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Recovering Blur Target Video using Video Tracking Techniques

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Abstract: The blur in a video is one of the problems in video processing. In some cases, it is a result of fast motion object, camera shake, noise treatment that makes the object to the smooth (blur). It may be used for hidden face or object. It is either intentional blur or non-intentional blur. The proposal of this research is to work with intentional blur on target. Therefore, it exploits the weakness of software that makes blur and tracking in a part of the target using tracking techniques by taking a larger window area of a certain value of the area surrounding the target blur. The larger window gives the capacity to follow the target and collect the parts of the target. The weaknesses of this software that make blurs such as fast move for the position of the sudden blur target or zoom of blur target that sometimes allow parts of blur target to appear.

Key words: Video tracking, blur target, image completion, mean shift, texture synthesis, Iraq

INTRODUCTION

The blur makes the target non-clear for a reason such as (security cases or target that not appears clearly, etc). Another type of the blur is the non-intentional blur such as (motion blur or it's a result from noise treatment) (Ankawala *et al*., 2015; Singh and Saghu, 2013). The second type is the intentional blur, sometimes cannot be de-blurred correctly because it depends on the type and the degree of the blur on a target. In other cases, the blur either be a dark or a semi-transparent (Fig. 1).

When blurring's dark is easy the region detection because of the edges of the region clear and distinct. When blurring is semi-transparent it becomes the challenge because the blurring depends on for the most part of what lies behind them (Kalal *et al*., 2010). The blurring region varies in blur degree and dependent on software that makes the blur. There are materials as well as general object recognition (Domadia and Gautam, 2015; Mahanty *et al*., 2015). Materials have several properties that can be used visually such as texture (Li and Wand, 2016) and reflections of surface texture are used to distinguish between dark materials.

This type of the blur is occasionally cannot be treated by traditional methods such as (Wiener filter, Lucy Richardson, blind image deconvolution, Motion Density Function (MDF), Laplacian sharpening filter, etc.) (Liu *et al*., 2016; Singh and Sahu, 2013). This type of blur is creating by using software such as (editor video, Camtasia program and Wonder share Filmora). This software has some weaknesses when creating the blur on a target in some videos.

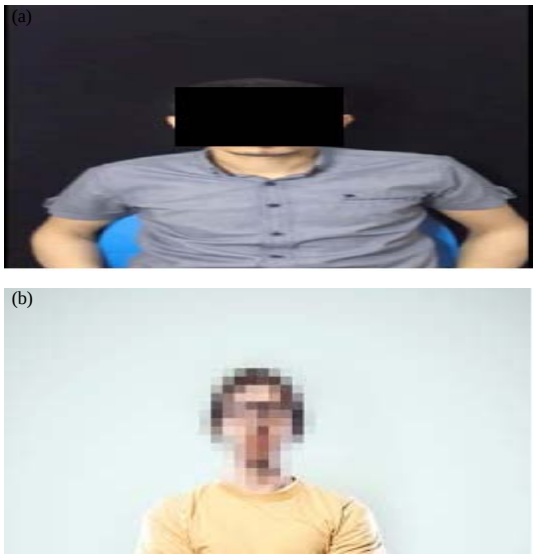

Fig. 1: The types of blur: a) Dark blur and b) Semi-transparent

For creating the blur is done by putting an entire shape of the blur on a specific target. Software that creates the blur sometimes can't cover all intended target but it covers most part of it. So, these parts of the target appear beside the blur. And sometimes the whole target is suddenly appearing in one of the frames. This problem explained by the simple example shown in Fig. 2. This research detects the special shape of the blur and takes a larger window area of a certain value of the area surrounding the target blur. The new area gives the ability to track the target and assemble of parts of the target that

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Fig. 2: Position of the blur region: a) Above part of the target is appeared; b) Bottom part of the target appears; c) Right part of the target appears and d) Left part of target appears

may appear in diverse frames one part after another. For merging of fragments, there are many techniques work with this. It is found in Image completion field that it has been studied of widely. Technique image such as inpainting methods (Liu *et al*., 2016) are working quickly fill small non-textured holes in time proportional to the size of the hole. Texture synthesis methods are works with large of hole textured holes but it has taken time proportional to the image size (Liu *et al*., 2016; Sreenivas and Babu, 2016). Another method is graph cut that using fragments merge of the target (Rawat and Raja, 2016; Jia *et al*., 2005, 2006).

