Performance Analysis of Watermarking Video formats & streaming them in Cloud

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Abstract— A revolution in digital video era is being promoted by continued enhancements in the transmission methods, storage capacity, processing performance. But a new paradigm of video streaming has a lot of potential and depth yet to be explored that can be in live video streaming or it can be video on demand. This paper comprises of performance analysis of different video formats being watermarked and streamed in cloud environment and will try to find out which format is favorable to end users requirement.

Index Terms — MPEG, XVID, Video Watermarking, Cloud, Video Streaming, DCT, DWT, Spatial Watermarking. .

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1 INTRODUCTION

A new era of video streaming is rising, which is of home streaming via personal server to remotely connected internet users. Potential of such technology need to be analyzed and implemented in such a way that optimal utilization can be achieved of facilities which video streaming provides. Video streaming over the Internet has grown in popularity, representing the largest fraction of Web-based traffic to the home [1].

Real-Time Messaging Protocol: It was a closed source protocol developed by macromedia for transmission of audio, data and video over the internet. But now adobe owns macromedia and launched a version of RTMP for public use, it works on TCP and allows smooth communication between server and video player with low latency.

2 DIGITAL VIDEO

2.1 Introduction

It is a combination of video and audio in digital sequence rather than analog signal. Digital video means a set of data comprising audio and video in discrete units. In analog data case recording is done on video tapes, signals are transmitted as electron signals provided with a carrier signal of different amplitude or frequency. But in case of digital media the conversion from analog signal to digital signal is be formatted by IJSER production staff in the same order provided by the author done by saving the digital media in from of a series of '0 and 1', 'low –high'.

2.2 Codec

Codec is made up of "Encoder or Decoder" or we can say

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"compressor-decompressor". Codec converts digital data stream flow or signal for transmission, saving or encoding, or decodes it for background play or corrections. Codecs are used in videoconferencing, video processing, streaming digital content and video corrections of applications available. [2].

2.3 Container

Container usually associates with the file format it contain several components of video i.e. images in stream, sounds. It is a metafile format which describes how several types of data and metadata can simultaneously exist within a file.

- MPEG-4Part14 or MP4: MPEG-4 Part 14 is an instance of the more general ISO/IEC 14496-12:2004 (MPEG-4 Part 12: ISO base media file format) which is directly based upon the QuickTime File Format [3][4][5][6][7].Mp4 store audio and video data not the code of it that's why it is mostly used for streaming over the web.
- AVI: Audio Video interleaved: it is a container format for multimedia launched by Microsoft in 1992 for windows 3.1. It

contains audio nd video both data types which serves synchronous audio-with-video requests.AVI files are also used in multiple streaming but this feature is used very rarely.

• Flash Video: Flash was developed by macromedia and adobe bought it in 2005. It is a container which is used to provide video on internet with Adobe Flash Player version 6 or upper. Flash video is currently the standard of video streaming (over RTMP) .Flash has a drawback that it cannot play on iOS devices such as iPad or iPhone.

• Matroska Multimedia Container: It is an open standard, flexible, popular file container format which is use to deliver high definition videos over the internet. It is popular alternate of AVI and Mp4 format as it provides multiple audio tracks, subtitles in many languages, rich metadata consisting cover art, information and ratings.

• QuickTime File Format (QTFF): It is a file format used by QuickTime framework. It is a multimedia file format that consists of tracks and each track can store different type of data ie it can store video, audio, text. Every track stores either a media stream or a reference to the media placed at another location. These tracks are organized in a hierarchical tree like data structure.

• Windows Media (WMV): It is a Video compression codec developed by Microsoft and used widely for streaming applications.WMV provides physically existing formats like HD DVD and Blu-ray Disc.

