# Performance Analysis of Various Video Compression Techniques

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**Abstract:** ***In familiar applications such as digital versatile disc (DVD), digital video can be found in digital TV, Internet video streaming, digital high-definition television is defined formula. Digital video sharing digital format all functions, including lossless transmission, lossless storage, easy to edit.Currently in many applications, including video conferencing, video games entertainment, DVD discs, digital video broadcasting. As digital video compression format storage requirements prohibitive, lossy digital video compression technology commonly used as the data transmission rate and a compromise between quality. In this paper, we compare and analyze the MPEG-2 , H.261 and H.264 video compression standards.After the Compression , We get the result that the compression of H.264 is better than other two but it take much time as compare to H.261 on higher cost.***

**Keywords:** Codec, Container, H.261, H.261, MPEG-2.

## 1. Introduction

Digital video technology has been used for many years, for example, in the television broadcasting industry. However, until recently a number of factors have prevented widespread use of digital video. The analog video signals are usually bandwidth of several megahertz, however, when it is converted into digital form, in the same quality, typical digital version of the bit rate of more than 100 Mbps. For most networks, or processor to handle, the bit rate is too high. Thus, over the past few decades, before it can be stored or transmitted information is compressed digital video, digital video compression technology has been constantly improved. Many international standards, focusing on the different digital video applications have been developed or are under development. In this paper we compare video compression techniques such as H.261, MPEG 2 and H.264, in order to analyze their performance on the basis of their execution time and compression ratio. To understand these standards firstly we discuss about the video formats [1].

### 1.1 Video

To view a recording of moving images created digitally. Moving image will be record in a proper digital format and then they will play in a sequence that is called video.

### 1.2 Types of video formats

When the video will be Digital then there will be different formats of video- WMV, ROV, MPEG. These standards will have sub standards-MPEG1, MPEG 2, and H.264 and so on. Video Format Involve Two Structured, And Very Different Technology Concept: Container (Sometimes Call Envelope) & Codec (Short form of Encoder / decoder). Codec Be Use Inside Of a Container And Because Of This Video Format Can Be Bewildering.

#### a. Container

That Container Introduction In Structure Of In File: Where In Each Item Be Storage How They Be Staggered And Which Codec Be Use By the Which Article It Possible Designation A Audio frequency Codec As Good As Video. It Be Use to Package in Video & Its Package (Audio / metadata) And Be Determine (Usually) by the File Extension So as AVI. . MP4 or MOV. Most Common Container:

- **AVI (Audio Video Interleave):** A Windows' standard multimedia container.
- **MPEG-4 Part 14 (known as .mp4):** It is the standardized container for MPEG-4.
- **FLV (Flash Video):** It is the format used to deliver MPEG video through Flash Player.
- **MOV:** Apple's QuickTime container format.
- **OGG, OGM & OGV:** open standard containers.
- **MKV (Mastroska):** It is another open specification container that you've seen if you've ever downloaded animation.
- **VOB (DVD Video Object):** It's DVD's standard container.
- **ASF:** a Microsoft format designed for WMV and WMA - files can end in .wmv or .asf [2]

#### b. Codec

A Codec (Short form "Encoder / Decoder") be A Way of Coding Audio frequency Or Video Become a Flow of Bytes. It Be in Method Use to Coding in Video and Be in Chief Determine of High-quality products. Most Common Codec:

- **MPEG (Moving Pictures Expert Group):** Three video formats, MPEG 1, 2, and 4.
- **MPEG-1:** Old, supported by everything (at least up to 352x240), reasonably efficient. A Good format for the web.
- **MPEG-2:** Aversion of MPEG---1, with better compression. 720x480. Used in HDTV, DVD, and SVCD.
- **MPEG-4:** A family of codec's, some of which are open, others Microsoft proprietary.
- **H.264:** Most commonly used codec's for videos uploaded to the web. Part of the MPEG-4 codec.
- **MPEG spinoffs:** mp3 (for music) and Video CD. MJPEG (Motion JPEG): A codec consisting of a stream of JPEG

images. Common in video from Digital cameras and a Reasonable format for editing videos, but it doesn't compress well, so it's not good for web distribution.[2]

**c. Container codec**

Think of in Container As In File Itself. Think Of In Codec As Its Content. That Important Thing to Achieve Be That Most Good Container Format Can Hold Many Codec. To Example A MOV. Container Can Hold Almost Any Sample Of Codec Data. That With go to MP4 and Even AVI. Files Can Hold A Width Breed of Codec. As Their Content, In No Way Not in Container Decide in Quality or Feature of in Video Itself, That be On To In Codec. That Correct Way to Description Video be to Show Both: A MOV. File Contain H.264 Data. An AVI, File Contain divx is Data. Professionals Use Shorthand to That, Words Thing Like "Give I a H.264 using quicktime File (MOV)" [2].

