Blur Detection in Video Stream using Filtering Algorithm

Rupali D.Pashte, Rais Mulla, Mahendra Pawar

***Abstract*— Digital videos are massively produced while digital cameras are becoming popular; however, not every video is of good quality. Blur is one of the conventional image quality degradation which is caused by various factors like limited contrast; inappropriate exposure time and improper device handling. A new technique is presented which automatically convert video into number of frames , then frame is converted into image and then detect whether image is blur or not. Blurry image make up a significant percentage of anyone's picture collections. So, an efficient tool is requiring for detecting blurry images and separating them form digital video in order to maintain quality of storage . There are various methods to detect the blur from the blurry images some of which requires transforms like DCT or Wavelet and some don't require transform. The method will find out key points for both original and filtered image by using SIFT algorithm. After that calculate variance value for both the key points. Draw and analyse the plotted graph to determine whether the frame is blurry or not..**

***Keywords*— Blur, DCT, DWT, Harr-wavelet, SIFT.**

I. INTRODUCTION

Advancement digital technology offers low-cost digital cameras. This technology helps users to generate high-quality images with low cost. High-quality lenses and sensors are not only expensive but bulky and thus inappropriate for integration in small cameras and other devices such as mobile handsets. Simple factors such as limited light conditions, inappropriate exposure time and improper device handling cause unsatisfactory image quality. In the field of computational photography, search for better image enhancement is going on.

Due to advancement in digital technology, high-quality digital cameras are popular. Users can take many conventional videos per day. However, it is not easy for them to look through all, to decide quality of video. Thus, some techniques of image quality estimation is need for separating the blurry images from the sharp video images. Imperfect focusing and/or motion is the main source of blurriness in digital videos.Blurry images degrade the quality of digital video. As a consequence, a tool to automatically detect blurry images is urgently needed. For that two reason are there. One is, blurry images can be labelled automatically and separated
from good-quality images. On the other hand, the same functionality can be used for automatic deletion in order to preserve storage capacity in the flash memory of a digital camera. The latter feature will enable users to virtually increase the storage capacity of their cameras by retaining only those videos with perceptively good quality [1]. There are already some existing methods for blur detection or image quality estimation for digital images. However, most of them are time-consuming, computation intensive, need different kinds of transformations (e.g. DCT or DWT) or the detection ratio is not very high .Also there is one new research algorithm for automatic real time detection of blurry images from digital video. The algorithm first convert the digital video into number of frames, then convert the frame into image and then it check whether the image is blur or sharp.for each image it compute variance values of the local key points that are extracted from the given image through implementing Scale Invariant Feature Transform (SIFT) algorithm in a scale space. No transforms (DCT or DWT) are required to be applied to the images, and no edge locations need to be identified in this method, which are the main techniques used in most of the existing methods. Only pixel values of the given images are directly employed in the algorithm [2].

II. EXISTING TECHNIQUES

The existing blur dection techquies for digital video stream are given below

1. Motion Blur Concealment of Digital Video Using Invariant Features

The approach is different from traditional methods, which attempt to deblur the image. The method utilizes the information in consecutive frames, replacing blurred areas of the images with corresponding sharp areas from the previous frames. Blurred but otherwise unchanged areas of the images are recognized using blur invariant features. A statistical approach for calculating the weights for the blur invariant features in frequency and spatial domains is also proposed, and compared to the unweighted invariants in an ideal setting. Finally, the performance of the method is tested using a real blurred image sequence. The results support the use of our approach with the weighting scheme. To get acceptable video quality the false positive rate has to be quite

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low. Otherwise the blocks containing moving objects may be replaced, contaminating the image content of the sequence.So concentration on the results where the false positive rate is relatively low is very essential[3].