For target tracking, there are many track techniques which used for this purpose. The tracking techniques are used for locating the target in the sequence of frames in the video. In this research, it is using location the target by finding center of the target in the current frame. This research depends on in locating blur region that covers the target and tracking of target and collects parts of the target.

Literature review: First review prior work the detection shape, image completion.

Video tracking: Patel and Mishra (2013) the proposed gives survey for techniques that using for object tracking. This proposed is compared the performance each technique of the video tracking. These techniques are the point tracking, kernel tracking and silhouette tracking algorithms. The performance these techniques depend on the purpose of video tracking such as object detection or object tracking. Kalal proposed a novel tracking framework (TLD) that explain tracking, learning and detection. The proposal is tracking of the object from frame to frame. This method is locating all appearance and correct the tracker. Our proposed is locating region blur that covers target because the blur region has features which are the same feature of semi-transparent glass.

Image completion: Poonam A. Domadia and Pankaj Kumar (Ankawala *et al*., 2015), the proposed use an effective and efficient technique of image inpainting by exemplar-based inpainting method. The proposed used texture synthesis of the target of best recovering the texture of the missing region. The target of texture synthesis is for creating the texture from given sample like which creating texture is bigger than the source sample with identical visual appearance.

Jia *et al*. (2005) the proposed is using mean shift and graph cut for complete video by search about best source fragment and merge with target fragment using the Bayesian framework to find most probably location for tracking the object in each frame by mean shift algorithm.

The proposed is using mean-shift and texture synthesis for search fragments of the target that may be appeared in frames and merge fragments by determining location each fragment in the target that covers by the blurring region.

MATERIALS AND METHODS

The proposal method: The proposal method consists number of stages that explain by Fig. 3.

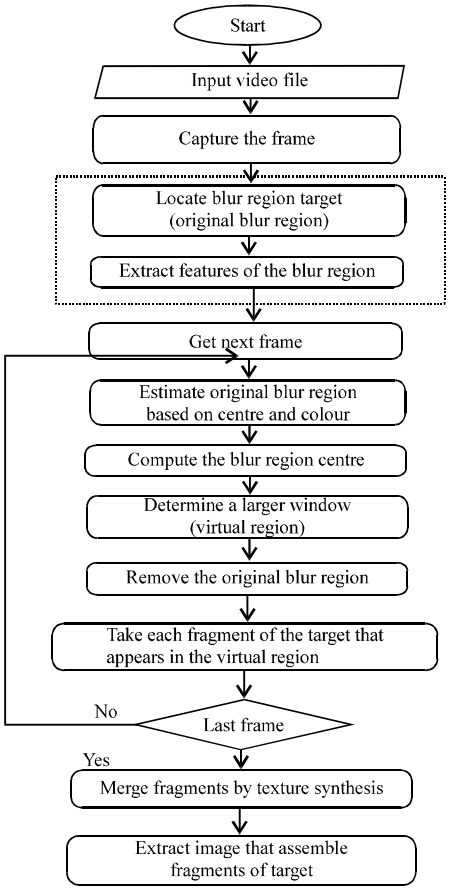

Fig. 3: Flowchart explaining the propoffsed methods to recovery a target that covers by the blurring region

Capturing the frame: The video which inputted, it consists of a set from frames. These frames are displayed by images device and each frame represents the image. Take each frame for processing which has target covers through the blurring region.

Locating blur region of the target: Determining blur region is the first and very important step for tracking of the target. In this research locating the blurring region manually only in the first frame of video. Locating blur region that covers the target shown in Fig. 4.

Feature extraction of blur region: Feature extraction plays a critical role in the video tracking. Feature selection is selecting property the desirable that is giving the capability to distinguish the target from another. In the suggested approach for tracking the blurring region is computing the area of this the blurring region (original blur region) and extracting centre of this region. For computing this area from the blurring region

