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AN EFFICIENT REMOTE MEDICAL MONITORING SYSTEM IN WANET USING MEDICAL DATA COMPRESSION & FUZZY LOGIC ROUTE SELECTION

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ABSTRACT-**The disaster such as flood or forest fire has drawn ever increasing attention to improving rescue efforts. The technique that can be applied from the recovery of disaster is known as telemedicine, which is the combination of information technology and science. The RMM system is a remote station which collects the health data of patients in the disaster area. The health information such as audio, video from the disaster area is transmitted from the primary health care station to the community centre via WANET. The WANET are spotted in the disaster area as small sensor nodes. The RMM system requires the efficient approach for the limited battery power of sensor nodes and energy efficiency to obtain the QoS of WANET. This approach is proposed by the optimization of lossless compression technique in medical data. It reduces the size of MDPs. This technique is used for compressing and decompressing the MDPs in PHC station as well as CC centre. It also proposes a fuzzy logic based route selection technique. It is an effective technique to transmit the compressed data and maximize the life time of WANET. The FRS technique is effective for the route selection of MDP from PHC station to CC centre. It only uses less energy and reduces the packet loss during the transmission.**

Keywords*: *Energy efficient, health care, fuzzy logic, data compression, routing, wireless ad-Hoc network

I INTRODUCTION

Networking is the technology for linking multiple computing devices together to share many resources. The shared resources may be any file over a communication media through a hardware or software. The communication is done over a large network using several methods like cables, telephone lines, satellites, radio waves, and by infrared waves.Without the ability to network, businesses, government agencies, and schools would be unable to operate as efficiently as they do today. The ability for an office or school to connect dozens of computers to a single printer is a seemingly simple, yet extremely useful capability. Perhaps even more valuable is the ability to access the same data files from various computers throughout a building. This is incredibly useful for companies that may have files that require access by multiple employees daily. By utilizing networking, those same files could be made available to several employees on separate computers simultaneously, improving efficiency. Switches are used in order to connect many devices on the same network. These devices are generally within the same building, such as an office building or school and could consist of various computers, printers, and other gadgets. The switch acts as a controller, allowing the connected objects to share information with one another. This not only increases productivity and efficiency, but also saves money. In addition to switches, networks generally employ routers as well. These essential tools connect different networks to each other through the internet in order to allow for data exchange between networks. Whereas the switch can be considered a controller, a router should be considered more of a dispatcher, packaging digital information and choosing the best route for it to travel. Routers can feature several other functions, including firewalls and VPNs that enhance the security of the data being sent over the internet.

II RELATED WORK

In [1] Routing and Performance of packet transfer has been explained with this AODV. The AODV Routing protocol uses an on-demand approach for finding routes, that is, a route is established only when it is required by a source node for transmitting data packets. It employs destination sequence numbers to identify the most recent path. AODV offers quick adaptation to dynamic link conditions, low processing and memory overhead, low memory utilization, and determines unicast routes to destinations within adhoc network. [2] Wireless Communication for telemedicine networks. Portable medical device that allows telediagnosis, long distance support, and teleconsultation of mobile healthcare providers by expert physicians. The device allows the transmission of vital bio signals and still images of the patient from the emergency site to the consultation site using the GSM mobile telephony networ k.[3]Hough Transform and Skewing based colour image comparison. [5] Perimeter Stateless Routing for implementing Protocols. [8] A novel wireless capsule endoscope with JPEG compression engine. [12] On efficient network planning and routing in large-scale MANETs. [13] A DoD perspective on mobile ad hoc

networks. [18] Image Compression Using Real Fourier Transform, Its Wavelet Transform And Hybrid Wavelet With DCT. [24] Compression of Medical Images Using Wavelet Transforms. [28] Wavelet Based Medical Image Compression Using ROI EZW. [7]Ad Hoc for fine grained packet transfer. [10] A colour image representation and compression scheme based on local resolution adjustment and self-extracting region representation.