**d. Container Codec Complications**

At first, this seems very simple, but it is not. The key is to use common terminology confusion and inaccuracies. Worse, the software companies try to simplify their own documents and instructions completely ignore the difference. As a result, it is believed that phrases such as "I will give you a MOV file," or "legitimate way about video MP4 files will be fine."

To make life even more confusing, some of the names, such as "MPEG - 4", describe both codec and a container, so it is not always clear in the context of being used. , You can have a movie an MPEG encoder - 4 One AVI codec inside the container, for example, or a movie inside an MPEG - 4 containers Sorenson codec's [2].

## 2. H.261

The ITU-T H.261 video coding standard, was approved in November 1988.This is the first member of a series of video coding standards H.26x the ITU-T Video Coding Experts Group field (VCEG) and the video codec is the first to be useful in practice.

H.261 standard actually only specifies how to decode the video. Encoder design, free to design their own coding algorithm, as long as they are properly constrained output allows it to be any according to the standard decoder decodes. Encoder also left free to perform any pre-processing they want their input video decoders allow any post-processing; they want their video decoding, prior to display. An effective post-processing techniques, to become the best H.261-based system, a key element is called deblocking filter. This reduces artefacts caused by the block-shaped block-based motion compensation and the appearance of part of the design space transformation. In fact, the blocking artefacts may be a phenomenon familiar to almost everyone who watches digital videos. The most recent standards, H.264 deblocking filter has become an integral part (although even when using H.264 still allowing additional post-processing can improve the visual quality, if the performance is good).

Standardization work in the future lead to the introduction of design improvements have been significantly improved relative H.261 compression capacity design. This has resulted in H.261 become essentially obsolete, but it is still used in some video conferencing system as a backward-compatibility mode, and certain types of network video. However, H.261 video coding development area is still a major milestone in the history.

The basic concept of h.261 compression is described as follows:

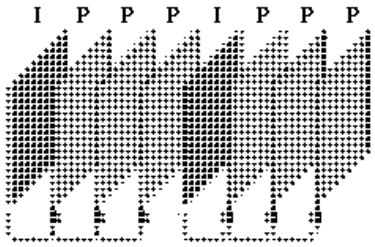


**Figure 1 I:** Frame and P-frame of H.261

- Decoded Sequence
- Frame types are CCIR 601 CIF (352x288) and QCIF (176x144) images with 4:2:0 sub sampling.
- Two frame types: Intraframes (*I-frames*) and Interframes (*P-frames*)
- I-frames use basically JPEG
- P-frames use ***pseudo-differences*** from previous frame (predicted), so frames depend on each other.
- I-frame provides us with an accessing point.[3]

## 3. MPEG 2

MPEG-2 standard is published in four parts. Part 1: The system specified in MPEG-2 systems coding layer. It defines a multiplex audio and video data and real-time synchronization sequence representing reproduction timing information needed, means for modular structures. Part 2: Video specified video data encoding means and decoding the reconstructed image precession required. Part 3: Audio specifies the coded representation of the audio data. Part 4: Conformance testing [4].

In particular, the MPEG standard defines three types of pictures:

1. Intra-picture (I-picture)
2. Predicted picture (P-picture)
3. Bidirectional picture (B-Picture)

These three types of pictures combined to form a group of pictures.

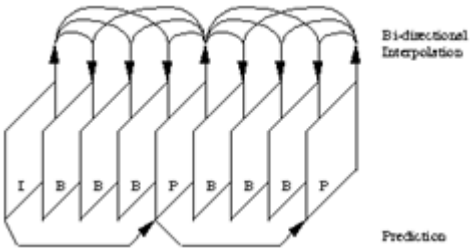


**Figure 2 I:** Frames, P-frame, B-frame of MPEG 2

## 4. H.264

The latest video compression standard, H.264 (also known as MPEG-4 Part 10/AVC Advanced Video Coding), is expected in the coming years as the preferred video standard.

H.264 is an open, licensed most efficient video compression technology standard, support today. Without affecting the image quality in the case, H.264 encoder can reduce the size of a digital video file More than 80% compared to, Motion JPEG format and up to 50% or more with the MPEG-4 is the second part of the standard. This means less network bandwidth and storage space required for video Files. Or seen another way, can achieve higher video quality, for a given bit rate [5].