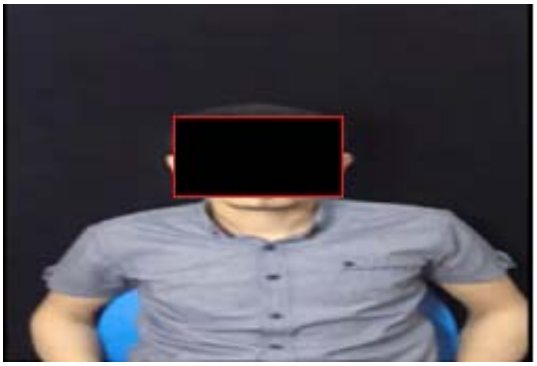

Fig. 4: Locating the blur region

by following Eq. 1, after that using the equations. Equation 2 and 3 to calculate the location of the blurring region:

$$\text{Area} = \sum_x \sum_y B(X,Y) \quad (1)$$

$$Xc = \sum_x \sum_y (yB(X,Y)))/\text{area} \quad (2)$$

$$Yc = \sum_x \sum_y (yB(X,Y)))/\text{area} \quad (3)$$

Where:

X, Y = Coordinate each pixel of blur region
B = The blurring region that requires computing it's the area
Xc = Summing rows on the area
Yc = Summing columns on the area

In each frame is computing centre of the blurring region. This centre must be saved because it is required for tracking of blurring region. The steps are finding only in the first frame that its content locating the blurring region, extract the area and computing centre of this blur region for tracking this region in each frame of the video file.

Getting next frame: It is the second stage for tracking of the blurring region in the video file. In each time, next frame must be taken and computing centre of blur region until reaching to the last frame.

Estimating original the blur region based on centre and colour: The current frame will be compared with the previous frame. The blurring region will be considered and followed. The centre of the blurring region is used that obtained in the first frame as a seed to track the blurring region in the next frames being each frame that starts from the second frame finds the blurring region through the centre.

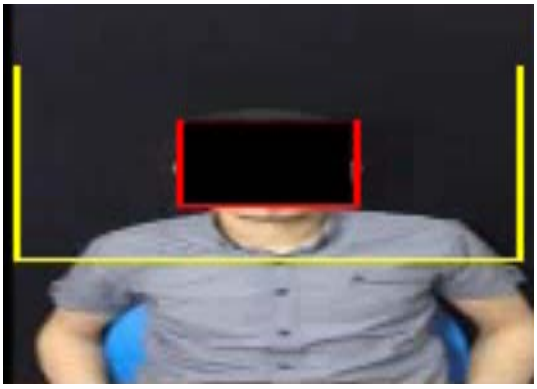

Fig. 5: Explains how to determine a large window (virtual region)

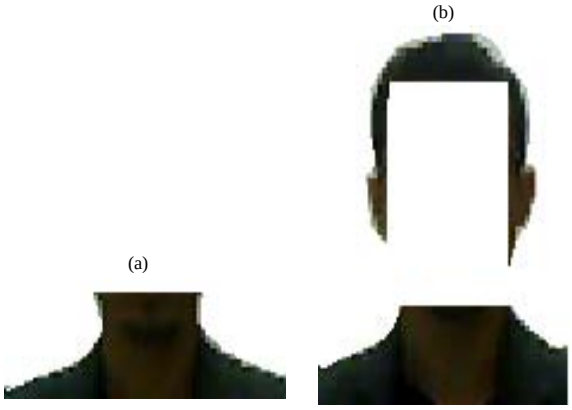

Fig. 6: a, b) Explains how to remove the original blur region and focus search only in the target

Computing the blur region centre: Computing the new centre for this the blurring region that use to find the blurring region in the next frame.

Determine a large window (virtual region): The large window is taken because the target is only required that it is covered with this the blurring region. This window is giving it capability for the following the target and assembles parts of this target which appear through video tracking (Fig. 5). The intentional from taking the bigger area that surrounds target is focus search only in the target.

Removing the original blur region: After that, extract this window and remove this blur region that covers target and it gives capability assemble parts that appear of the target. Figure 6 shows the example for this problem.

Take each fragment of the target that appears in the virtual region: It is depending on parts of the target that appear in sequence in the video that results from weakness of software that makes the blur. For selecting the best source fragment to repair or merge the fragment nearest of it by the method tracking which searches to find the best source fragment. In this research used mean-shift to select the source and target fragments to merge. This research is robustly tracking the target in the video by using feature such as colour or texture. It used the Bayesian framework to find the most probable location of the tracked target in each frame.

