Intelligent Object-Based Video Inpainting Approach For Fast Video Repairing

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ABSTRACT   *This paper approaches improved technique to speed up the object based video Inpainting for fast Video Repairing. This approaches to reduce search area by converting video into 3D patches and 3D patches into 2D slices. Here method tries to improve existing Exemplar-Based inpainting method as well as Patch Match algorithm for reducing processing time. The main target of this method is to make better priority function. After combining completed slices, sequences of virtual contours forms to retrieve the most similar postures among number of available postures. To overcome over-smoothing problem resulting from the averaging of patches it tries to give the good results in one fourth time to fill the target region. Key posture selection method and indexing method are used to curtail the complexity of posture sequence retrieval. Synthetic posture generation method is used to generate unavailable postures and to increase the number of postures in database and tries to maintain spatial consistency and temporal motion continuity of an object simultaneously.*

Introduction

An improved algorithm is proposed for extracting large objects from 3D digitalize images. The big challenge is to fill in the hole that is left behind. It is possible by dividing the image and get good result in less time as compare to the without dividing the image. Exemplar Based Inpainting Required Execution time for not divided image is 46.265000 Seconds and for Divided Image it is 10.891000s [1]. Exemplar Based Inpainting require four times more time as compare to Divided Image in same algorithm and both gives good result. Therefore Divided Image in Exemplar Based Inpainting is good here as compare to time and result.

Video inpainting is having problem of in inpainting a spatio-temporal holes in a video sequences [1-9]. Challenges are such as foreground inpainting, background inpainting and moving objects inpainting. The execution time is an additional critical aspect in video inpainting algorithms which may take days or even weeks to execute. Video inpainting algorithms are basically belongs to "object-based" or "patch-based" category. Object-based algorithms usually segment the video into moving foreground and static back-ground. These segmented images sequence is then inpainted using separate algorithms. The background is often inpainted using image inpainting methods such as, whereas moving objects are often copied into the occlusion as smoothly as possible. Unfortunately, such methods often include restrictive hypotheses on the moving objects' motion, such as strict periodicity. Some object-based methods include Patch-based methods are based on the intuitive idea of copying and pasting small video "patches" (rectangular cuboids of video information) into the occluded area [2]. The first patch-based method ensures temporal coherency in video inpainting. High dimensionality problem makes the algorithm very slow, requiring up to several days for a few seconds of VGA video [2]. This is also greedy algorithm, and cannot guarantee for global coherency. Due to extremely long execution times, it is difficult to implement and experiment with, making the setting of implementation details and parameters especially tedious. For this, some researchers suggest method of iterative aggregation of nearest neighbors in the patch space to obtain an automatic algorithm with greatly reduced execution times [1-4]. We extend the Patch-Match algorithm to the spatio-temporal domain in order to accelerate the search for approximate nearest neighbors. We propose a simple solution for known over-smoothing problem due to averaging the patches, and provide specific implementation details to craft our work reproducible. The resulting algorithm tries for similar results to the original one, with a speedup time. To save computation time, a multi-scale approach is adopted. The reported result is good, only low resolution videos are shown and the multi-scale nature may cause over-smoothing artifacts and high computation complexity.

In addition to patch-based approach, object-based approach, a video inpainting mechanism is proposed an efficient object-based video inpainting technique to deal with videos captured by a stationary camera [3]. To inpaint foreground, they make use of all available object templates. For each missing object, a sliding window covering the missing object and its neighbor object templates is used to find a most similar sliding window. They then use this corresponding object template to replace the missing object [7-14]. However, if the number of postures in database is not sufficient, it would synthetically generate postures and inpaints result. This method does not have a systematic way to identify a good filling position of object template. We can use a user assisted video layer segmentation technique in which it decomposes a target video into color and illumination videos [4]. Then, a tensor voting technique is used to maintain consistency in both the spatio-temporal domain and the illumination domain. For an occluded object their method is able to reconstruct it through synthesizing other available objects. However, the synthesized object does not have a real trajectory. Besides, only textures are allowed in their background.

