

Disocclusion Free Video Inpainting: Application To Object Removal And Error Concealment

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Abstract: Video inpainting is an important video enhancement technique used to facilitate the repair or editing of digital videos. It has been employed worldwide to transform cultural artifacts such as vintage videos/films into digital formats. However, the qualities of such videos are usually very poor and often contain unstable luminance and damaged content. In this project, we propose a video inpainting algorithm for repairing damaged content in digitized video films, focusing on maintaining good spatiotemporal continuity. The proposed algorithm utilizes key techniques. Frame completion repairs damaged frames to produce a visually pleasing video with good spatial continuity and stabilized luminance. We demonstrate the efficacy of the algorithm on different types of video clips.

Keywords : Video Inpainting, Texture Synthesis, Disocclusion, Depth Image Based Rendering (DIBR), Knn algorithm

I. INTRODUCTION

Nowadays video inpainting is a way of attracting a mind of researchers. Video Inpainting technique, in which we fill damaged or missing area in Video Sequence. The missing area is nothing but removal of one or more undesirable object in the scene. The region is inpainted is general: it may be still or moving, In the background or foreground. For example some object may not be wanted in a film shooting that unwanted object and we must have to remove it. It was not feasible to reshoot the scene because it was time consuming task and costly too, so to overcome this problem we are using video inpainting technique.



Figure1. Before and after inpainting

In system, user select the video for inpainting. Then extract the frames from video that contain unwanted objects. After frame extraction, user can select the frames for inpainting from where frames are saved. User can select first frame from the selected frames as reference frame. By using the depth image based rendering, calculate the depth of the adjacent frame object and take it as reference frame for that next frame. By applying techniques looking for digital video inpainting process automatically, we have achieved promising results, even with the images containing complicated objects. Then object is removed easily. Arrange the frame sequentially and play the video. Video data is used in various fields. Such as film industry, military, any occasion, surveillance and so on.

II. PROPOSED SYSTEM

We are proposed system video object inpainting algorithm to inpaint occlude objects. Our algorithm can maintain motion consistency by using sliding window registration using dynamically. Image inpainting concept proposed in to deal with videos. We first separate the video frame into background and foreground and then generates the corresponding sequence of frame. Firstly inpaint the background of the video sequence, holes of foreground are filled with pixel by applying texture synthesis. Texture synthesis is a process construct large image using small pixel or small image using mathematical way, in this use the repair the frame pixel by pixel it available to neighborhood around the damaged area.

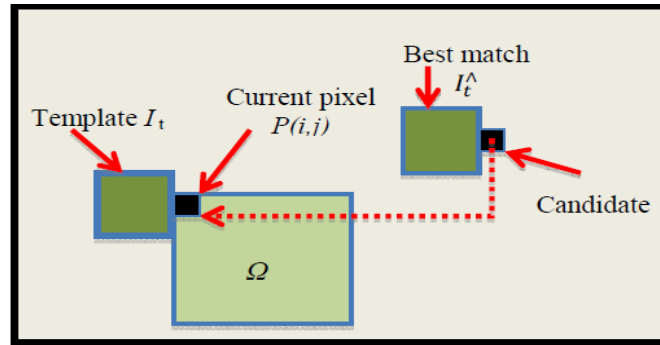


Figure 2. Texture Synthesis

Video sequence divides into multiply layers on the motion by using graph cut algorithm. Each layer is then inpainted by applying the proposed image inpainting algorithms. There is two way: sampling and alignment video inpainting that predicts motion in the foreground before repairing damaged foreground areas and adopted an image inpainting technique to repair damaged areas of separated background. Intensity flickers are viewed as visual defects in vintage films. Therefore, when we do inpainting on damaged vintage films, we not only recover the missing content but also stabilize the intensity change across consecutive frames. The objective of the above-mentioned moves is to guarantee the recovery of visually pleasing results. Most of the above-mentioned algorithms discussed the use of image inpainting techniques to repair damaged background areas in videos.