3 VIRTUALIZATION

It is a definition used in IT paradigm which segregates computing functionalities and technical implementations with physical hardware. For Example Cloud Computing.
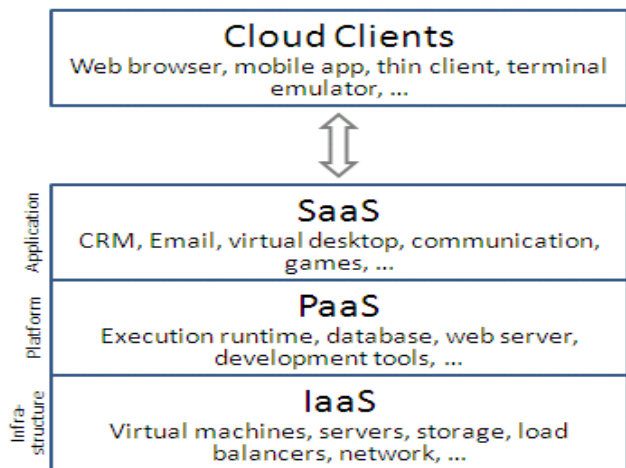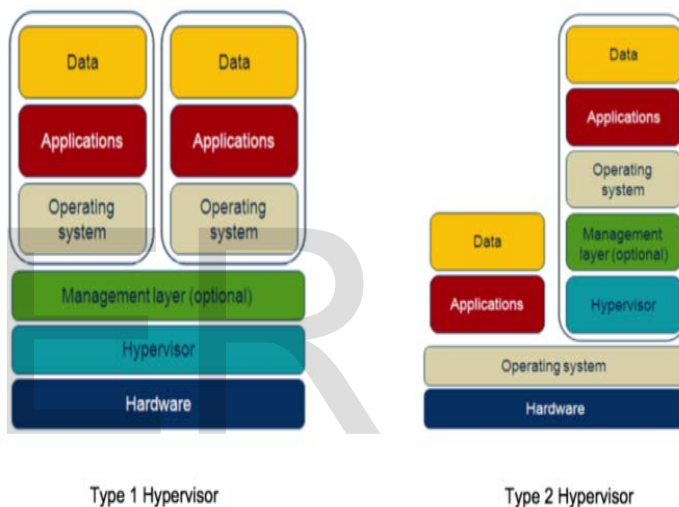

3.1 Hypervisor

It is also called Virtual machine monitor. It can be understood as a software, hardware or firmware which is used to run virtual machines. A machine over which hypervisor is running virtual machines is called host machine, hypervisor provides end user with a virtual operating system and carries out execution of their requests

3.2 Hypervisor Type-1:

It is client hypervisor which connects itself directly to hardware that is to be virtualized. It is totally independent of Operating system, unlike Hypervisor type 2 and boots to operating system (OS).Presently hypervisor type 1 is used by big market leaders in field of desktop virtualization space which includes VMware, Microsoft and Citrix but not limited to them.

3.3 Hypervisor Type-2:

It is a client hypervisor over operating system on which you work. Hypervisor of this type is dependent upon the operating system we are using .The functioning of hypervisor is only in existence when operating system is functional, the security of hypervisor is also similar as of operating system user works on it is a big drawback's hypervisor type 2 are Operating System depend they cannot provide full control to end users.

Type 1 Hypervisor   Type 2 Hypervisor

3.4 Hypervisor Type-1 vs. Hypervisor Type-2:

If we talk about high performance, expandability and delivery of user requirements hypervisor type-1 is far superior to Hypervisor type-2. It is mainly because type-1 is independent from operating system. As hypervisor type-2 comes above the operating system, it makes end user's work hard to handle.

4 WATERMARKING

Watermarking is a process by implementation of methods and several technologies is done for hiding digital information or media like video, image or audio. In this process actual manipulation is made in the digital data, it is not actually inserted within frame around the data. The actual image is on the left; the watermarked image is on the right and contains the name of the photographer.

