

Key Frames Extraction and Video Summarization Based On Histogram

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Abstract—with the advent of digital multimedia, a lot of digital content such as conference, movies, and video lecturers, news, shows and sports events is widely available. Also, due to the advances in digital content distribution (direct-to-home satellite reception) and digital video recorders, this digital content can be easily recorded. However, the user may NOT have sufficient time to watch the entire video (Ex. User may want to watch just the highlights of an occurrence) or the whole of video content may not be of interest to the user(Ex. Soccer or cricket match video). In such cases, the user may just want to view the summary of the video instead of watching the whole video.

In this paper video summarization is based frame extraction in which whole video is convert into the shots (segmentation) and then select frames which is part of video summary and this will be done by taking different parameters like entropy change, histogram level, audio level etc. and then select frames for make summary which is call key frames. This key frames is dives the main information of the whole video. After select key frames filtering is used for over duplication and make good video summary.

Keywords: Insert video, Frames Extraction, Features extract, Key frames selection, video summary.

I. INTRODUCTION

The volume of multimedia information such as text, audio, still images, animation, and video are made every day. The accumulated size and length of this information can become a large collection of data. It would be an arduous work if a human tries to process such a large volume of data and even; at a certain scale, it would be impossible. A perfect example of this task is video. [1]

Thus, a video summary is a short version of an entire video event. The video summary can be represented in two fashions: [1] a static video storyboard and a dynamic video skimming. Dynamic video skimming consists in selecting the most relevant small dynamic portions of audio and video in order to generate the video summary. On the other hand, static video storyboard is interested in selecting the most relevant frames of a video sequence and generates the related video summary [4]. Video is an unstructured data. Physically consisting of a sequence of video shots. A video shot is composed of a number of frames and its visual content can be represented by key-frames. [5]

VideoSummarization defines as a collection of key-frames extracted from a video. In general, content-based video summarization is therefore a two-step process. The first step is partitioning a video into physical shots, called video segmentation or video shot boundary detection.

[3]The second step is to find these representative frames. Thus, video can be organized as video, shot, and key-frames hierarchy. Video summarization can provide a simple and effective way to abstract a long video sequence. They can be a generated as storyboards and video abstractions. Key frames can act as the most representatives of video shot for video indexing, browsing, and retrieval [10]. Video summarization is indispensable processing for video management. After video is structural organized hierarchically, thus, video can be stored by shots as indexed sequential key-frames. [1][5] [6] [7]

II. PROPOSED ALGORITHMS

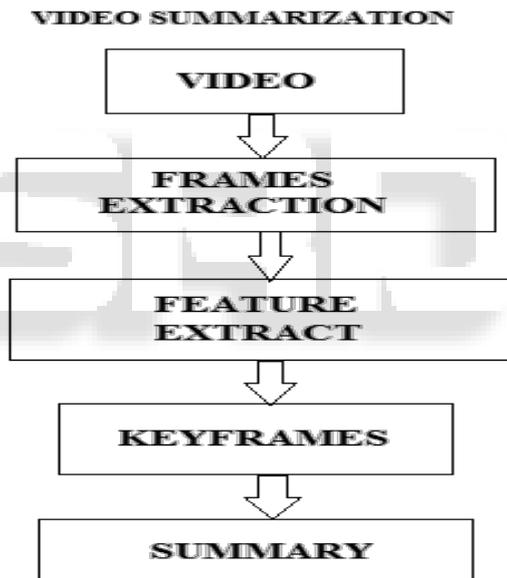


Fig. 1: Proposed Algorithm for video summarization

Figure1 shows the proposed algorithms for video summarization. In this block diagram step by step blocks is given for the process to get the frames and key frames from video and also get the video summary. All blocks in sequence is the process of this paper for video summarization using features extraction methods bases on histograms [9]. Video summarization in this paper is based on histograms and features extraction algorithms methods which finally give the key frames which is the part of video summy and this key frames covers whole information of original video.[11]

III. VIDEO SUMMARIZATION PROCESS

A. Insert video and extraction of frames[5]

Very first steps of this are insert the video for video summarization. In this paper here for experiment use

“vipmen.avi” example video. Which is 15.6 MB in size and 9 sec. in length and .AVI in video format. After insert or selected a video for summarization next step is, this video is convert into images by using the frames extraction algorithm. Here video is extract into the frames for further process. In this paper taking example video is extract into the 282 frames. All frames are in PNG format.[7]