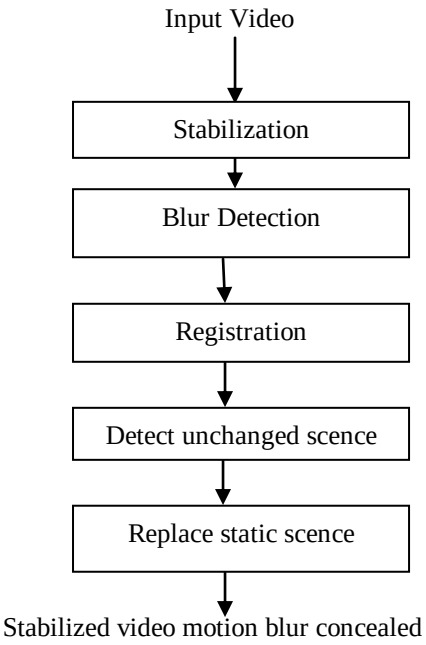

Fig. Framework for motion blur concealment

First of all the results show the positive effect of weighting the invariants. The improvement of the true positive rate at a given false positive rate using weighted invariants in the spatial or frequency domain is not as large as in the ideal case, probably because of the boundary effect which now causes the results to deteriorate. The improvement is still significant in the case of spatial invariants, and again very large in the case of frequency domain invariants. Clearly, without weighting, the frequency domain invariants could not be used for our purpose. This method can be used to conceal the motion blur of the unchanging scene of the video by replacing the blurred areas from the previous frames.

2. Iterative Video De-blurring Algorithm Utilizing a Neighborhood of Unblurred Frames

In this method, video deblurring can be done by iterative operations on blurred frames using Accurate Blur Kernel estimation and residual deconvolution processes. In general, while recording a video sequence using a digital camera or a digital camcorder, blurred frames may happen sparsely. The this method a novel motion deblurring algorithm is used in which a blurred frame can be reconstructed utilizing the high-resolution information of adjacent unblurred frames. First, a motion- compensated predictor for the blurred frame is derived from its neighboring unblurred frame via specific motion estimation. Then, an accurate blur kernel is computed using both predictor and the blurred frame. Next, a residual deconvolution is applied to both of those frames in order to reduce the ringing artifacts inherently caused by conventional deconvolution. The blur kernel estimation and deconvolution processes are iteratively performed for the deblurred frame. This algorithm provides superior deblurring results over conventional deblurring algorithms while preserving details[4].The detail process of algoriyhm is given in below flowchart

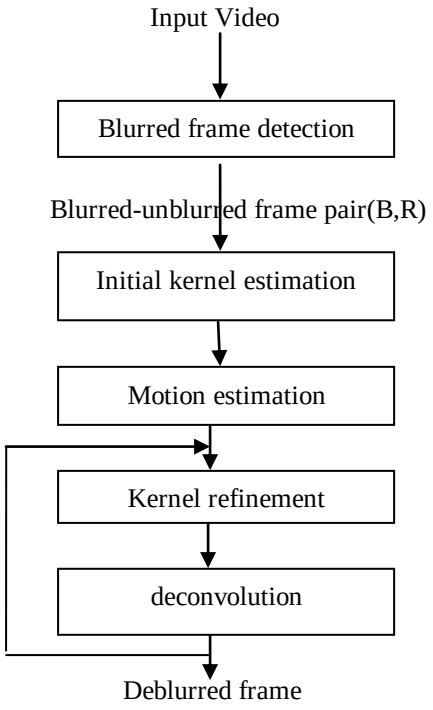

Fig. Iterative Video De-blurring Algorithm

3. Blur Detection for Video Streams In The Compressed Domain

In general, clear video frames always have sharpness edges and rich details. When blur occurs, no matter what kind of blur is, the edges will disappear or lose their sharpness and details will lose their richness. Since DCT coefficients are correspondent with video frames' pixel values, the characters of DCT coefficients will change when blur occurring. The basic idea ofthis method is to detect blurs by analyzing the DCT coefficients' characters changing. The entire method is explain in Fig. 3. Firstly, the method detect shot cut to segment video stream. And then use motion vectors (MVs) to classify video blocks into several kinds within one shot cut. Thirdly it analyze their DCT coefficients to calculate in correspondent kinds of blocks located in continuous frames. After that, adjust weight matrixes for every kind of blocks, calculate nonzero DCT histograms for different parts of frames segmented by different weight matrixes and measure the whole frame's blur together with every part's blur. Global blurred frames and partial blurred frames can be detected out more accurately by the blur metrics achieved above at final[5].This method is very effective and efficient so that normally used in real time applicationsThe below diagram shows theblur detection scheme used in compressed domain method.

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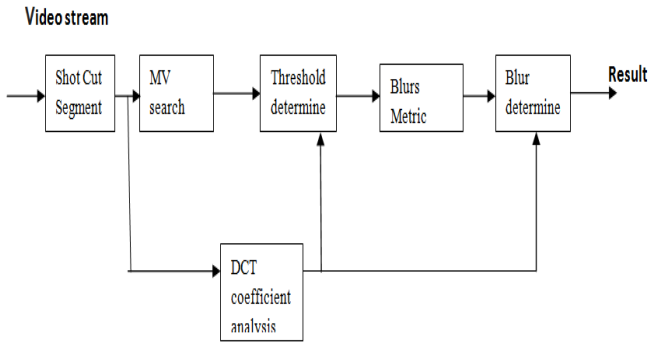

Fig.4 Blur Detection Scheme

IV .Proposed Method

The proposed method is divided in three phases.First phase is preprocessing phase in which input video is converted in number of phases for next phase,Second phase is processing phase which determine number of blur frames from input video.Last phase is resultant phase which gives output video with blur frame remove from input video.