III PEER TO PEER NETWORK

A Peer-to-Peer network, is one in which multiple computers are connected without linking through a separate computer that acts as a server. These connections can vary based on how many computers are being linked together. Two computers can be linked via a USB drive to allow for the transfer of files. Multiple computers in an office can be connected directly to each other via traditional copper wiring instead of through a server computer. The fundamental basis for P2P networks is that individual permissions must be set for each computer on the network. For instance, if one computer (A) is connected to a printer and another computer (B) on the network wishes to use the printer, then A would first have to grant B permission.

IV WIRELESS AD HOC NETWORK

In computer networking, the routers, switches and the base stations are important for data transfer from one source to destination. An ad hoc network does not require a router or a wireless base station. If you need to transfer a file or data to your friend's laptop, you might create an ad hoc network between your computer and his laptop to transfer the file. This may be done using an Ethernet crossover cable, or the computers' wireless cards to communicate with each other. If you need to share files with more than one computer, you could set up a multi-hop ad hoc network, which can transfer data over multiple nodes.Basically, an ad hoc network is a temporary network connection created for a specific purpose (such as transferring data from one computer to another). If the network is set up for a longer period of time, it is just a plain old local area network (LAN).

Ad-hoc Networks is different from wired networks, it is a new architecture. Some challenges are in two key aspects: self-organization and wireless transport of information.Adhoc networks nodes are free to move arbitrarily at any time. So the networks topology may change randomly and rapidly at unpredictable times. Routing is difficult because the topology is constantly changing and nodes cannot be assumed to have persistent data storage. We don‟t know whether the node will still remain next minute, because the node will leave the network at any minute. Bandwidth constrained is also a big challenge. Wireless links have significantly lower capacity than their hardwired counter parts. Also, due to multiple access, fading, noise, and interference conditions etc. The wireless links have low throughput. Energy constrained operation. All of the nodes may rely on batteries. In this scenario, the most important system design criteria for optimization may be energy conservation.

Security is important one of all networks including Ad-hoc networks. Security issues for Adhoc network are difficult for fixed networks.This is due to system constraints in mobile devices as well as frequent topology changes in the Wireless networks. Here the system constraints contains low-power, small memory and bandwidth, and low battery power.

Energy consumption is also one of the most important performance metrics for wireless ad hoc networks, it directly relates to the operational lifetime of the networks. Mobile elements have on finite source of energy. While battery technology is improving over time, the need for power consumption will not diminish. Overall performance becomes highly dependent on the energy efficiency of the algorithm.

V IMAGE COMPRESSION

An image is essentially a 2-D signal processed by the human visual system. The signals represents the images are in analog form. Processing, storage and transmission by computer application are converted analog to digital form. A digital image is basically a 2-Dimensional array of pixels. Images from the significant part of data, particularly in remote sensing, biomedical and video conferencing applications use on information and computers continue to grow, so too does our need for efficient ways of storing and transmitting large amounts of data.

Image compression represents the problem of reducing the amount of data required from a digital image. It is a process to intend the yield of compact representation of an image, thereby reducing the image storage/transmission requirements. Compression is achieved by the removal of one or more of the three basic data redundancies:

- Coding Redundancy
- Inter pixel Redundancy
- Psycho visual Redundancy

Coding redundancy is present when less than optimal code words are used. Inter pixel redundancy results from correlations between the pixels of an image. Psycho visual redundancy is due to the data that is ignored by the human visual system. Image compression techniques reduce the number of bits required to represent an image by taking advantage of these redundancies. An inverse process called decompression proposed a new image compression technique using Real Fourier Transform. This algorithm uses quantized coefficients of discrete cosine transform. Image transformation, quantization and encoding are the main steps in compression. Inverse transformation de quantization and decoding are the steps in reconstruction. An NXM image is taken and the intensity of pixel is calculated. DCT coefficients of the images are generated using dct matrix. The pixels in the array are in the form of gray scale level.