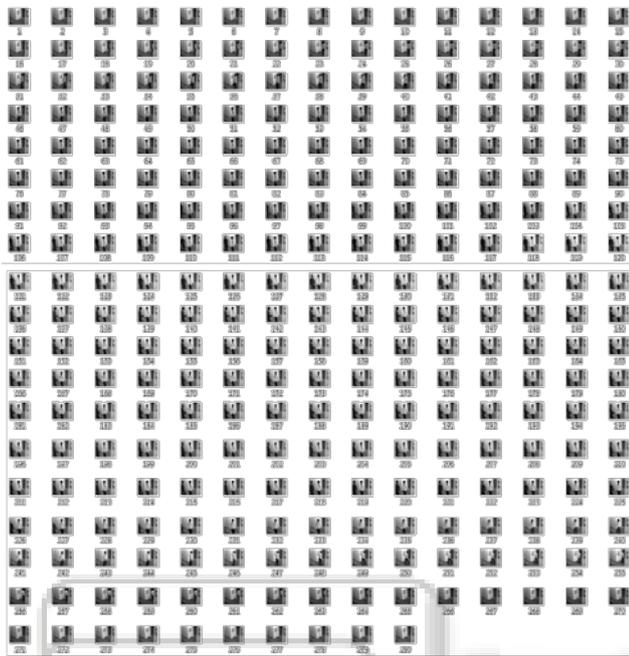


Fig. 2: frames extraction of example video

Figure2 shows the extracted frames of example video “vipmen.avi” which has total 282 frames. All are in 160×120×3 in size and PNG in format.

B. Features Extraction methods

After the frames extraction of the original video next steps is features extract for these extracted frames[6]. This process can be explained with flow chart of feature extraction which is shown in figure3

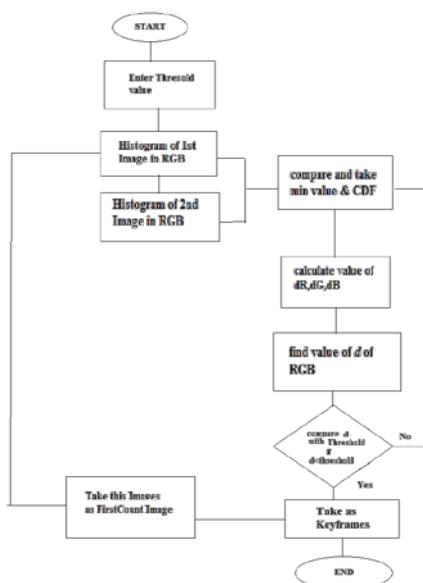


Fig. 3:flow chart for feature extracts method

Figure3 shows the flow chart of feature extract method which gives the totally step by step process for select frames which will be the part of video summary. This frame is known as key frames which is the video summary of original video.

In this flow chart first put the threshold value for video. After this put value find the histogram of 1st frame. These histograms are finds for all R,G and B for color histograms.[9] this all values are stored as Precounts.Now next steps is finds all R, G and B histograms for 2nd numbers of frames and store as second Counts. Now compare this both values of 1st and 2nd frames with taking minimum values and CDF for all this pixels of frames.[14] this stored as sR ,sG and sB. Now calculate the values of dR, dG and dB. The formula for this calculation is given as-

$$dR= CDF \text{ of } sR/\text{sum}(\text{second Count R})$$

$$dG= CDF \text{ of } sG/\text{sum}(\text{secondCount G})$$

$$dB=CDF \text{ of } sB/\text{sum}(\text{secondCount B})$$

After calculate that entire values of *d* by using Color space conversion as shown in Formulae, converts color signals dR, dG, and dB into a color space having a luminance signal Y (an example of the second intensity signal).[6]

$$d = 0.30*dR + 0.59*dG + 0.11 dB$$

Now this calculated value of *d* are compare with the Threshold value, if *d* will be less than the threshold than this frame is stored and select as a key frame.[11] Which will the part of summary. but if *d* will be greater than the threshold than go back to the comparison for next frame of 3rd frames. And this process to be continuing up to 282 frames for this example video. Here if frames are select as key frame than this image will be the firstCount image for further comparisons and others frames are compare with this selected frames as same formulas and algorithms steps.

After all frames are compare and selects all frames as key frames this will be the video summary which contains whole information of original video.