Merging the fragments by using texture synthesis: Recovering the target is sequentially in the video by removing blur region that covers of the target and assembles parts of this target. For solve, this problem is using texture synthesis by merging of fragments of the target. On way the choice the most promising target pixel at the edge of a hole. This depends on finding the source fragment is the most similar for known part of target's neighbourhood. The merge fragment of the source with fragments of the target to complete the target or appeared large part of the target.

Extracting image that assembles fragments of target: The aim of this research is recovering the target that it's covered the blurring region. The output of this process one image that contains fragments that appear.

RESULTS AND DISCUSSION

The show of the proposed method is dependent in fragments of the target that appeared beside the blurring region. It is working through video partition into the set of frames. Each frame is being taken and it is called still image. Figure 7 explains the sample of frames that contain target that is blurring. If the target parts are appearing by sequential in the shot the target appears in the best accuracy. It explains by Fig. 8 is output image by merging of fragments that appear from the target.

The discovering of the face or target object a certain hidden goal behind a particular form of challenges at the moment. In this proposal which can be used in this area. As this proposal is using video tracking technique to collect parts of the target which appear as a result of the weakness of the programs that make up the blur region that covers the target. In this research has been to exploit these weaknesses of the programs and characterize the follow-up of the target. This research is collecting parts that appear and whenever there is a visible portion of the target increases image resolution.

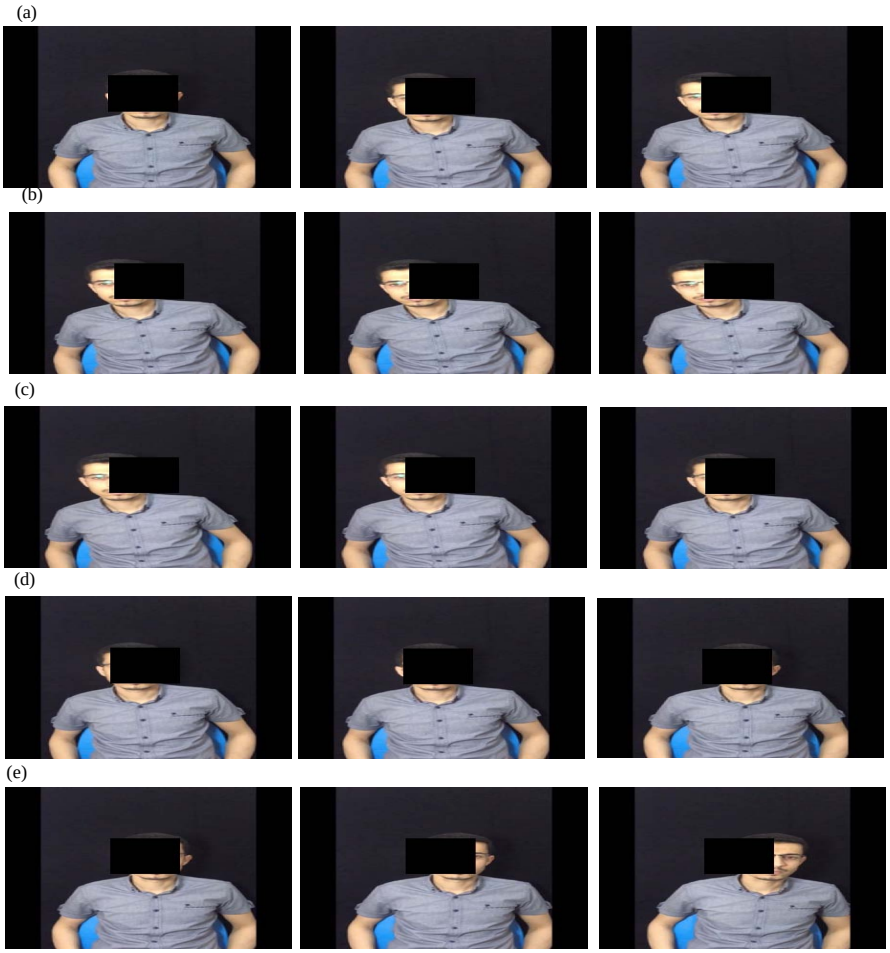

Fig. 7: Represent shot (set of frames in same seen)

Fig. 8: Represent output image

CONCLUSION

This research exploits appearance of parts of the target and collects these parts by tracking techniques and recover blur of the target. The experiments have shown the efficiency and robustness of the proposed method.

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