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EFFICIENT MODEL FOR VIDEO TRANSMISSION BY UDP LITE PROTOCOL

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Abstract

In this work a model is present that is used for recovering the bits that are damaged while transmission of packets. Transmission is done by UDP Lite protocol. Before transmission of data, compression is done by DWT technique. The model is work for MJPEG format. The basic idea of this proposed model is that firstly we select the file which is in the form of video. Generally, in the computer network all the data is in the form of packets or 0's or 1's. These packets are then compressed using bitwise operator. After compressing the packets, we will use the transport protocol that is UDP Lite Protocol. In the UDP Lite protocol checksum is used to for reducing the packet loss and in this model we use a program which is called an Error Trace Program by which we can know if there is any loss of packet. Generally, we can increase the number of packets in an individual block by doing compression but only disadvantage is that some of the packets are lost. Nowadays a number of audios, videos, images files are increasing continuously on internet. During transmission of these files, sometimes bits are losses by many reasons and quality of data is reduced [7, 8]. So, this work improves the quality of data and increase the performance during transmission of data by managing the packets.

1. Introduction

Technology is increasing day by day and if technology increases then obviously data will increase. The number of people is also increasing for using that technology and if they will use that technology and then automatically will increases. This increment of data not in kilobytes or megabytes, it is in gigabytes, terabytes, petabytes and this huge amount of data is increased only in a single day. On the internet, this data is continuously transmitted from one place to another or from source to destination. A wide variety of new applications are being invented daily. All these applications need High Bandwidth Internet connectivity. The emerging technologies of video compression without any loss of packets or bits are currently a very exciting and challenging area of research.

1.1 Compression

Compression is the technique that compresses the data and it reduces the overall space, it means bits are compressed and make space for other bits. These packets are in the form of 0 and 1. When these bits are combined then they form images, audios and videos. Compression is of two types:

- Lossless Compression
- Lossy Compression

In Lossless compression, the exact copy of data is created without any loss of data. It is also called entropy encoding. The Huffman coding, Run-length coding, Entropy coding, and Bit-plane coding are some Lossless image compression techniques.

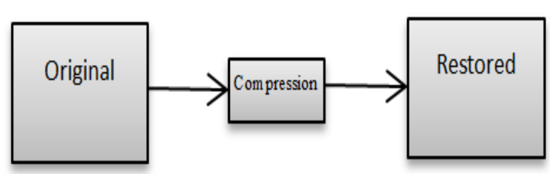

Fig.1 Lossless Compression

In Lossy Compression there is always reduction of data. It means some bits or packets are loss during compression of data. There are some techniques of Lossy Compression like Discrete Cosine Transform, Discrete Wavelet Transform and Fractal Transform etc [2].

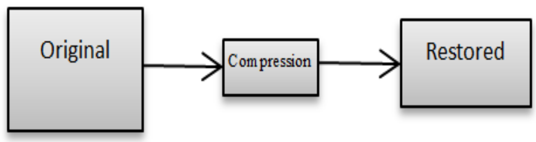

Fig.2 Lossy Compression

The main work of compression techniques is reduction of data which is in the form of packets or bits. It emerges a number of images, videos in a low memory space and which is accurate for the system works that is used to find the coordinates or we can say that it is used to predict the errors based on coordinates.

1.2 The Discrete Wavelet Transform

DWT is an extended version of DCT. It is an expertise to a certain functions then that function is fragmented into wavelets and makes a set of signals called Wavelet signals. A transform wavelet has an average value and that value is zero. The representations of compact wavelet signal are in orthogonally shape. It means it has the property of orthogonally. This property tells that representation of data is not over. The original mother wavelet can be decomposed into many shifted representations Representation of signals of one wavelet is sparser than another so the techniques of wavelet must be examined during compression of image that which is most preferable and which is not [2].

1.3 Issues during Transmission of Packets

Various Topologies are used for transmission of data and during transmission some issues are generated. They are as follows:

1. In each topology some data are lost that means some nodes are disturbed or destroyed during transmission.

2. Sometimes in a wireless medium, nodes changed their places. So the unnecessary nodes are generated on the network that gives the wrong information about data.