This algorithm also provides good quality images. Proposed a compression algorithm based on the wavelet transforms. Christo Ananth et al. [9] proposed a secure hash message authentication code. A secure hash message authentication code to avoid certificate revocation list checking is proposed for vehicular ad hoc networks (VANETs). The group signature scheme is widely used in VANETs for secure communication, the existing systems based on group signature scheme provides verification delay in certificate revocation list checking. In order to overcome this delay this paper uses a Hash message authentication code (HMAC). It is used to avoid time consuming CRL checking and it also ensures the integrity of messages. The Hash message authentication code and digital signature algorithm are used to make it more secure . In this scheme the group private keys are distributed by the roadside units (RSUs) and it also manages the vehicles in a localized manner. Finally, cooperative message authentication is used among entities, in which each vehicle only needs to verify a small number of messages, thus greatly alleviating the authentication burden. Then the transformed images are encoded using Partial EZW algorithm. Arithmetic encoder is used to reduce the redundancy and to improve the efficiency of compression.

VI ARCHITECTURE

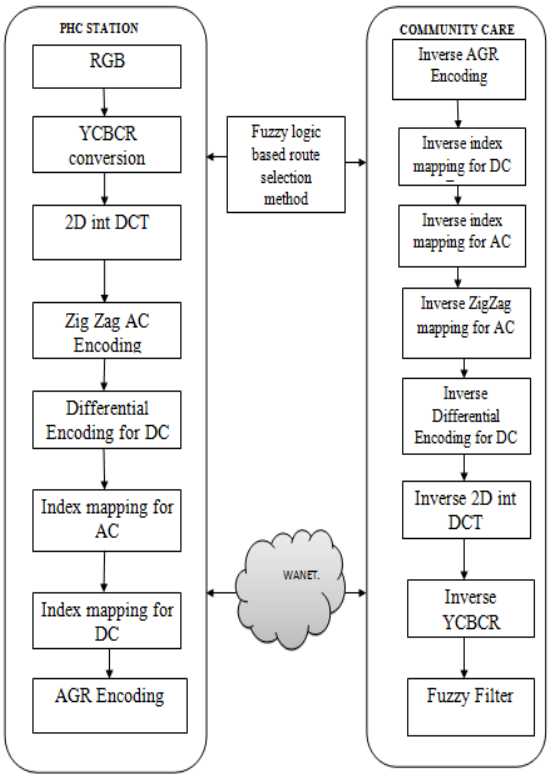

Fig 1: ARCHITECTURE DIAGRAM

A. Medical Data Compression Algorithm:

Step 1: The color-space conversion from *RGB* to *YCbCr* of an input image is performed to generate less correlated component planes.

Step 2: Each component plane is transformed and quantized to reduce inter pixel correlation and packing pixel energy into few transform coefficients.

Step 2.1: The plane is divided into non-overlapping $N \times N$ blocks.

Step2.2: The blocks are transformed and quantized by blocked IntDCT.

Step 3: The quantized coefficients of each component plane are encoded using a hardware efficient encoder.

Step 3.1: The coefficients of a block are partitioned into DC and AC coefficients.

Step 3.2: The DC coefficients are differentially encoded and mapped to non- negative integers.

Step3.3: The resultant coefficients are further encoded using AGR coding.

Step 3.4: The AC coefficients are scanned along a zigzag order and the nonzero AC coefficients are also mapped to nonzero positive integers.

Step 3.5: A pair consisting of a nonzero AC coefficient and the run-length of the succeeding zero-value AC coefficients is encoded using the AGR encoder.

Step 3.6: Each zero-value AC coefficient is assigned the value „0".

B. Fuzzy Logic Based Route Selection Algorithm:

Step 1: When a node *d* wants to find a route to destination node t, it broadcasts RREQ messages {s,t,d, Esd k , esd 1 , dsd1 }.

Step 2: If an intermediate node *c* receives RREQ messages for *t*.