4.1 Qualities of Digital watermarking techniques

a) **Robustness:** The ability of a watermarked video to ignore attacks by varying the size, rotation, quality, or visual aspects of the video

b) **Security:** the ability of the watermarked video to ignore attempts by a sophisticated attacker to remove it or destroy it via cryptanalysis, without modifying the video itself.

c) **Perceptual fidelity:** the perceived visual quality of the marked video compared to the original, unmarked video.

5 PROPOSED WORK

a) Parameters: In cloud environment we will test several parameters for two types of codecs MPEG, XVID by taking two sample videos like Streaming delay, Streaming bit rate and Frame rate at the time of streaming.

b) Quality of Video: While streaming two videos in virtual cloud environment we will check the changes in quality of video and also identify the performance of video while watermarking them.

6 TOOLS USED

6.1 Matlab

MATLAB is a programming language and a numerical computing environment. MATLAB created by the math works which provides easy matrix molding, picturesque functions and data presentation, deploying of algorithms, generating of user interfaces and interaction with programs in other languages. Although it specializes in numerical calculations so that an optional instrument interacts with the Maple symbolic engine, it is a complete computer algebra system. It is used by more than one billion people in the industry and academia, as well as it works on most modern operating systems.

6.2 Windows Multipoint Server

Windows multi-point-server 2012 is the first generation of server which has features of windows server. It is mainly used in education areas, hospitals, billing counters that allow multiple users to share a single computer at that same instant. Windows Multi Point Server 2012 enables more users to access technology at a lower total cost of ownership.It is mainly designed for non-technical users as it is simple to manage and use. Unlike other similar solutions in the market, Windows Multi Point Server 2012 is based on the latest Windows technology and thus can run Windows applications

7 RESULT & ANALYSIS

7.1 MPEG- Format Results

Firstly MPEG format is tested for video streaming delay and then for video streaming BITRATE in cloud environment is calculated with it. Two types of networking is used i.e via LAN and Wi-Fi on three different watermarking techniques which are DCT, BIT and DWT. Similar experiment is carried on XVID format and result for both are given as follows