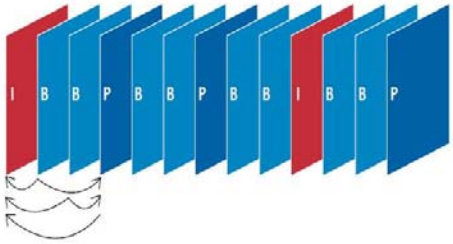


**Figure 3 I:** Frames, P-frame, B-frame of H.264

**Table 1: Study of Comparison between all Three**

| | *h.261* | *MPEG-2* | *H.264* |
|---|---|---|---|
| Quality | Worst | Medium | best |
| Size | less | More than h.261 | Less than from |
| TIme | less | More than H.261 | maximum |

## 5. Proposed Work

**1. Parameters**

To make the Comparison of different video Compression standards we will use parameters time and size. In the video compression standards we do the comparison on basis of size of the file after compression and time consume in the compression.

**2. Quality of video**

After the compression of using these standards, we will analyze the file that the compressed file is how much differ from the original data and will get that how much quality is maintain after the compression. The standard which provides the better quality as compare to other standard will be effective and useful for the video compression purpose.

## 6. Tool Used

### 6.1 MATLAB

MATLAB is a high level of numerical computation, visualization and programming language and interactive environment. Using MATLAB, you can analyze the data, the development of new algorithms, and create models and applications. Languages, tools, and built-in math functions, allowing you to explore a variety of ways, and to reach a solution faster than spreadsheets or traditional programming languages such as C / C + + or Java.

### 6.2 Video Processing

Computer Vision System Toolbox provides video processing algorithms and workflow tools. You can read and write common video formats, such as progressive and chroma resampling algorithms perform common video processing, video burning text and graphics displays the results. Using MATLAB video processing system objects, thus avoiding the use of excessive memory data stream from a video file.

## 7. Result & Analysis

### 7.1 Time Consumed to perform the compression by the video compression standards

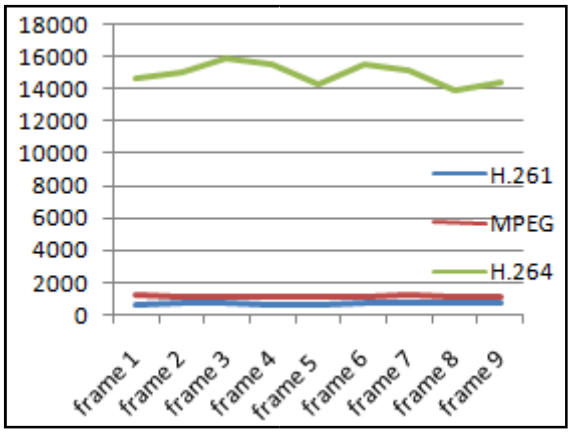


**Figure 4:** Time (msecs) consume by video compression standards

### 7.2 Compression of the data by the video standards

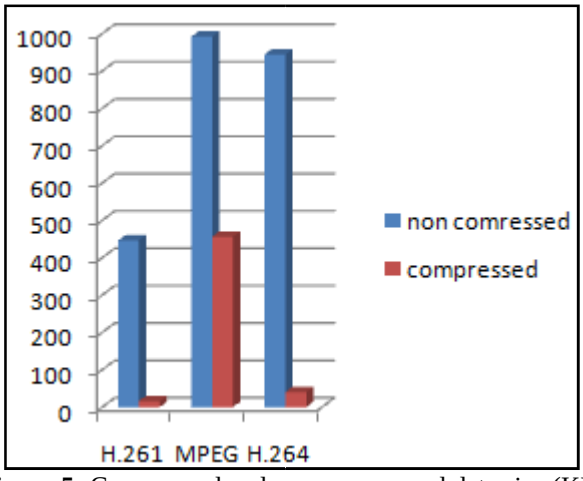


**Figure 5:** Compressed and non compressed data size (KB)

## 8. Conclusion

In this work we have tried to analyze the different video compression standards for effective and useful video compression. From above results following can be easily concluded.

1. The compression of h.264 is better than other two techniques

2. The quality of compression is best in H.264 and is worst in H.261
3. The time required for compression is more in H.264 while others have very less time
4. The H.264 format encodes all three frames that is I, P & B while H.261 & MPEG-2 encode only I & P frames.

Thus it may be concluded that quality is better in case of H.264 while cost is better in case of H.261 & MPEG-2.

## 9. Future Work

The results prove that if some time optimization tools may be used for H.264 than H.264 can be a better technique. The MPEG-2 and H.261 can be improved on quality and some new codes may also be developed.

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