3. When the continuous transmission of packets occurs then sometimes a problem is generated at the receiving end called the Hidden Terminal Problem. This problem occurs when the nodes those are not within the direct transmission that belongs to the sender, but are within the transmission that belongs to the receiver.

4. In wireless networks there is always collision of number of packets because of the presence of terminals and those terminals are hidden. It means problem occurs due to the presence of interference, links of unidirectional, and break the request that send by sender.

Nowadays technology is increasing. Each technology depends on web and web totally depends on moving packets or bits. The recent trends in technology have shown that most of the applications with audio/video data transmissions send over the Internet prefer to be delivered erroneous than being discarded, or arriving late. An enhanced version of UDP, called UDP-Lite was introduced decade ago, designed for transmitting various multimedia applications more efficiently. Packet losses due to transmission errors that are generated by ad hoc wireless networks in which collision is higher because of terminals that are mostly hidden, unidirectional links, and frequently breaking of paths due to continuous movements of nodes [3].

2. Proposed Approach

During transmission of the compressed data in a network, the packets are damaged rather than discarded by the network. The compressed data is used for broadcasting purpose. There are many codecs are used in networking that is used for coding or decoding the data stream. These codecs are also used to manage with the errors when the packet or bit is lost [6].

There are many technologies where data can be moderately damaged. There are many radio technologies that show this behaviour when operating at a point where cost and delay are sufficiently low.

The intermediate layers are IP and the transport layer. There is no IP related problem because the IP header has no checksum that covers the IP payload. The available transport protocol is best suited for those applications that based on UDP which is a connectionless protocol; it means that no prior connection is required when data is transmitted. In this protocol there is no guarantee of delivery and duplicity. If any of the packet or bit is lost then there is no notice of missing. Packets arrive in this protocol not in sequentially manner.

There is a header format of UDP is:

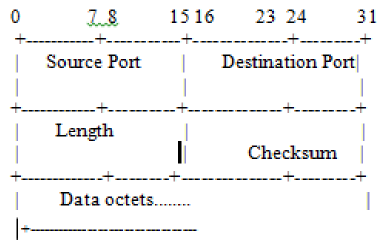

Fig 2.1 UDP Header

Source Port- It is a port of sending data and also it is assumed to be the port that reply a message when data is absent.

Destination Port-It is a port of receiving the destination address.

Length-It is a combination of header and data. It is of length eight.

Checksum-It is a 16 bit one's complement which is sum of the header of information encapsulated in the IP header.

There is another protocol which is enhanced version of UDP called UDP-Lite. It is simple and also connectionless protocol. This protocol includes a checksum facility which provides an optional coverage of the packet that is sent. So the packet is divided into two parts, one is sensitive and other is insensitive part. The complex part is covered by the checksum and insensitive part is not covered by the checksum. If there is any error found in insensitive part that will not cause the packet to be discarded by the receiver. When checksum takes the entire packet i.e. header plus data, UDP-Lite is semantically identical to UDP.

It has also a header format:

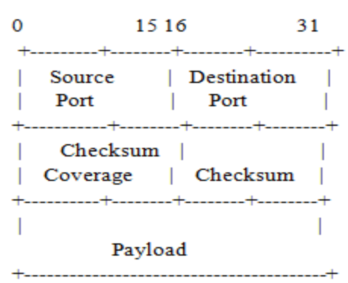

Fig 2.2 UDP Lite Header

Source Port - It helps to sending the data.

Destination Port - It receives the destination addresses.

Checksum Coverage- It has number of octets that is covered by checksum. The UDP-Lite header which is of 8 bytes is always covered by the checksum. If checksum (header +data) covered by checksum but if coverage value is 8 that means only UDP-Lite header is covered by the checksum [3].

A transport protocol is required that adapts the properties of link layers and applications that are mentioned in the described in UDP-Lite protocol. The error-detection property of this transport is used to protect the important information, but ignore the errors that are best dealt with the application [8].

2.1 Protocols Used

We have used following protocols for transmission purpose:

Real Time Transport Protocol (RTP).

Point-to-Point Protocol (PPP).

Internet Protocol (IP).

User Datagram Protocol (UDP).

