Analyzing & Designing a Framework of Video Editing

SUMMARY OF THESIS

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SUMMARY

In recent years, video development has experienced an enormous explosion, and we've seen people hovering on social networks very frequently. Almost in every field, digital image and video processing puts a live effect on things and is growing with time to time and with new technologies. Since the video process is multidimensional field we have touched the compression and editing part of it very minutely. Based on that algorithms are developed and detailed analysis is done. The entire research work is organized as follows:

CHAPTER I

INTRODUCTION

Video is termed as image sequence, represented by a time sequence of still images. In other words, it is said as the sequence of kinetic frames captured/ play backed into some sequences. Digital video is an illustration of moving visual images in the form of encoded digital data. The rapid development of video capturing systems changed the world from recording the still frames on tapes to the storing frame digitally through charge coupled devices. The Video recording system changes from past analog era to digital era which made editing and manipulation very easy. Any video recording systems do not actually record videos but the sequence of the still image at the desired frame rate. The human eye can't distinguish delay between the processing of still frames if it can be processed with above 16 frames per second due to the persistence of vision. It gives an illusion of moving videos.

As multimedia and communication technology is on peak nowadays and keep growing day by day, the vast and voluminous content present on the web is video data. It needs to be compressed as it is of draconian in nature if not compressed. A lot of compression techniques are developed for handling the video data. If it is keenly observed then it is found that search techniques play a pivotal role in video compression. Video signals comprise of temporal, spatial and statistical correlations and the same needs to be exploited to achieve better compression. Spatial correlation is due to the similarity of neighbouring pixels within a frame, whereas temporal correlation in a video is due to the similarity of the adjacent frames as changes are

mainly due to camera or object motion. As adjacent video frames are highly correlated, independent coding of each frame generally generates a lot of redundant bits. Block based motion estimation serves as the backbone of video compression and the search techniques used in the block based method play a pivotal role in detecting the motion vector. Motion vector is detected by motion estimation and compensation. For the detection of motion vector some patterns are used. The impact of search pattern is a crucial part in the block-based motion estimation for finding the motion vector. An issue of distortion performance and search speed heavily depends upon the size and shape of search strategy applied. Performing the deep analysis for motion vector distribution on standard test videos, it is desirable to have such type of algorithm that meets the requirement of searching motion vector in less time. The encoding of motion vector and residual results in a compressed video form.

All the things mentioned above deal only with the pre production activities. A broader view of video processing is also there which is known as the post production, widely used in cinematography, film industry and news industry. Video editing, the part of post production activity, is not only used in professional movie making but also in various areas like education field, marketing fields etc (eg. Since lockdown due to covid-19 the education world started classes online). Today, we have more popular video cameras to manage the video data but algorithmic solution is needed to solve various problem related to the video editing. There are also more opportunities in quality degradation, video security, video copy detection etc.

Day to day huge volume of extended videos resulting from documentaries, movies, sports and surveillance cameras are evolving over video databases and Internet. Processing of these videos manually is hard, costly and time-consuming. For extracting these long-duration videos an automatic procedure is desperately needed. As a vital factor the Shot boundary detection (SBD) is considered for lot of video analysis tasks, for example video editing, indexing, summarization and action recognition.

Digital video standards are required for exchanging of digital video among different products, devices and applications. Fundamental consumer applications for digital video comprise digital TV broadcasts, video playback from DVD, digital cinema, as well as videoconferencing and video streaming over the Internet

CHAPTER II

REVIEW OF LITERATURE

This chapter covers the literary analysis of the evaluation and development of video editing systems. Literature analysis has been done from various reputed online journals, e-books and many more resources. By performing analytical studies from various resources we are able to find out some interested and vital research areas in video processing and video editing.