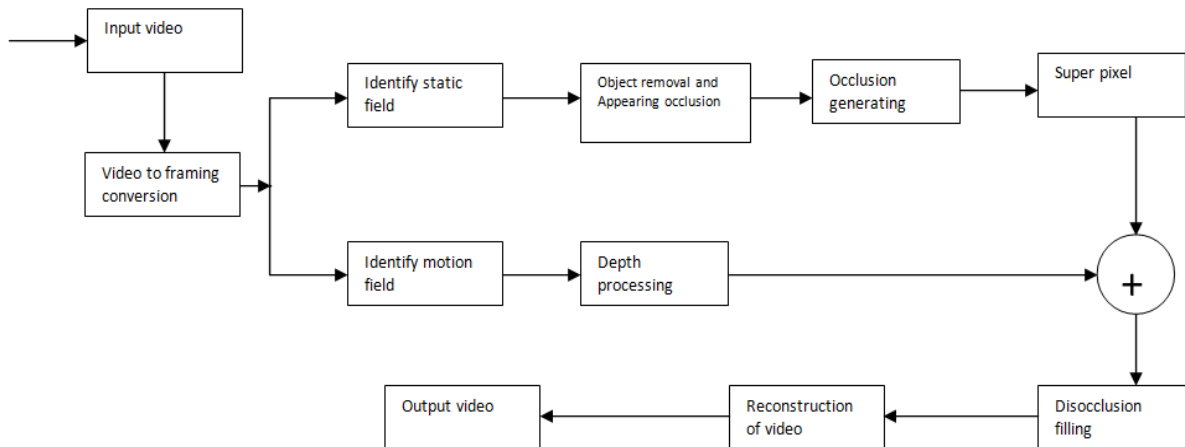


Figure 3. System Architecture

Depth Image Based Rendering (DIBR) technique, find the geometry. Geometry information of per-pixel value stored in depth map. In which information contained in a depth map is used to shift pixels in the 2D image to generate a new image as if it were captured from a new viewpoint. The major problem of DIBR is which pixel occupy originally empty space that will occupy new position and leaves area. These disocclusion areas have to be filled correctly otherwise they can degrade the image quality.

III. LITERATURE SURVEY

Unwanted Object Removal In A Video By Using Video Inpainting Technique was proposed by Mohammad Sufyan, Sagar Badnerkar. In this technique Inpainting algorithm was proposed that can deal with removing the unwanted object in a video. Firstly the video converted into number of frames and then inpainting algorithm is applied to each frame by maintaining its spatial consistency and temporal continuity. Secondly includes inpainting of unwanted moving objects from the video which requires proper tracking of dynamic objects, for tracking RGB frames is converted into HSV(hue saturation value) format and then compared it with template matcher. With these two tasks tracking is done, After this applying inpainting algorithm to each frame the resultant video with desired removed unwanted object is obtained. This method automatically select the parameter values and reduce the search region using region of interest(ROI).

Image Inpainting approach was proposed by Christine Guillemot, Olivier Le Meur. Image Inpainting refers to the process of restoring missing or damaged areas in an image. This field of research has been very active over recent years, boosted by numerous applications: restoring image transmission, object removal in a context of editing or disocclusion in image- based rendering(IBR) of viewpoints different from those captured by the cameras.

A Rank Minimization Approach to Video Inpainting was proposed by Tao Ding and Mario Sznajder. In this approach the problem of video inpainting, that is seamlessly reconstructing missing portions in a set of video frames. They propose to solve this problem proceeding as follows: (i) finding a set of descriptors that encapsulate the information necessary to reconstruct a frame, (ii) finding an optimal estimate of the value of these descriptors for the missing corrupted frames, and (iii) using the estimated values to reconstruct the frames. Kokaram et al. Proposed the use of three interpolators to perform motion estimation and interpolate missing portions in films from frames around. This technique works well for restoring relatively small losses not spanning continuous frames, but has a substantial computational burden. Wexler et al. minimize an objective function to find a patch satisfying spatio-temporal consistency constraints with the patches around the missing area.

