Design and Implementation of Different Algorithms for Object Removal for Video Completion

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Abstract

In the video inpainting techniques, we are presenting the framework for temporally consistent video completion by using the exemplar-based inpainting method of Criminisi et al to video inpainting and the other method which will be implemented on the certain frames of video in which, we are using optical flow. Here, we are specifically mentioning the two important issues which are often occur are: First one is, we are using a color and optical flow inpainting to ensure the temporal consistency of inpainting in the objects in a motion in video .The another is rather than selecting particular region in every single frame of video sequence, we implementing a flow based approach which will be applied for all the frame sequences which we have selected.
Keywords: Temporal Consistency Video Inpainting, Exemplar Algorithm, Optical Flow, Video Completion

I. INTRODUCTION

In our day-to-day life the scenes in the video often includes undesired elements or the objects like unknown people or occluding objects which are captured in the video unknowingly. The techniques used to resolve this problem is known as video inpainting and its originally based on the image inpainting technique there are many researches on the image inpainting while the video inpainting was less focused also. At the same time the contradictory part in video completion has a much larger range of applications which includes professional, post-productions or restoration of damaged film .Also there are two major problems in video completion are temporal consistency and the efficient mask definition, as said earlier the video inpainting is based on the Image inpainting, theImage inpainting is also known as image completion technique that modifiesan image with the available information outside the region to be inpainted in anundetectable way by the ordinary observers, belongs to the areas of image estimation and interpolation. It has wide applications in editing and transmission of images. By using this technique we can add special effects such as object removal from a scene, text removal and restoring old photos.

II. VIDEO COMPLETION BY USING OPTICAL FLOW AND COLOR INPAINTING

The temporal dimensions is the major challenge in the video inpainting .The consistency should be there in the inpainted with the color and the structure around the region, additionally temporal continuity has to be remain unchanged, when we are applying the image inpainting methods to each frame side by side, sometimes the inpainted videos show ghost shadows or flickering. We are presenting the exemplar based image inpainting by Criminisi et al [7] overcoming these problems as mentioned above. We are applying the exemplar based algorithms to inpaint an image and the optical flow to inpaint the video with efficient temporal consistency.

III. OPTICAL FLOW FOR TEMPORAL BACKGROUND

If the background is temporally consistent then by finding the best matching of Criminisi et al[7] it compares the most approximate similar pixel value and then inpaints the selected patch based on this temporal background information present in given frame of the sequence. In other words, we can say that this optical flow is obtained by tracking the object.

IV. OPTICAL FLOW INPAINTING

In the optical flow inpainting we have used the extended the Telea-Inpainting [21] to the optical flow. Telea-inpainting is a fast PDE (partial differential equation image inpainting) approach suited to fill inpainted regions in optical flow of sequence of images. Let us consider Ω is denoting the region in the optical flow which has to be inpaint, also ∂Ω the contour of the region and Ωc is the search region which is the complement of Ω. Telea-Inpainting approximates the value made it constant color from

the surrounding regions. These techniques provides good result of filling small regions, otherwise the propagation of similar color creates undesired soothing effects. So we are using the exemplar based techniques which are giving more efficient effect.
In our project we are implementing the image inpainting by using the exemplar based algorithm. Other than the exemplar based techniques also the following techniques are used:
The following groups of various Image Inpainting techniques are:

1) Texture synthesis based
2) Exemplar and search based
3) Partial Differential Equation (PDE) based
4) Wavelet Transform based
5) Semi-automatic and Fast Inpainting

V. TEXTURE SYNTHESIS BASED IMAGE INPAINTING

In texture synthesis image inpainting, we propagate image texture by direct sampling of the source region. In the general definition of this problem, an input sample of a texture is given, pixel which has most similar value prior on the fill front have been computed, then fill it with data extracted from the source regionand the goal is to produce more of that texture. The simplest solution of this is to tile the texture sample on a rectangular grid of required size. Sophisticated techniques are required for reproduction of image, thus we search in the source region for that patch which is most similar to the impainted region.

