Web based Modified Video Decoding for Mobile Application

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ABSTRACT
Videos are the most useful and only approach to represent audiovisual information. Today all the communication approaches are working with such kind of media. The problem with such kind of media is its large size. Data is required to be stored in the database or to be transferred over communication medium. Size of video always affects the efficiency. Video compression is required to save the storage space as well as time for transmission & reception. By using effective compression techniques video size is reduced thereby reduction in cost of data usage for mobile applications.

General Terms
Compression, resolution

Keywords
DCT, DWT, PSNR

1. INTRODUCTION
Video compression is the method of reducing the amount of data required to represent a digital video signal, ahead of the transmission or storage. The decoding process regenerates a digital video signal from a compressed representation before display. Digital video data requires the large amount of storage or transmission capacity and so video coding is essential for any application in which storage capacity or transmission bandwidth is constrained [1].

Image, video and audio signals are compressed due to the following factors.

There is several amount of statistical redundancy in the signal.

•Within a single image or a single video frame there exists significant dependency among neighboring samples. This dependency is recognized as spatial correlation.

•For data acquired from multiple sensors, there exists significant correlation among samples from these sensors. This correlation is known as spectral correlation,

•For temporal data (such as video), there is a significant dependency among samples in different segments of time .This is known as temporal correlation.

So by well-designed compression techniques the video size can be reduced which can be result in the cost reduction in web based video viewing also space requirement reduces.

1.1 Need for Video Compression Particularly for Mobile
The problems in making new video services accessible to the mobile handheld market are the limitations of bandwidth, screen size, resolution, and power.

1.1.1 Wireless Network Evolution
The impact of the wireless evolution on video to the handheld service, the impact of video on today's mobile network must be evaluated by looking at the traffic load a streaming video represents on the user's network access.

Table 1. Shows the ostensible rates for various encoded video streams

Encoding Type	H.263	H.264	HD720p	HD1080p
Resolution	175x144 @ 15 fps	352x288 @ 30 fps	1280x720 @ 60 fps	1920x1080 @ 60 fps
Bit Rate	64 kbps	768 kbps	20 Mbps	50 Mbps

Table 1. the download speeds of different network technologies compare as follows.

Generation		Technology	Maximum Download Speed	Typical Download Speed
2G	G	GPRS	0.1Mbit/s	<0.1Mbit/s
	E	EDGE	0.3Mbit/s	0.1Mbit/s
3G	3G	3G (Basic)	0.3Mbit/s	0.1Mbit/s
	H	HSPA	7.2Mbit/s	1.5Mbit/s
	H+	HSPA+	21Mbit/s	4Mbit/s
	H+	DC-HSPA+	42Mbit/s	8Mbit/s
4G	4G	LTE	100Mbit/s	15Mbit/s

1.1.2 Screen Size & Resolution
The fundamental problems with screen size are power and the size of a person's hand. Screen size is constantly growing. It is not uncommon to find screens larger than 2.5 inches these days that are capable of displaying a CIF sized image with high clarity. At least one business handheld now boasts a four-inch screen size with 640x480 VGA resolutions. This is nearly four times the resolution of a CIF image; however, it is more likely to be used with downloaded content (loaded into the handheld's memory via a USB interface to a PC).

The products available in the market now allow a user to plug an external eight-inch monitor and keyboard into the USB or Bluetooth connections on a Windows® Mobile handheld, greatly increasing the viewable image area and providing a suitable keyboard for real content creation (as opposed to that used for SMS text messages and short emails).

1.1.3 Power

The next critical issue to solve is the need for power. Two things drive the need for power in the handheld:

• The processor

• The display

Processor

Processing power consumption will drop as function of the normal progression of silicon manufacturing technology, anything that the network can do on behalf of the processor will help offload that work and allow the processor to conserve battery power. In the video, a classic example of this is video conferencing. This paper addresses applications in the Usage Scenarios section; however, some recent attempts to run a conference using peer to-peer techniques with the application loaded in the handheld itself show a sizeable increase in power consumption, network bandwidth, and processor MIPS. It can be argued that such applications are best run in the network equipment, where they can be done more efficiently and with less cost to the handheld's battery.