CHAPTER III

VIDEO GENERATION

This chapter proposed methods of video generation using still-image techniques. A video is the visual multimedia source that combines a sequence of images to form a moving picture. Any video recording systems do not actually record videos but the sequence of the still image at the desired frame rate. The human eye can't distinguish delay between the processing of still frames if it can be processed with above 16 frames per second due to the persistence of vision. It gives an illusion of moving videos. The video recording systems change from past analog era to digital era very rapidly. This chapter also briefs about the evolution of video camera. In this we have used Matlab platform to work with still image for generating the videos of different kinds. Matlab is a good platform for working on digital image processing application like compression, enhancement, and detection of an object in an image, segmentation and pattern recognition. In summary of experimental study, it is concluded that Matlab is also very suitable for working in video processing application. Easily images can be read from file or folder and the frame is also generated by calling simple function im2frame().Video file is generated and all the frames are stored in the video file and execution of the video takes less time and acquire a less space in the memory compare with other platforms.

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CHAPTER IV

MOTION VECTOR SEARCH AND MOTION ESTIMATION & COMPENSATION

This chapter describes the motion vector as the central element in the compression of video. In previous chapter we have seen that the video is the sequence of kinetic images. In those sequences of images, there are strong redundancies of different types e.g. spatial, temporal, perceptual and statistical. The compactness among the neighboring pixels is termed as spatial redundancy. There is a vast correlation among the neighboring pixels that needed to be removed for achieving the better compression ratio. On the other hand, there are also strong temporal redundancies between the frames in a video sequence. Temporal redundancy is resolved by block matching motion estimation techniques in successive video frames. In this chapter we have gone through the different search techniques for finding the motion vector. It is calculated through the method of motion estimation and compensation.

CHAPTER V

PENTAGON SEARCH TECHNIQUE

After various studies we proposed a new kind of search technique for finding the motion vector. This chapter deals with the justification behind the proposal of Pentagon search technique. The simulation results shows that it has better performance over the existing hexagon and diamond search (DS) algorithm in terms of lesser no of search points. The speed improvement rate also gets increased with respect to the DS algorithm. Motion vector finding the probability through pentagon search is better than the previously proposed search strategy.

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CHAPTER VI

FRAMEWORK FOR VIDEO COMPRESSION AND DECOMPRESSION

This chapter explains the compression and decompression of videos with the help of pentagon search. Our proposed framework is a step forward in the field of

compression and decompression. Basically at the back end i.e. search strategy, a new pentagon search method is used that searches the true motion vector efficiently that further encoding method gets benefitted by it. Before knowing the complex process of compression it must be investigated first that what a video frame consists of. Basically video is a sequence of kinetic frames. These frames are bundled together by its properties and these bundles are known as group of picture (GOP). In a GOP there are three types of frames I, P and B frames. All three types of frames are encoded in different ways. The first frame of the GOP is always an I frame that is encoded just like the still image. The P & B frames are then coded with the reference of other frames. The compression performance achieved for P and B frames through this method is larger than any other previously proposed framework. This framework is also applicable for compressing the real time video data.

This chapter's resources were published in the International Journal of Grid and Distributed ComputingVolume 13, Issue 2, (2020), pp. 235 – 245.

CHAPTER VII

VIDEO EDITING

This chapter deals with the video editing. It is very much required in film, news, online education industries. As we know that the process of video editing is also known as the post production phenomena. According to the need visual effects are added, corrupted frames are removed and some new frames are added. Some useful operations are carried out with the editing operations like clip insertion, bad frames removal, gray conversion, frame rate modifications etc.

In further study of video editing, we observed some issues in shot boundary detection. We have tried to sole out the problem related to the abrupt and gradual transition detection in shot boundary. Using the adaptive threshold the similarity features are obtained for detecting the abrupt transitions. For detecting the gradual transition the gradual curve was obtained. For this initially the average edge image was found. The minimum difference between sequences and local variance were considered. At last the gradual change point was identified.

The resources for this chapter were published in the journal of critical reviews Issn-2394-5125 vol 7, ISSUE 09, (2020) and Turkish Journal of Computer and Mathematics Education Volume 12, Issue 11, (2021), 3820- 3828.

CHAPTER VIII

CONCLUSIONS AND FUTURE SCOPE

This research work provides the overall idea of video production and video editing. Video compression is very much required in today's scenario. We have developed a framework for compression and decompression for that. There are maximum chance of a video to become error prone during the capturing side for this we have some video editing operation to overcome such issues. Video editing is not only done on distorted videos but if, one requires addition changes, special effects, etc. then editing play pivotal role. This chapter concludes all the research work discussed in the previous chapters and the potential scope of the book.