2.2 Flowchart of Proposed Model

Firstly we will set the size of the file which is of audio, video or image which is of MJPEG format. Read the size of packet by Input Video Stream. Then the complete file is compressed using DWT technique with the help of bitwise operator. Now the compressed file is divided by 24 or any standard part (i.e. 16, 32 etc. depends on size of file) that is called radio blocks. Then overhead is prepared which is a combination of four protocols RTP+UDP+IP+PPP.

Now the file is transmitted using transport protocol UDP Lite. During transmission of file, if there is any loss of packet or bit then error is generated by the program called error trace program then we can take input video stream again and then we will get output video stream without any loss of bit.

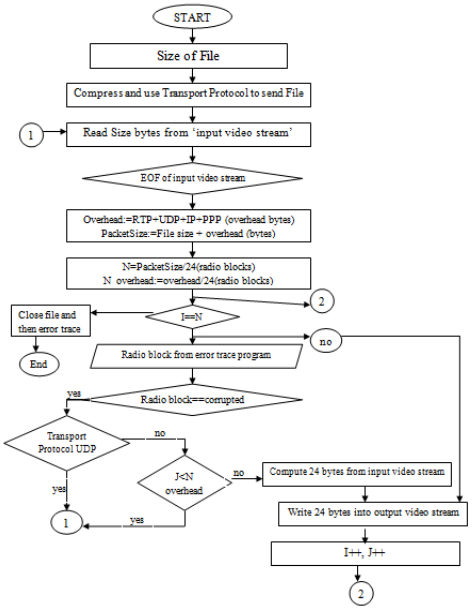

Fig. 2.3Flow Chart of Model

Proposed Algorithm:

Step 1: Set size of File=FILESIZE

Step 2: Read FILESIZE bytes from "input video stream"

Step 3: Compression of File

Step 4: if (inputvideostream!eof)

Then,

4.1: Set Overhead=RTP+UDP+IP+PPP[overhead bytes]

4.2: Set PacketSize=FILESIZE+overhead[bytes]

4.3: Set N=packetsize/24[radio blocks]

Step 5: Set N_overhead=overhead/24[radio blocks]

5.1: Set i=0,j=0

5.2: if(i!=N) then

5.2.1: Read radioblocks from 'error trace'.

5.2.2: if (radioblock is corrupted)

5.2.3: if (transport protocol==UDP)

goto step 2

Else /* Transport Protocol is UDP-Lite */

if (J<N_overhead) then

goto step 2

(UDP header is corrupted Drop UDP Packet)

Else

Read 24 bytes from "input video stream."

Write 24 bytes into "output video stream."

i++

j++

goto step (5.2)

[end of if statement]

[end of if statement (5.2.3)]

[end of if statement (5.2)]

[end of if statement (4)]

4. Experimental Results

After implementation of model, we create client side and server side:

At client side, we put the IP Address of the server for connecting two systems or we can connect multiple clients with one server and for sending a file firstly we will start the server.

Fig 3.1 Client side

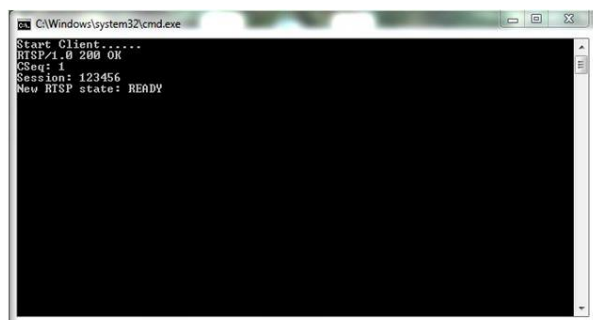

Fig 3.2 When Client is in Ready State

The file that we want to send to the clients belongs to the server side. The file will be in mjpeg format.