VI. EXEMPLAR BASED IMAGE INPAINTING

In the exemplar based image inpainting technique it consists of two steps that are assigning priority and the most important part is selection of the best matching patch. It samples the best matching patches from the known region, whose closest value is measured by certain metrics, and pastes into the target patches in the missing region. Exemplar- based inpainting iteratively synthesizes the unknown.

VII. PARTIAL DIFFERENTIAL EQUATION(PDE) BASED ALGORITHM

Partial differential method was proposed by Marcelo Bertalmioet.al [1].This algorithm are in iterative format. Also, this algorithm will produce good results for the smaller missed region will not produce good results because these missed regions are large.

VIII. WAVELET TRANSFORM BASED

In the wavelet transform based algorithm the expectation of the best global structure estimation of the damaged parts of an image in addition to shape and texture properties. The wavelet transform has the speciality of data separation, multi-resolution analysis and compaction along with the statistical properties then we need to consider the wavelet transform due to its good image representation quality.

IX. METHODOLOGY

To inpaint the video by using the earlier mentioned algorithms that are exemplar based image inpainting and optical flow we are going to remove the undesired part present in that sequence of frames. Here, we have used Matlab software for the programming purpose. The exemplar based algorithm will be applied for the any one of the selected frame in which we inpaint that image and for further processing optical flow based approach will be applied for n-number of frames for which we are applying the code, the code should have exemplar based coed for removing the object and the PSNR code for removing the undesired noise present in given frame.

The next and most important part is about applying this process to all the selected frames, so that instead of selecting each frame, the optical flow will give its advantage that the selected region to be removed will be selected in each frame of the sequence of frames in the video.

The code for the second part must contain these two parts should be cover: First one is about ROI (region of Inpainting) that should be selected and the second one is about object tracking code i.e. histogram tracker is used.

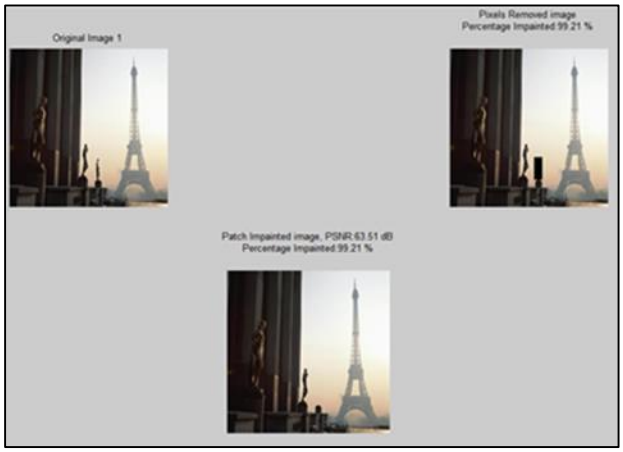

Fig. 1: image inpainting using Exemplar based algorithm

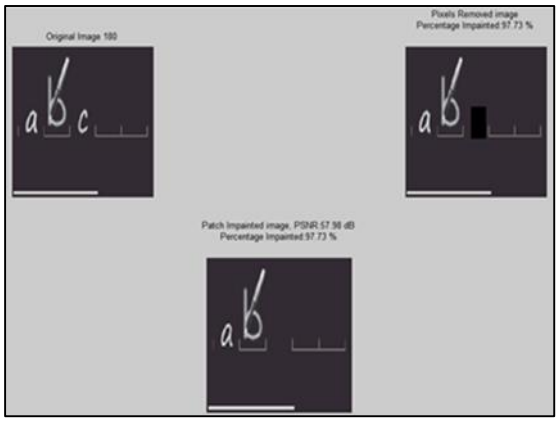

Fig. 2: video inpainting using optical flow algorithm

X. CONCLUSION

In this paper we have presented an efficient methodology for video inpainting by using the optical flow and exemplar based algorithm which has given us proper output. Also in this paper we shorty overlook on variety of image Inpainting techniques as mentioned earlier which includes texture synthesis based Inpainting, PDE based Inpainting, Exemplar based Inpainting, wavelet transformation Inpainting technique. In future by improving the algorithms, we would like to inpaint video more effectively i.e. by choosing the more consistent background we will get the more effective results.

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