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Optimization of MPEG-2 to Concise Color Video

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***Abstract*— With incredible advances in digital video technology, there is also increase in use of limited expensive resources. In this paper compression is achieved by using two algorithm scene change detection and key frame extraction. Scene change detection is accomplished using MPEG-2 (Moving Picture Expert Group) . Broadly frames are of three types is B I P. MPEG 2 detects scene change detection hierarchical level of frame type. Key frames extraction is done using X^2 as histogram difference. The resultant frames are replacement of complete video. The compression ratio is achieved is 0.9537% .For key frame extraction threshold plays an eminent role. Video is segmented in scene shots over frames respectively so this paper competently and commendably use the limited expensive resources such that to cater every individual requirement. Application to this entitled project is used cellular phones for video broad casting. Streaming conferencing portable media player (PMP) Digital storage media HDTV cable TV**.

Keywords*—*Video,Bandwidth,compression,MPEG, Scene.

I.INTRODUCTION

MPEG 2 moving picture expert group is giving formed under International Organization ISO and International Electro technical Commission (IEC) . MPEG 2 sampling format 4:2:2 . It implies ratio of Cb and Cr rare half of that of Y (Luminance Component) compacts (black and white information) and Cb and Cr are two colored different signals (chrominance component).The MPEG 2 can encode picture either a field picture or frame picture. Infield picture mode two fields in frame are coated separately. In frame picture, two fields are interleaved into a picture and coded picture together as one picture. In MPEG 2, a color video sequence is a collection of frame picture and field picture. As there is an exponential use of multimedia, there is also la need to find efficient scheme to use limited resources. Compression is the ultimate solution for this imperfection . As the color video occupies most space than gray scale video. Compact form of color video is need of hour. Compactness of color video is achieved using key frame extraction and scene change detection, by this compression algorithm, redundancy and irrelevance is achieved.

II. SCENE CHANGE DETECTION

The hierarchical constitution of video is [frame]-[shot]-[Scene]-[video]. Frames are elementary of a video. Group of frames constitute shots an group of shots constitute a scene . Scene and shot maybe same or different depending on video content.MPEG-2detects scene change at Group of Picture (GOP) level. If there is scene change at GOP level it checks at sub GOP level. Again if scene changes sub GOP level is affirmative then when it checks at every picture. At GOP level 'I' Independent frame are responsible for scene change detection. At sub GOP level 'P' Predictive frames are responsible for scene change detection. At picture level between Bidirectional frame B is responsible for scene change detection. The size of 'I' for one is 18 KB, sixe of 'P' frame is 6 KB, and that of 'B' is 2.5 KB (Kilobyte).Hence scene change detection is performed at three stages. GOP, sub GOP and picture. The scene change detection is formulated as mathematical equation:

$$\sigma^2 = \frac{1}{M \times N}\left[\sum_i \sum_j f(i,j)^2 - \left\{\sum_i \sum_j f(i,j)\right\}^2\right] \quad (1)$$

M and N are horizontal and vertical size of frame respectively. The absolute value of variance difference is formulated as:

$$\left|\Delta \sigma^2\right| = \left|\sigma_2^2 - \sigma_1^2\right| \quad (2)$$

H_i and H_j stand for histogram of I_i and I_j. If this difference is greater than predefined threshold then these respective frame is selected Key frame.

IV. EXPERIMENTAL RESULT

The color video chosen is 'vipmen'. It consist of 238 total frame scene change detection using MPEG- 2 and key frame extraction is implemented in software MATLAB R 2011b

The compression ratio CR is given as

$$CR = 1 - \frac{ExtractedKeyFrames}{TotalFrames} \quad (4)$$

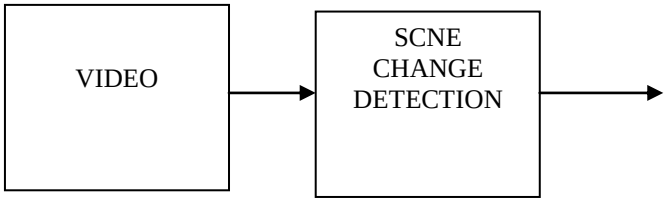
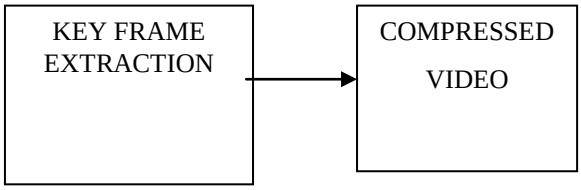


