So it indicates that performance of the system is good regarding the lossless compression techniques.

V. CONCLUSION AND FUTURESCOPE

Proposed system of transferring medical image under disaster hit scenario plays a vital role in real life paradigm. Proposed system is deployed in WIFI local area network by considering computers as movable nodes and the prescription can be provide by the doctor from any remote location by accessing his/ her account by valid credentials.

Image compression and decompression is carried out which are intend lossless and catalyze the process of data transformation in the weaved scenario.

This system can be enhancing in the future by implementing it as mobile applications that can run through Bluetooth service.

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