

Implementation of Frame Lapse Video in Cinematography Application

Mayur C. Patel, Niraj V. Bhadresha, Dipak Jethloja

Abstract - If any real time application video wants to be study or captured, it will take longer time. To overcome this drawback Time lapse technique is used. Time-lapse technique can be utilized for Security System effectively. Security video recording does not require everything to be record, it requires very less information compared to normal video. A differential time-lapse technique allows us to remove the unnecessary data from the normal video, in order to save the time to visualization and storage space. Time-lapse techniques if used for documentary, not only saves the time to understand how thing are changed but also reduces the size of documentary. Time lapse technique is a cinematography technique whereby each film frame is captured at a rate much slower than it will be played back. When replayed at normal speed, time appears to be moving faster and thus lapsing. Processes that would normally appear stable to the human eye, such as the motion of the sun and stars in the sky, blooming flowers, plant growing, rotting fruits etc become very pronounced. Times lapse techniques is a very powerful technique to document extremely slowly changing/developing/moving phenomenon. Basically in this technique, a series of photographs of the subject are taken at regular or irregular intervals and then arranged sequentially to create a small movie of all those shoots. Most of video recording does not require everything to be record, it requires very less information compared to normal video. A differential time-lapse technique allows us to remove the unnecessary data from the normal video, in order to save the time to visualization and storage space. Time-lapse techniques if used for documentary, not only saves the time to understand how thing are changed but also reduces the size of documentary. Differential Time Lapse Video is non-periodic time lapse technique. The disadvantage of the differential time lapse video is that it does not provide the information about at which time the event is recorded. In order to overcome this limitation of the differential time lapse video, loss less visual watermarking is used in real time. MATLAB based algorithm is used for generating the differential time lapse video along with the date and time stamping using the loss less visual watermarking.

Keywords - Time Lapse Video, bit mapping algorithm, Watermarking, Pixel Difference Threshold level, Pixel Difference Cutoff.

I. INTRODUCTION

Time-lapse technique is a cinematography technique whereby each film frame is captured at a rate much slower than it will be played back. When replayed at normal speed, time appears to be moving faster and thus lapsing. Processes that would normally appear stable to the human eye, such as

the motion of the sun and stars in the sky, blooming flowers, plant growing, rotting fruits etc become very pronounced. Times lapse photography techniques is a very powerful technique to document extremely slowly changing/developing/moving phenomenon. Basically in this technique, a series of photographs of the subject are taken at regular or irregular intervals and then arranged sequentially to create a small movie of all those shoots. Time-lapse technique can be utilized for Security System effectively. Security video recording does not require everything to be record, it requires very less information compared to normal video. A differential time-lapse technique allows us to remove the unnecessary data from the normal video, in order to save the time to visualization and storage space. Time-lapse techniques if used for documentary, not only saves the time to understand how thing are changed but also reduces the size of documentary. These two reasons are more than sufficient to attract the any communication engineer about time-lapse technology.

II. DIFFERENTIAL TIME LAPSE VIDEO

In order to select the frame out of live streaming captured by the video capturing device, motion detection technique, edge detection technique, bit wise pixel mapping technique etc can be used. The simplex algorithm should be selected to make it run faster and smoother in real time. The simple bit by bit pixel mapping based algorithm is used to detect the motion. The simplified algorithm is shown in the figure 1.

The simplified algorithm of selection criteria of frames for generating differential time lapse video is shown in figure 1. The first frame captured by the capturing device, get stored in the video file. The next frame captured is tested for variation from the previous frame. If variations found enough, the frame get selected to be stored in video file else get discarded [2]. The variation calculation is done by pixel mapping algorithm. The previously stored frame is compared with the recently frame captured by pixel to pixel. If pixel intensity having the value difference more than some pre-define Pixel Difference Threshold (PDT) level then, it consider as the change in the pixel. The PDT value is kept around 20 to make sure that the change in the pixel value is not due to the surrounding environmental change, but due to the change in

the object only. This value selected is also depends on the object of the focus and the environment of the observe location. The pixel difference value is one the parameter which defines the quality of differential time lapse video.

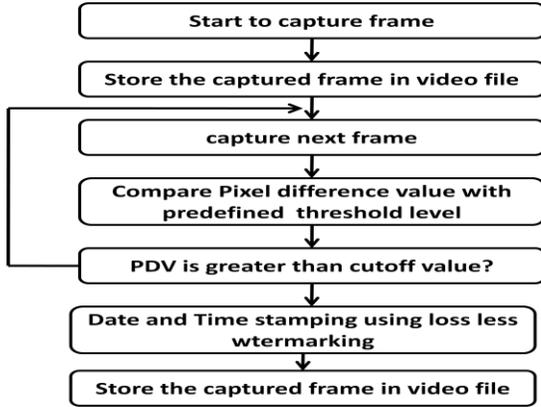


Figure 1. Simplified Algorithm to generate Time Lapse Video

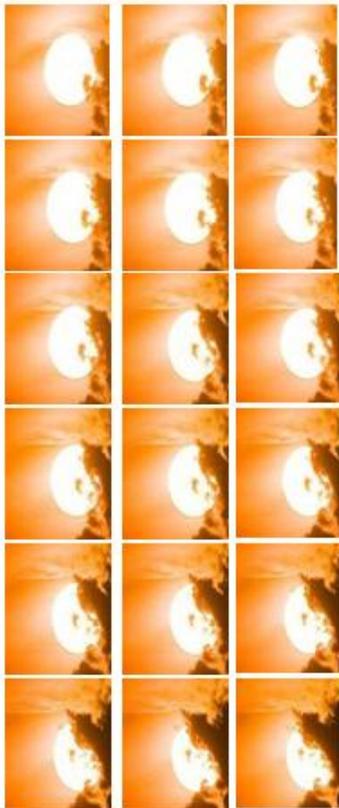


Figure 4. Sequential Snapshot Example for PDC

eliminated from the differential time lapse video.