Display

The battle is with the constant power drain of the display screen. The larger and higher resolution the screen, the more power it tends to use. Advances in LCD technology have greatly improved screen power consumption, but the constantly changing and always-on nature of a video call will rapidly consume the battery. And although battery technology is continually being improved, its advances thus far have lagged behind those of other technologies. Some of the advancement in battery technology is coming out of the vehicular market, where the push toward environmentally friendly electric cars is driving the need for better battery technology. Another related technology being explored is for the military — one that allows a generator to operate off a standard body motion. Such advances could help alleviate the power source issue.

2. LITERATURE REVIEW

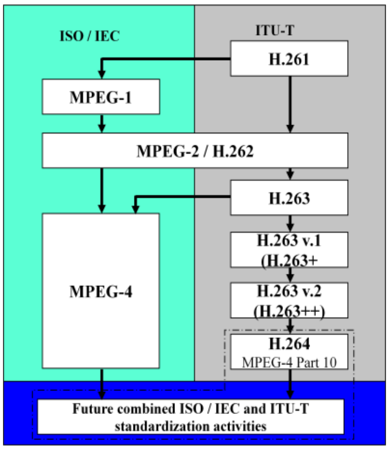

Fig 1: MPEG Standard

The video standards which are developed over last two decades are MPEG and H.26+. An overview of MPEG standard is given in fig.1

2.1 MPEG 4

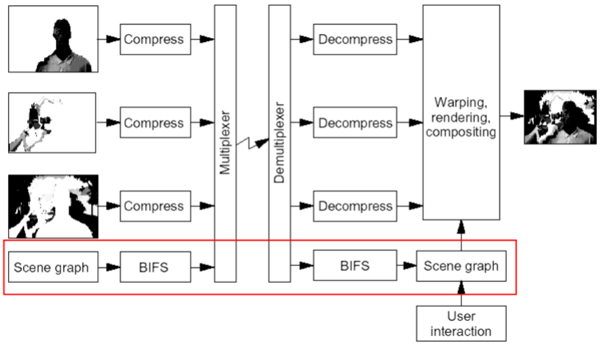

Fig 2: Block Diagram of MPEG 4

The audio/video components of MPEG-4

- Objects are coded, transmitted separately and composed at the decoder site
- They can exist independently
- Multiple objects can be grouped together to form complex objects
- Video and audio can be easily manipulated
- Permits choosing appropriate coding tools for audio, video and graphics objects

Coding in MPEG-4

- The scene is composed and rendered at the sender site
- video frames, audio are coded, multiplexed and transmitted
- tools for coding arbitrarily shaped objects

At the receiver the stream is demultiplexed

2.2 H.264/AVC - MPEG-4 Part 10

Advanced Video Coding (AVC), developed by Joint Video Group (JVT) and approved as Recommendation H.264 (by ITU-T) and as MPEG-4 Part 10 (by ISO/IEC) is originally intended to compress moving images that take the of eight-bit 4:2:0 coded pixel arrays. Although complex, AVC offers between two and two and half times the compression factor of MPEG-2 for the same picture quality.

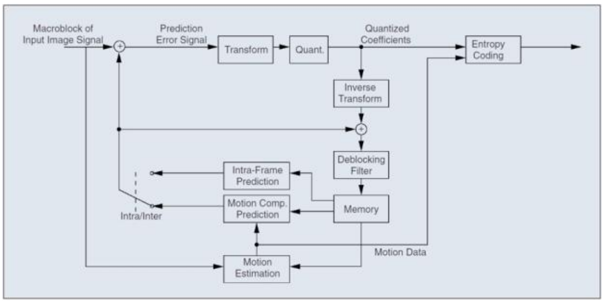

Fig 3: AVC encoder with spatial (for I frames) and temporal (for P and B frames) predictors [7]

2.3 Comparison of MPEG4 & H.264

H.264 is a new standard for video compression which has more advanced compression methods than the basic MPEG-4 compression. One of the advantages of H.264 is the high compression rate. It is about 1.5 to 2 times more efficient than MPEG-4 encoding. This high compression rate makes it possible to record more information on the same hard disk. The image quality is also better and playback is more fluent than with basic MPEG-4 compression. The most interesting feature however is the lower bit-rate required for network transmission.