C. Key frames selection

Another important criteria to decide which shots are important the number of key-frames that a shot contains. A key-frame is a frame that best represents the video content in an abstract part. The colour difference between a key-frame and its succeeding frames is not large until the next key frame arrives. On the other hand, the colour difference between a key-frame and its preceding frame is large. Thus, a key-frame is a frame that is much different from its preceding frames and the all of its selected frames are similar.[10]

In this paper example video is “vipmen.avi” and its total frames are 282 frames and after applying the feature extract methods on proposed algorithm for video summarization got 13 frames as key frames where threshold value is 0.87.

Figure4 shows the selected key frames from the all frames of example video.

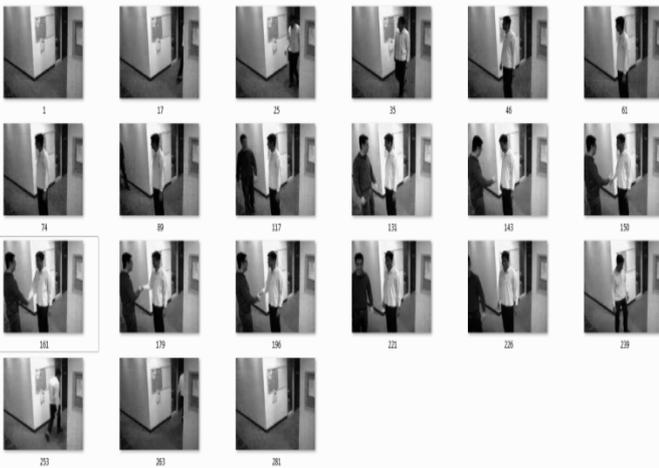


Fig. 4: Key frames for video summary

IV. EXPERIMENTS AND RESULTS

In this paper video summarization is making based on histogram and feature extraction method. By using this methods and applying to proposed algorithms which is shown in figure1 we got short video summary which length of video is very small compare to original video and also cover whole information of original video.[1][2]

In this paper we take an example colour video of “vipmen.avi” with 15.6 MB size. And applying this method got 282 frames from the original video and also here we take 0.68 thresholds value for experiments on feature extract algorithms. by taking this thresholds value got total 21 key frames for make video summary. These resulted key frames are video summary which contains whole information of original video. This is shown in figure4.

In this paper we also take others thresholds values and get different key frames for video summarization. These experiments and its results are given in below table-1.

Threshold value	How many key frames select?	Frames number
0.50	1	1
0.60	3	1,22,35
0.65	13	1,22,24,25,35,36,46,47,57,68,69,79
0.70	28	1,8,13,14,22,24,25,35,36,46,47,57,58,68,69,79,80,90,91,101,102,112,114,124,130,135,136,146
0.75	31	1,7,13,14,22,24,25,35,36,46,47,57,58,68,69,79,80,90,91,101,102,112,114,124,125,135,136,146,172,175,193

Table. 1: Experiments results with different thresholds

Figure 5 also shows the chart of thresholds vs. How many numbers of key frames we get. This value takes from the table-1 of first two columns. By taking this value and ours experiments we can draw below graph shown in figure 5and we can see that by increasing the thresholds, numbers of key frames are increase.

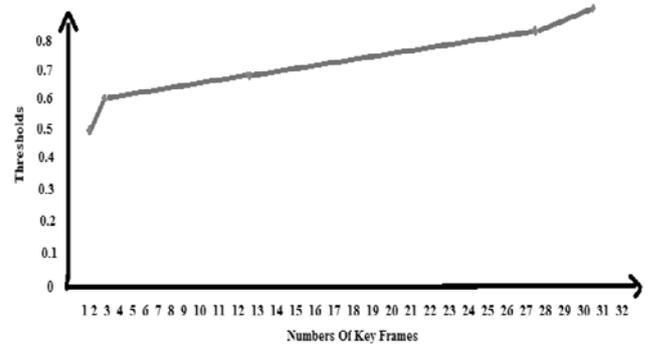


Fig. 5: Thresholds vs. number of key frames chart.

V. FUTURE WORK

Extend the model for dynamic video summarization;[2] Compare audio/video and text summaries [12], Interactive and intelligent video browser-Toc (Video table of contents)[13], Video scenes with merge key frames and filter of key frames.

VI. CONCLUSION

The most important part in video summarization is to give a solid model to extract the key frames. Key frames can be very subjective, what one person canConsider important information for another person. This area of research is still very young, there is still no standard database for researchers to analyses their methods. In this method we have make video summary very shorter compare to original and also by taking different values of thresholds we have also make different length in size of summary. In this we have addressed basic problems in video program indexing and analysis, namely detection of frames and key frame models for video program structure. In addition, we have developed systems for various higher level applications, such as summarization of video programs and the detection of unique people.

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