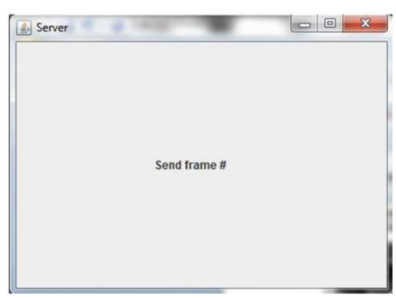

Fig 3.3 Server side

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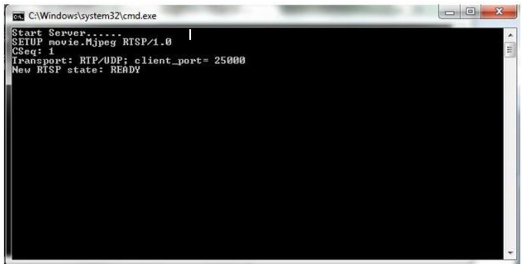

Fig 3.4 When Server is in Ready State

After connection, video file is sending on the client side:

Fig 3.5 On playing video

Comparison between video using UDP and UDP Lite by our algorithm of mjpeg File:

Observe that the video quality with UDP is not better than the UDP Lite. UDP drops corrupted packets if there is any loss of bit while UDP Lite transmits them.

Fig 3.6 Comparison of video by UDP and our Algorithm

Video Time(Seconds)	Streaming Time(Seconds)
20	70
50	153
100	317

Fig 3.7 Streaming time of video via UDP protocol:

These are graphs that are showing the streaming time of UDP Protocol.

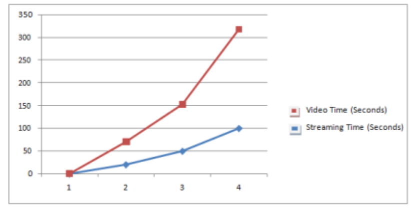

Fig 3.8 Line Chart of UDP

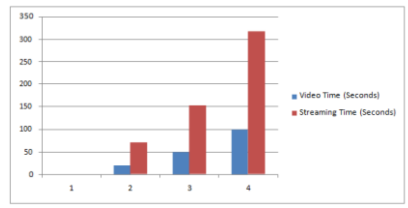

Fig 3.9 Graph Chart of UDP

When UDP Lite protocol is used via compression technique, the streaming time reduces:

Video Time Seconds	Stream time seconds
20	50
50	113
100	227

Fig 3.10 Streaming time via our algorithm

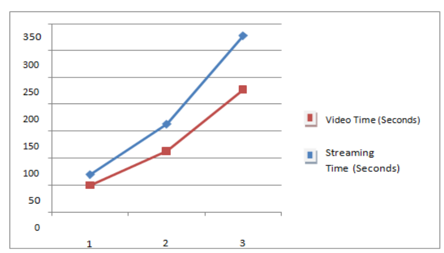

Fig 3.11 Line Chart of UDP Lite

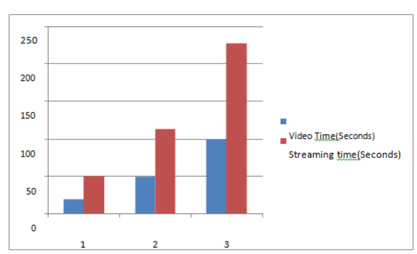

Fig 3.12 Graph Chart of UDP Lite

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4. Throughput

Throughput is a useful performance metric. We measured throughput as the amount of data passed up to an application either corrupted or not, divided by the total connection time. The throughput of UDP Lite via DWT compression as compare to others is:

Wireless Network	Throughput (Kb/s)
802.11g	250
802.11e	307
802.11e+Snr Utilization	417
802.11n	500

Fig 4.1 Throughput (kb/s)

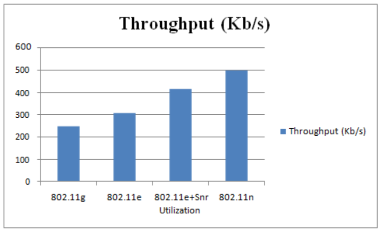

Fig 4.2 Throughput chart

5. Conclusion

In recent years, multimedia is the most widely used technology for the communication. Here we described the transport protocol that is commonly version of UDP. Its main feature to divide the packet into two parts one that is one part is more sensitive to errors and other is less sensitive to errors. Errors are acceptable by data payload to reduce the number of unnecessarily discarded packets.

In this work we explored the technique for improving multimedia content delivery. By using this technique data will not be lost and if it is lost then it is recovered and the exact information is received and by using this technique performance of transferring l videos on networking is increased.

6. References

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