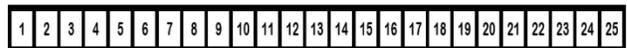
The total number of such modified pixel are calculated, are known as Pixel Difference Value (PDV). If the PDV is found above the some pre-defined cut-off value, Pixel Difference Cutoff (PDC) then the frame gets selected to be stored in video file, else discarded. The pixel difference cutoff value is another parameter which defines the quality of the differential time lapse video as frame selection or rejection criteria depends on this value.

Pixel Difference Cutoff (PDC) the sequence of images whose pixel valued is added with the factor of 10, in order to increase the brightness of the frame or picture. The changing effect cannot be visualized in nearer figure easily, but as comparing the first with third or fourth it can be visualized easily. The frames should not be selected for edit in to the differential time lapse video due to the just change in the brightness or contrast or both. For this the pixel difference threshold value is set around 20 or higher,

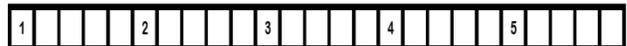
III. WORKING PRINCIPLE OF TIME-LAPSE VIDEO

Videos are often projected at 25 FPS, meaning that 25 images appear on the screen every second. Under normal circumstances a video camera will record images at 25 FPS. Since the projection speed and the recording speed are the same, the images onscreen appear to move normally. Even if the video camera is set to record at a slower speed, it can be projected at 25 FPS. Thus the image on screen will appear to move faster.

When Frames are Captured at Normal Rate : 25 FPS



When Frames are Captured at Rate : 5 FPS



When Frames are Captured at Rate : 4 FPS

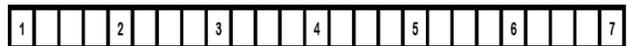


Fig. 5 Time-lapse Technique Interpretation while capturing frames.

IV. VISUAL WATERMARKING OF DATE AND TIME

The frames which are selected to be stored in the video file, shows the frame which contain some changes from the previously stored frame. The change might require some finite time and hence, in order knowing the frame timing time and date should be labeled with the time and date. Lossless visual watermarking technique is used for stamping the date and

So that the effect of the brightness and contrast are

time over the frame.

The date and time of the system with whom the capturing device is connected is taken as reference time. This date and time is stamped over the selected frame, which are going to be stored in differential time lapse video. The stamping is done with the 20x18 pixel character stamping. The character is made on the 20x18 pixel image with binary presentation as shown in figure 5 [3,4,5].



Figure 6. Time-stamping using Visual lossless Watermarking

The algorithm finds out the pattern for each character to be stamped and its corresponding pixel image of 20x18. On the predefine location pixel to pixel mapping is done. If the pixel value in character image is 1, then corresponding image pixel is kept as it is, else the corresponding image pixel value is increased by factor 40 or decreased by factor 40 depends on whether the pixel is bright or dark respectively. The time stamping and recovered images are shown the figure 6. It can be easily seen that, visual watermarking done here is loss less.

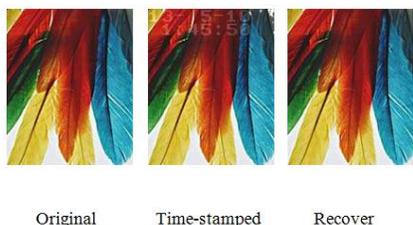


Figure 7. Time-stamping using Visual lossless Watermarking

The numbers are stored in terms of binary digits only having array of 20x18 characters. The number which is listed with '0' are highlighted and its shows the character to be displayed. The simple MATLAB based algorithm is used for embedding the time-stamping over the frame. The time-stamp locations

are fixed over the pixel values from 1:20 x 1:144 for date stamping and 21:40 x 1:144 for time-stamping

V. CONCLUSION

When comes to communication, the differential time lapse video is important technique for long distance communication where the information need to transfer from remote location to the destination. If all the information send over the channel then lots of frames needs to send, but however all that frame does not contain the information. The differential time lapse helps to send the selected frames only which are contained information. There are many other applications for which differential time lapse is found to be handier compared to normal video communication.

The goal of this work to make effective video communication system over the bandwidth limited channels based on the digital processing of the frame. The Differential Time Lapse Video is new concept in the image processing era and will grow faster.

VI. REFERENCES

- [1] <http://en.wikipedia.org/wiki/Time-lapse>
- [2] http://www.mathworks.com/products/imaq/demos.html?file=/products/demos/shipping/imaq/demoimaaq_timelapse1.html
- [3] <http://www.mathworks.com/matlabcentral/fileexchange/12262-datetime-stamp-in-a-plot>
- [4] Shu-Kei Yip,. "Lossless Visible Watermarking"
- [5] Adnan M. Alattar, "Reversible watermark using the difference expansion of a generalized interger transform", IEEE Trans. On Image Processing, vol. 13, no.8, Aug, 2004

AUTHOR'S PROFILE

Mayur C. Patel

Department of Electronics & Communication, T.I.T., Bhopal,India.
ermeggi@gmail.com,

Niraj V. Bhadresha

Department of Electronics & Communication, R.I.T.S., Bhopal,India.
nirajbhadresha@gmail.com,

Dipak Jethloja

HOD, Department of Electronics & Communication, A.I.T.S. Rajkot, India.
dipak_jethloja@rediffmail.com,