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An Approach of Video Inpainting Technique To Remove Undesired Objects Using Mean Shift Algorithm

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***Abstract*-- Video inpainting is the method of eliminating specific unwanted areas or repairing the missing or damaged area in a video sequence. It is a unique method for filling holes or missed areas in a video. This can be applicable to both static or slow moving camera videos. This technique is useful for object tracking, objects removal and loss concealment purposes. There has been several video inpainting methods and algorithms proposed so far. In our project, we try to implement using mean shift algorithm and Region based registration method. This is suited for near real time video editing application as well as back ground reconstruction application**

***Keywords:** Inpainting, registration, camera motion.*

I. INTRODUCTION

Video Inpainting approach aims to remove undesired objects/persons or restore missing parts or tainted parts in a video sequence by using *spatial* and *temporal* data present in the neighbouring frames of the scene. The missing areas are the result of removal of undesired objects in the frame.

Objective of this approach is to create an inpainted area that is merged perfectly into the video. And then visual coherence is maintained throughout and no distortion in the merged area is observable when the video is played.

The main problem of video inpainting method is to fill the missing area. It is also called as a hole, possible to occur both in space and time. This can be obtained by expanding still images inpainting techniques, either by considering spatio-temporal similarities between patches or by ensuring global minimization of energy function. These approaches work better for videos captured by static cameras.

The proposed method is faster than all existing method. This approach is less complex and provides visually pleasing results on the tested video sequences.

The proposed approach has the following main contributions: Region-based registration method reduces alignment errors and computational complexity. Spatio-temporal inpainting based on minimizing cost function is ensuring coherence in a better way.

Our goal is to achieve high quality inpainting results in a moving, complex video sequence, with reduced execution time. We compare our work to that of Wexler et al. and to the most recent video inpainting method of Granados et al.

II. PROPOSED SYSTEM

Region based registration method is used for inpainted frames registration. Most region-based registration methods search for each pixel's best homograph transformation that minimizes a predefined energy function. Homogeneous region is segmented using mean-shift algorithm. Inpainting performed depends on the quality

of both registration and segmentation methods.

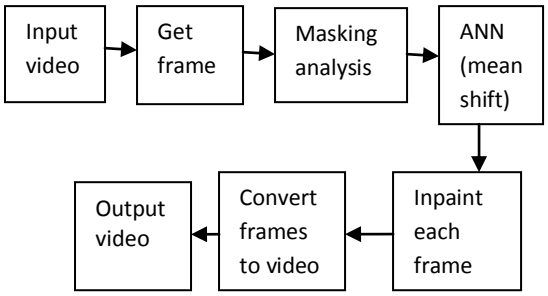

Fig 1 Block diagram of proposed system

Patch-based methods are based on the concept of copying and pasting small video patches into the missing area. Proposing an extension of this algorithm to the spatio-temporal concept greatly improves the Approximate Nearest Neighbour (ANN) search.

A. REGION BASED REGISTRATION

Registration is used for aligning the neighboring source frames with the target frame. An efficient registration method is required, since alignment errors can propagate and undermine the spatial and temporal coherency of the inpainted areas.

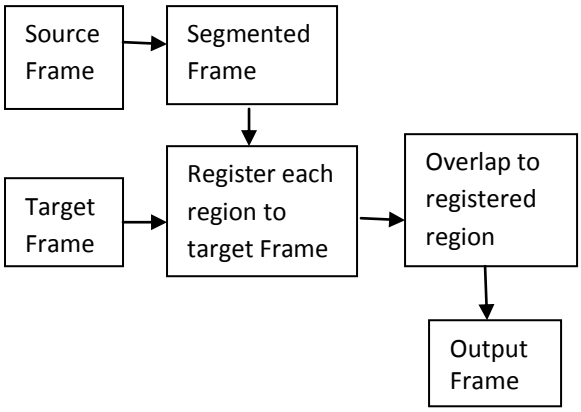

Fig 2 Block diagram of registration method

B. MEAN SHIFT ALGORITHM

It is a fast and automatic segmentation tool requiring few parameters such as minimum size of a region. Regions must be large enough to detect a sufficient number of key points for the correspondence matching. For locating maxima of a density function from a set of sample data, this algorithm is used. This is a robust and most prominent algorithm. This is also scale, rotation and illumination invariant.

C. HOLE FILLING

Video inpainting method is to fill in the missing part which is also called hole. This approach is more robust to error, noise and illumination variations. Then from aligned neighboring frames form a stack of images, from which missing areas (holes) are filled.

D. VIDEO RECONSTRUCTION USING MEAN SHIFT

Video inpainting algorithm uses a patch-based approach. The algorithm is based on the alternation of two steps: first one is search for the nearest neighbours of patches contain occluded pixels. Second reconstruction step based on the information provided by the nearest neighbours.

III. REQUIREMENTS

Data used: Video sequences with simple background are used. Images are stored in JPG Format and video sequence in AVI format and output is played in VLC/Windows media player.

Software used: MATLAB R2014a is used as a platform for coding along with Visual Studio 2008 which is running on Intel i5 processor, with frequency 2.20 GHz along with 4 GB RAM for implementation.

Parameters Set: We use the average colour difference per pixel between iterations as a stopping criterion. This threshold value is set as 0.1. Patch size parameters were set to $5 \times 5 \times 5$ in all examples. Texture feature parameter set as λ to 50. Number of

iterations for search algorithm is 10. Window size reduction factor β to 0.5

IV. RESULTS

We calculate the performance of the proposed method in the following applications: object removal, background estimation and error concealment. The goal of work is to get high quality inpainting results in varied, complex video situations, with reduced execution time.

CASE 1: Beach Umbrella Video

In this video, object removal is done by using video inpainting approach. Removal of beach umbrella is achieved by converting original video into number of frames. For this we get totally 98 frames. Mask file used is in .png format in this video. Then frames are converted to again video and output video is played with removal of object that is umbrella.

Fig 3 Original frame with " beach umbrella"

Fig 4 Inpainted frame "umbrella removed"

For each frame x, y, z axis is noted. Propagation time and random search time is calculated in seconds. Total execution time is obtained in minutes for understanding about inpainting calculations.

Total execution time required for removing unwanted object in video is 20 minutes (1200 seconds) for 98 frame.

For single frame time required is 1200/98 = 12.244 seconds/frame which is very less as compare to previous methods.

CASE 2 : Fontaine_chatelet video

In this video, person removal is done with static background. Objective of this inpainting video inpainting is to remove a girl moving in this video. Occlusion file is saved in avi format for this video. In this all are in video format only. We get totally 104 frames in this video.

Fig 5 Original frame " girl moving"

Fig 6 Inpainted frame " girl removed"

Total running time required for removing girl object in video is 35 minutes (2100 seconds) for 104 frame.

For single frame time required is 2100/104 = 20.192 seconds/frame which is very less as compare to previous methods.

V. CONCLUSION

We proposed a video inpainting technique using mean shift algorithm for segmentation and region based registration method for registering neighboring frames of a video. Video inpainting is performed using globally minimized predefined energy cost. The proposed method has a reduced complexity and time delay when compared to existing methods. Missing areas in the frames are filled by considering a short window of small number of frames. Our results showed that the proposed inpainting approach provides high quality results. Future work will focus on inpainting of both background and moving objects in the videos.

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