Step 2.1: Node *c* uses the fuzzy rule set of Table I and calculates the select_routing_metricfor each RREQ message.

Step 2.2: Node *c* selects RREQ message having least select_routing_metric.

Step 2.3: Node *c* updates its routing table and broadcasts a RREQ message.

Step 3: When *t* receives RREQ messages.

Step 3.1: Node *t* uses fuzzy rule set (Table I), calculates select_routing_metricfor each RREQ message, and updates its routing table.

Step 3.2:*t* waits for a fixed time interval to receive more route request messages.

Step 3.3: Node *t* unicasts a RREP message back to its neighbor from which it has received the least select_routing_metric.

Step 4: Each node, after receiving a RREP message, unicasts the RREP message towards source node*s*.

VII SYSTEM ANALYSIS

JPEG compression is the most popular compression technique for images. In lossy JPEG compression, pixels are first transformed using DCT, then quantized using quantization tables, and finally encoded

using Huffman coding. In lossless JPEG compression, quantization step is not performed. The JPEG2000 gains over JPEG are attributed to the use of DWT and bit plane coding scheme. In the pre-processing of tumour images using principle component analysis is followed by DCT. To code the transformed image we use Vector quantization. Nodes do not depend on active paths neither store any routing information nor take part in any periodic routing table exchanges.

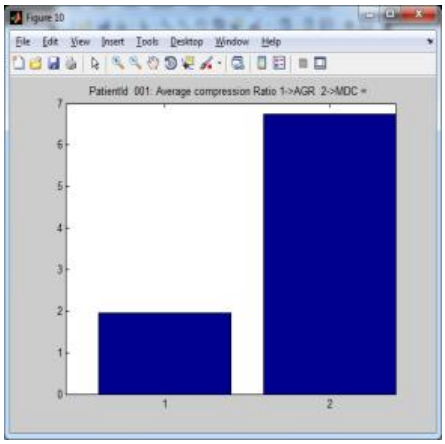

FIG 2 : FUZZY ROUTING

In a distributed routing scheme is designed to offer scalability and extend the network lifetime in a mobile ad hoc network. A multicast algorithm is presented in to increase the lifetime of node and network in the mobile ad hoc network. Two energy-aware routing algorithms for wireless ad hoc networks, called RMECR and RMER are presented in to address energy-efficiency, reliability, and network lifetime of ad hoc networks. The major drawbacks are

- Less efficient routing protocol
- No post processing method to enhance reconstructed image
- Less compression ratio
- Less PSNR

This paper proposed method for medical data compression and transmission in wireless ad hoc network. The main contribution of the paper can be proposing a novel MDC technique that reduces the size of MDPs. The MDC technique compresses and decompresses MDPs at PHC station and CC center, respectively. In addition, robustness is achieved in the presence of transmission errors. The technique addresses the compression of MDPs in the form of color images, such as, endoscopic images, where a robust and efficient compression of color images is still usedelectrocardiography images, magnetic resonance imaging. Various issues have to take into account when routing the compressed MDPs in WANETs. Next, we propose a FRS technique that optimizes among of the issues related to the routing of the compressed MDPs. The FRS technique estimates an effective route selection metric for routing the compressed MDPs from PHC station to CC center. Finally, we show that MDC and FRS techniques can be easily integrated with the existing routing protocols for WANETs to form an effective RMM system. The existing protocols for WANETs with MDC and FRS techniques consume less energy and reduces packet-loss during the transmission of the compressed medical data from the PHC station to CC center.

VIII CONCLUSIONS

The RMM system for routing the medical data of patients in the disaster area. The proposed system comprises a set of components which collects, compresses, and transmits compressed medical data to the base station using WANETs. The coding technique in RMM system allows to decode correctly even in the presence of transmission errors. RMM system exploits the attributes of WANETs to maintain QoS of WANETs. The proposed system out performance the existing system by the compression ratio and a time taken.

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