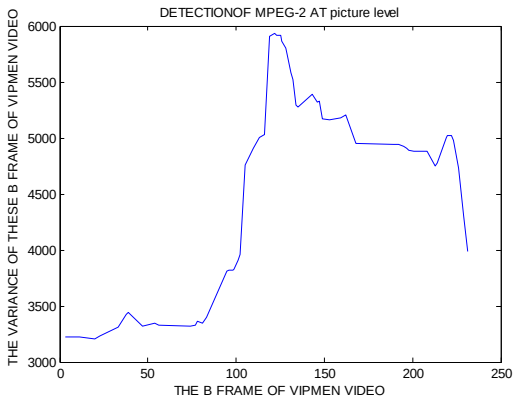
Fig .1.Block Diagram of Paper

III. KEY FRAME EXTRACTION

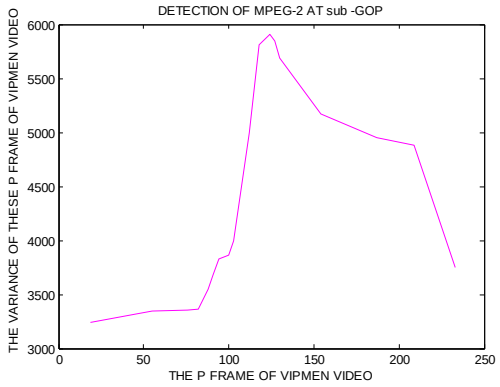
Key frame extraction is a vital part in video analysis and management for providing further video summarizations for video indexing and browsing and retrieval. The key frame extraction summarize the video content key frame extraction is for extracting valid information from video and discarding repetitive or redundant information for key frame extraction, threshold plays and important role. Since it is deciding factor whether the frame is key frame or not. o extract key frame color histogram difference $d(I_iI_j)$ between two consecutive frames are calculated as follows.

$$d\left(I_i, I_j\right) = \sum_{k=1}^{n} \frac{\left(H_{ik} - H_{jk}\right)^2}{\left(H_{ik} + H_{jk}\right)} \quad (3)$$

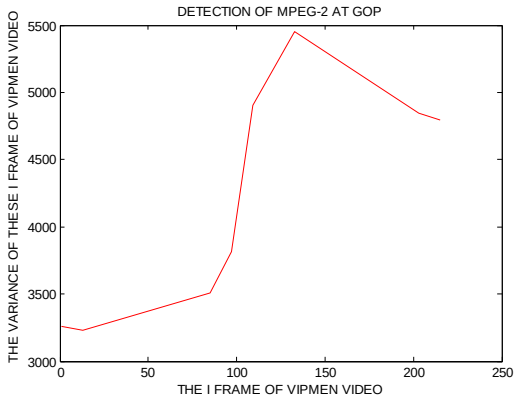




(a)



(b)



(c)

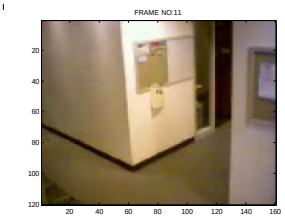
Fig.2 : Scene change Detection
(a)"B" Frame responsible for scene change
b)"P" Frame responsible lfor scene change
(c)"I" Frame responsible for scene change detection

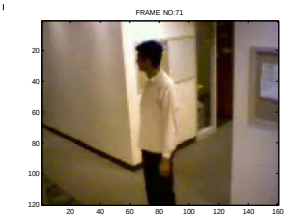
Table 1:MPEG-2 Scene Change Detection

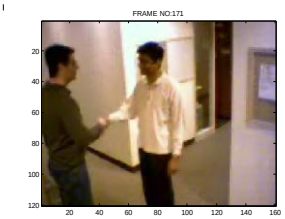
NAME	VALUE
VIDEO	VIPMEN
WIDTH	120
HEIGHT	160
TOTAL FRAMES	238
GROUPOF FRAMES (N)	12
SEQUENCEOF FRAMES	IBBPBBPBBPBBI
TOTAL B FRAMES	158
SCENE DETECTED B FRAMES	62
TOTAL P FRAMES	60
SCENEDR]ETECTEDP FRAMES	19
TOTAL I FRAMES	20
SCENE DETECTED I FRAMES	9

Table 2:Key Frames Extraction

NAME	VALUE
VIDEO	VIPMEN
FRAMESIZE (W*H)	120*160
KEY FRAMES	10
COMPRESSION RATION (CR)	0.957







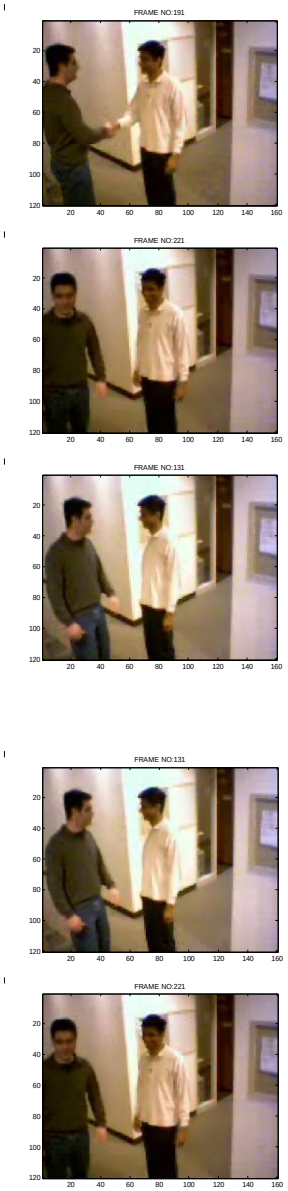


Fig.3. Ten Key Frames from video "vipmen"

V. Conclusion

Color Video Compression is achieved using MPEG – 2 based scene change detection. Color histogram frame difference for key frame extraction. The key frame extracted are visually important frames. These desired extracted frames are replacement of all other frames in particular video. Hence compression and appropriation is achieved. Thus expensive bandwidth required for video is minimized by this dedicated compression algorithm.

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