Super-Resolution from a single image technique was proposed by Daniel Glasner, Shai Bagon. The goal of Super-Resolution (SR) method is to recover a high resolution image from one or more low resolution image. Method for SR can be broadly classified into two families of methods: (1) The classical multi image super-resolution, and (2) Example-Based super-resolution. If enough low-resolution images are available, then the set of equation becomes determined and can be solved to recover the high-resolution image.

Inpainting on Static Object of Video and Maintaining Spatial Temporal Stability was proposed by Prof. R. K. Sarawale, Nitin L. Tajane, Ashwini R. Makhare, Neha R. Reddy. Video Inpainting technique is a reconstructing or make up the video. It includes two key technique, first is static completion. In static completion, which recover damaged or missing static information to retrieve good temporal continuity? Second is frame completion. That repair damaged frame to get pleasing result video with good spatial continuity.

IV. ALGORITHM

We use Knn algorithm to finding the nearest pixel for filling the holes. The concepts of Knn explain below.

K-nearest-neighbor algorithm

Introduction:

The K-nearest-neighbor (KNN) algorithm measures the distance between a query scenario using data set.

Distances

We can compute the distance between two scenarios using some distance function $d(x,y)$.

Where,

$x = \{x_1, x_2, \dots, x_n\}$

$y = \{y_1, y_2, \dots, y_n\}$

Two distance functions are discussed in this summary:

1) Absolute distance measuring:

$$d_A(x, y) = \sum_{i=1}^N |x_i - y_i|$$

2)Euclidean distance measuring:

$$d_E(x, y) = \sum_{i=1}^N \sqrt{x_i^2 - y_i^2}$$

Because the distance between two scenarios is dependant of the intervals. This can be accomplished by replacing the scalars x,y with x0 , y0 according to the following function:

Where,

$$x' = \frac{x - \bar{x}}{\sigma(x)}$$

Where

x is the unscaled value, $\bar{x}$ is the arithmetic mean of feature across the data set, $\sigma(x)$ is its standard deviation, x0 is the resulting scaled value.

The arithmetic mean is defined as:

$$\bar{x} = \frac{1}{N} \sum_{i=1}^N x_i$$

We can then compute the standard deviation as follows:

$$\sigma(x) = \sqrt{\frac{1}{N} \sum_{i=1}^N (x_i - \bar{x})^2}$$

KNN algorithm steps:

1. Store the output values of the M nearest neighbors to query scenario q in vector $r = \{r_1, r_2, \dots, r^m\}$ by repeating the following loops M times
 - (a) Go to the next scenario s^i in the data set, where i is the current iteration within the domain $\{1, \dots, P\}$
 - (b) If q is not set or $q < d(q, s^i)$: $q \leftarrow d(q, s^i)$ $\leftarrow o^i$ $\leftarrow$
 - (c) Loop until we reach the end of the data set (i.e. $i=P$)
 - (d) Store into vector and into vector
2. Calculate the arithmetic mean output across as follows:

$$\sigma(x) = \sqrt{\frac{1}{N} \sum_{i=1}^N (x_i - \bar{x})^2}$$

3. Return r as the output value for the query scenario q

V. CONCLUSION AND FUTURE SCOPE

We have proposed a novel video inpainting algorithm for digitized aged films. The algorithm consists of frame completion. In addition, a preprocessing procedure constructs a motion map to record the motion information in undamaged source areas. The motion completion procedure restores the motion in each missing area based on the completion order determined by the priority computation step. The completed motion map is used to improve the temporal continuity and find the best-matched result for inpainting damaged areas. The frame completion procedure seamlessly repairs all the damaged areas and reduces the intensity of video flicker. During the frame completion phase, we use a panoramic mosaic to help stabilize the global and local luminance and thereby obtain better restored videos. Future work will include development of proposed First, our video inpainting method relies heavily on the results of motion completion and frame completion. If the damaged content covers a large area in every frame, visual defects may appear in the resultant video, as most of the useful reference data can only be obtained from neighboring areas nearby. The goal is to prove effectiveness and efficiency of the proposed approach.

VI. ACKNOWLEDGMENT

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