7.2 XVID-Format Results

Bit rate of watermakring & streaming XVID video in cloud
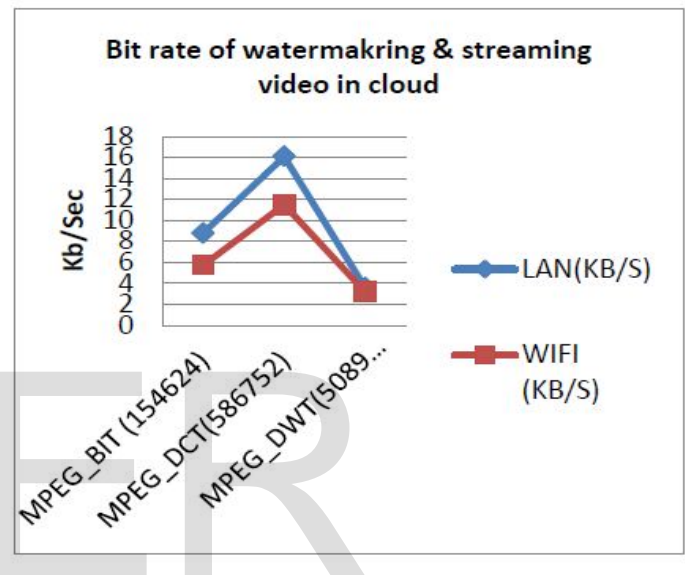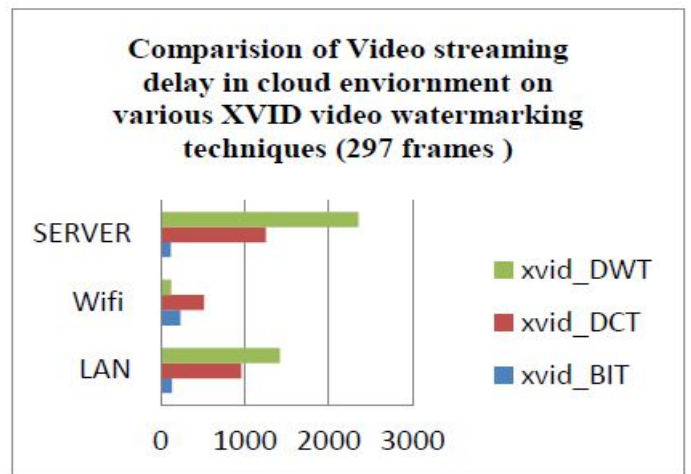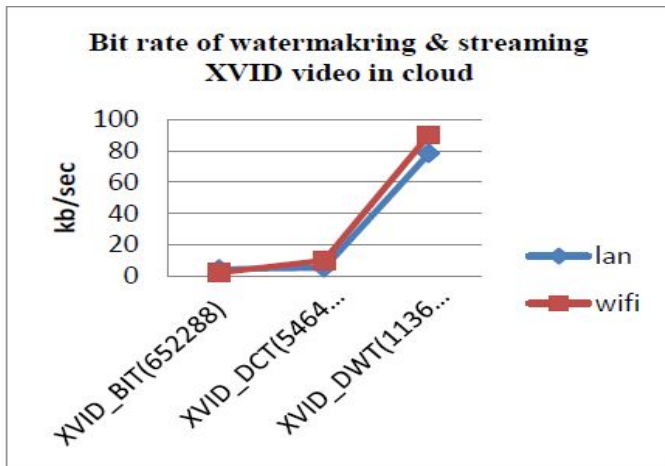
[7]   Jump up^ Apple Computer. "MPEG-4 Fact Sheet".J.S. Bridle, "Probabilistic Interpretation of Feedforward Classification Network Outputs, with Relationships to Statistical Pattern Recognition," Neurocomputing—Algorithms, Architectures and Applications, F. Fogelman-Soulie and J. Herault, eds., NATO ASI Series F68, Berlin: Springer-Verlag, pp. 227-236, 1989. (Book style with paper title and editor)

8   FUTURE WORK

This work has been carried out to analyse the performance of watermarking and streaming of video formats in cloud, in future based on the results researchers shall attempt some kind of new watermarking techniques which is faster, bigger payload and less lossy.The work can also be analysed using other video formats too.

9   CONCLUSION

In this work performance is analyzed for streaming two
Video formats i.e. MPEG and XVID. While streaming two sample video in cloud environment and watermarked by three different techniques which are BIT(Spatial domain watermarking), DCT(Discrete cosine transformation), DWT(Discrete wavelet transformation) following conclusions have been inferred:

1. The spatial watermarking is the fastest.

2. The video size almost remains same in spatial watermark

3. The stream rate in cloud increases as the data size increases

4. The spatial domain watermarking increases the size of the main file at the minimum while DWT watermarking increases it the most.

5. DCT watermarking has the least payload capacity.

REFERENCES

[1]   G. Maier, A. Feldmann, V. Paxson, and M. Allman. On Dominant Characteristics of Residential Broadband Internet Traffic. In Proceedings of the ACM Internet Measurement 2013-38-25

[2]   http://en.wikipedia.org/wiki/Codec

[3]   Jump up to:a b mp4ra.org - MP4 Registration authority. "References, MPEG-4 Registration authority". Retrieved 2013-06-14.

[4]   Jump up^ ISO (April 2006). ISO Base Media File Format white paper - Proposal. archive.org. Archived from the original on 2013-07-14. Retrieved 2014-1-26

[5]   Jump up^ ISO (October 2010). MPEG-4 File Formats white paper - Proposal. archive.org. Archived from the original on 2008-01-15. Retrieved 2009-12-26.

[6]   Jump up^ ISO (October 2012). ISO Base Media File Format white paper - Proposal. chiariglione.org. Retrieved 2009-12-26.