So the 3 main advantages of H.264 over MPEG-4 compression are:

- Small file size for longer recording time and better network transmission.
- Fluent and better video quality for real time playback
- More efficient mobile surveillance application

3. PROPOSED METHODOLOGY

Today in the communication approaches the only problem with video is its large size, So that video compression is required to save storage space. The most frequent compression techniques find the redundancies in the movie frame and the dependency between the scenes to get high degree of compression. The projected approach is also about the up-down sampling based approach. Here presenting a frame skipping and DCT based approach to perform the video compression with scalability vector. First we enter the AVI video in sequence, then scrutinize video format those are AVI or not, if that is satisfy then analyze the compression model in which analyze all frame of video those are accepted or rejected if satisfy then put on extract key frames it do frame in different way in sequence and then skip the alternate frames and apply block matching algorithm and last rebuild video in sequence. Proposed Model show in figure 4

3.1 Block Diagram

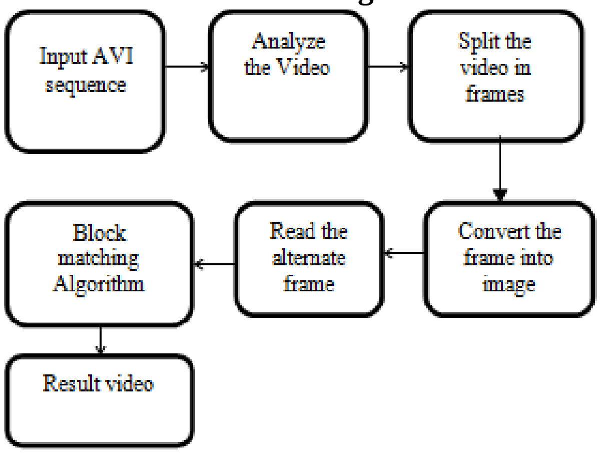

Fig 4: The Actual Block Diagram for Video Compression

The proposed work is about to compress the video data. The whole proposed work is divided in 3 main phases.

1. Pre-Processing
2. Frame Skipping and block matching
3. AnalysisPre-processing

Initially it will first read the avi video file from input then feature and properties of video file will be extracted from it. After doing this al the frames of video will be extracted and in that frame skipping will taken place. Because of alternate frame skipping the compression of 50% would be achieved. And this will also doesn't affect the video quality. After frame skipping the block matching algorithm for video compression will be applied to compress the video. After this the compressed video would be analyzed and the compression ratio would be around 70% of the original size.

3.2 Proposed Algorithm

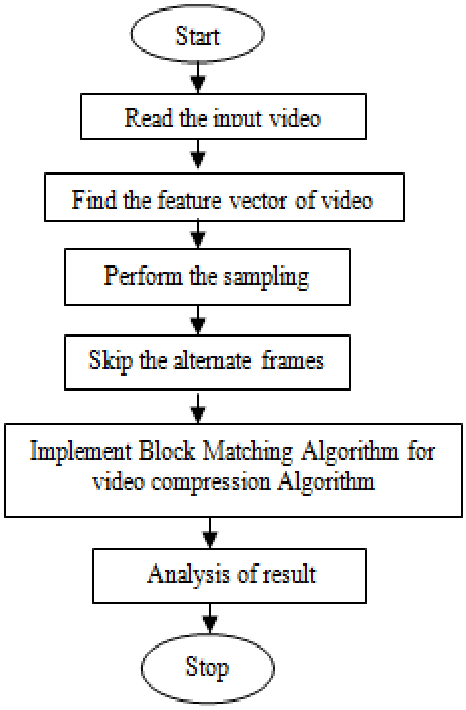

Fig 5: Proposed Flow Chart

Streaming Process:

Fig 6: Streaming Process

The application initially works on the web server and when the application started by the user. The application checks for the internet connection is connected or not and if internet connection is there then app shows the main screen and on that app the list of video is shown which are present on the web server and user has the option to select the video which the user want to play and also one more option is there in which user can select which type of video wanted to play means compressed or uncompressed. If user select the compressed video then the cost for seeing the video is less as compared to that required for uncompressed video.