In order to estimate images, first we apply SIFT algorithm, that is, detecting local key points of the images objects. Then, generate additional images from the given one through the linear diffusion process. And finally, analyse the variance values calculated for the local key points of the original and its filtered images generated in the scale space.Depending on the number of key points obtained and variance value ,we can determine whether image is blurry or not . The graph structure also helps to determine whether image is blur or sharp. The SIFT operator provides the number of key points found in the image and their position information. The number of key points varies from several hundreds to even hundreds of thousands per one image depending on the quality and structure of the image. To speed up the process and to minimize the time for calculation we are selecting m=300 number of key points by using random function and fixed their locations.

Once we define the values of key points in each scale space low-pass-filtered image we need to calculate their variance values for each subsequent image using formula given below.

$$S^2p = 1/p\text{-}1 \sum_{K=1}^{p} [\, V(k)\text{-}v]^2$$

The behaviour of curve evolution of these variance values in the blur graph is similar to one of the differences between subsequent low-pass-filtered images. Therefore in order to evaluate the curve we estimate the speed of image degradation through calculating the differences between consecutive variance values and weighting them by the maximum value of it as follows

$$W= \frac{\sum_{i=1}^{n-1} |(var(i)-var(i+1)|}{max\,|(var(i)-var(i+1)|)} \quad i \in [1, n-1]$$

var= variance, w=weighted sum and n=number of iterations in scale space.

The graph is plot by using var and n values. The behaviour of curve and weighted sum together will helps to determine whether image is blur or sharp. From the experiments it is found that if w<3 than image is sharp otherwise image is Blur.

The same process is repeat for all the frame images.Finally all blur frame is remove from the video and all remaining frames are combine to form a original video so that quality of the video is maintain. The flowchart for the above method is given below

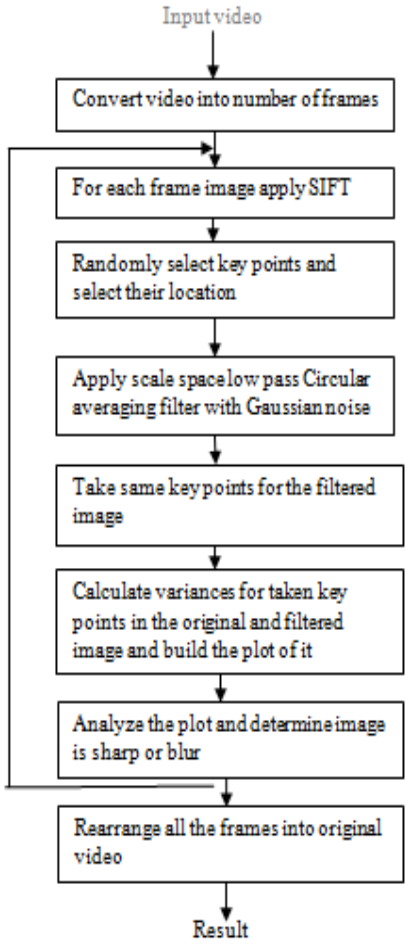

Fig: Flowchart of proposed system

III. Conclusion

The Motion blur method can be used to conceal the motion blur of the unchanging scene of the video by replacing the blurred areas from the previous frames. A drawback of this method is that it cannot deblur the moving objects and Other changing parts of the video. The iterative video deblurring method reconstructs details better than conventional algorithms , with fewer ringing artifacts.The method assume that the blur kernel is shift-invariant. The blur detection for

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compressed domain scheme is based on studying DCT coefficients' characters under blur affection. The method designed adaptive DCT coefficients' metric matrixes by coefficients characters and MVs' blocks classification. It can achieve more accurate global blur detection and better performance in partial blur checking. The computation of the blur detection scheme can be further saved, since the DCT coefficients and MVs are already in compressed video streams. So the proposed detection procession can be used into real-time applications easily.The alogorithm proposed in this paper is applicable for real digital cameras.The proposed algorithm use filtering to improve the quality of the input video.

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