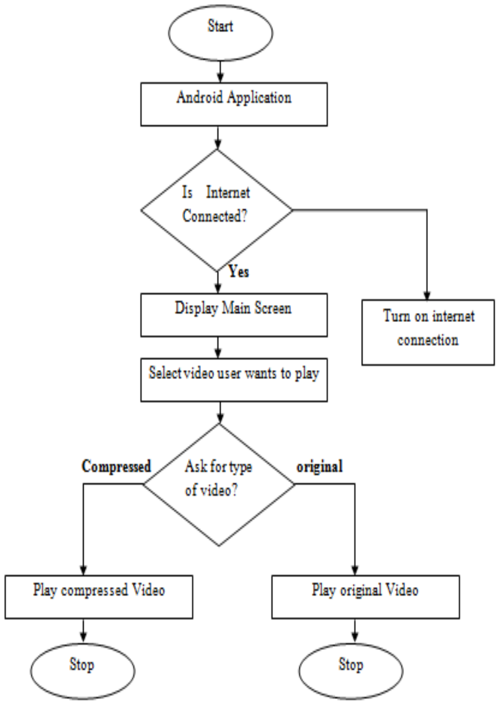

Fig 7: Application Flow

4. RESULT

This work is implemented by using MATLAB 2013a. The purpose of this work is to improve the video compression by improving the frame based similarity and the dependency. In this work, the AVI file has been set as input video sequence on which compression operation is performed. The proposed work is beneficial in videos that have lesser movement. A video having maximum number of motionless frames gives the better compression ratio. This methodology is helpful to compress the videos captured by CCTV cameras where the movement is done rarely and the camera is set on a particular scene. In the next stage, the splitting of video sequence is carried out and frames extracted from the video. Once the frames are spitted the next work is convert these frames to image. For this conversion png format of image is used. Because of this on individual image the JPEG compression is performed.

Finally these all images are collected to form a new video sequence or the result video sequence. Figure Shows results of video in sequences. Once the frames found in a sequence. Alternate frame has been kept and remaining frames are processed. Finally these all images are collected to form a new video sequence or the resultant video sequence. In the following section results are tabulated on the basis of different parameters viz. data size, PSNR and time duration.

Table 3. Comparison of size of .Avi video files of duration of 4sec each for DCT

Video name	Uncompressed original video size on Hard Disk	Compressed video size on Hard Disk	Time Required for compression
CLIP 1	27.3mb	4.34mb	90sec
CLIP 2	30.5mb	4.5mb	85sec

Table 4. Comparison of size of .Avi video files of duration of 4sec each for DWT

Video name	Uncompressed original video size on Hard Disk	Compressed video size on Hard Disk	Time Required for compression
CLIP 1	27.3mb	472kb	20sec
CLIP 2	30.5mb	471kb	22sec

Table 5. Time required for uploading the compressed video to the proxy server

Video name	Approx. Time required for DCT video	Approx. Time required for DWT video
CLIP 1	1min 30sec	15sec
CLIP 2	1min 45sec	15sec

Table 6. PSNR of Video

Video name	PSNR of original video	PSNR for DCT video	PSNR for DWT video
CLIP 1	44db	38db	34db
CLIP 2	42.05db	37db	35.01db

5. CONCLUSION & FUTURE SCOPE

This study presents analysis of video Compression using DCT, DWT for web based streaming. DWT provides high quality compression at low bit rates. Wavelet analysis is very powerful and extremely useful for compressing data such as video. Its power comes from its multi resolution. Although other transforms have been used, for example the DCT is used to compress video but wavelet analysis is seen to be far superior and free of blocking artifacts. This is because the wavelet analysis is done on the all frames of video rather than sections at a time. The discrete wavelet transform performs very well in the compression of still type video. The Compression results are measured in terms of size of compression, PSNR, time required for execution. Hence from these results it is concluded that by applying different compression techniques variations in parameters are observed and also these variations are seen for different types of video. Using DCT the compression is around 80 to 90% and for dwt it is around 90 to 95%. DCT is preferred when number of frames is more but DWT is preferred when percentage of still part is more in a video. The time required for uploading the video to the proxy server is around 1minute for video compressed by DCT and 10sec that of by using DWT. The time required for uploading the video can be reduced by using high bandwidth data connection.

6. SNAPSHOTS OF CLIP1 & CLIP2

Clip1

Original CLIP1

After DCT applied

After DWT applied

CLIP2

Original CLIP2

After DCT applied

After DWT applied

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