PRESENT THEORY AND PRACTICES

In previous works, this problem addressed in two algorithms: - (a) "texture synthesis" algorithms (for generating large search area from sample texture sequence) and (b) "video inpainting" techniques (for filling gaps in video sequence). The previous work is well suited for "textures" repeating in 2D patterns with some stochastic. Latter focus is on linear "structures" which can be considered as 1D pattern, such as line and object contour.

We have proposed an object-based video inpainting scheme that can maintain the spatio-temporal motion continuity of an object simultaneously. The system handles the problem of insufficient available postures. The system consists of Texture Synthesis, Exemplar based inpainting, Patch match inpainting, Object completion, posture mapping, posture sequence retrieval, synthetic posture, video inpainting. First, an available posture creation is done. Then posture processing converts all 3 dimensional patches in to 2 dimensional patches and segmentation is done. Some ideal posture sequences are collected and arrange them in sequence and performs indexing, occluded object postures are compared with the available postures then it replaced with the occluded posture otherwise a posture is synthesize by synthetic posture generation and then replace it with occluded one. Then the background inpainting is approached. Finally whole video combines them an inpaint.
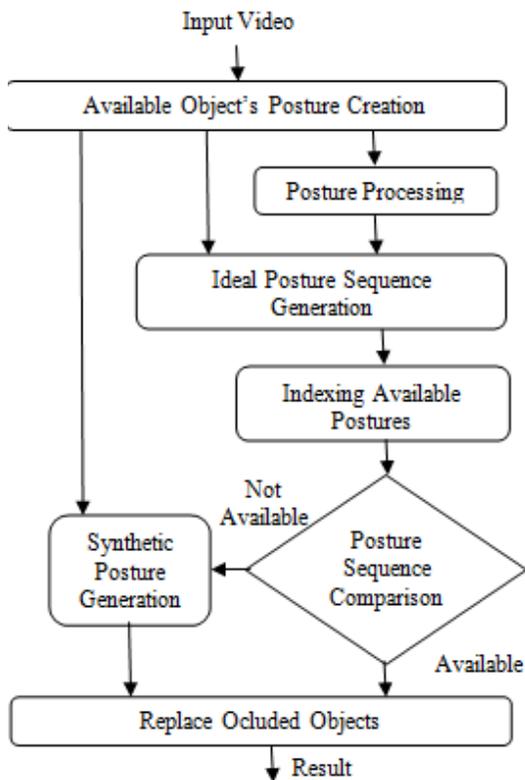
Fig - 1 Flowchart for proposed system.

KEY OBSERVATIONS
Exemplar-based synthesis method:
This method processes an isophote driven image sampling which is used to slice patches. It performs well for 2D textures. But, In addition to improve that exemplar- based texture synthesis method requires a sufficient available postures for propagating extended linear image structures, as well as a separate synthesis mechanism is required for handling isophotes. It finds the match patch with the highest continues process until all the gaps are filled satisfactorily.Patch-based Inpainting Technique:

Spatio-temporal slices of a video sequences are used to derive object virtual contours, which are utilize as features to assume the occluded objects posture. After object extraction or removal, 3D video dimension classified in several consecutive frames to obtain 2D spatio-temporal slices. To attain continuous trajectory objects, patch-based image inpainting completes objects missing regions in spatio-temporal slices. In this method it determines the fixing order of objects missing regions based on the priorities of missing regions.

Virtual Contour Construction:
To make an object completion process visually sense of satisfaction, extraction is much important to form a damaged object in consecutive frames. A set of features that cannot represents the object's characteristics (e.g., shape, appearance, and posture) but it also takes it into account the temporal motion continuity. Here the proposed work uses spatio- temporal slices to compose virtual object contours and then it uses them as the features to guide the object completion process. After object extraction and removal, we sample a 3-D video volume which is composed of a number of contiguous frames. We then obtain a set of directional 2-D spatio-temporal slices which separately to avoid inpainting error.

Key-Posture Sequence Matching:
By systematically arranging sequence of repeated virtual contours, it tallies large number of related postures. Objects Posture sequence is formed such that to fix degraded objects in video sequence. A posture refuses as a key-posture, if its degree of contrast exceeds a predefined threshold with all key-postures. In posture sequence matching process, key-posture selection method used to pick large amount representative postures from available postures. Key-posture that has most similar situations get matched with virtual trajectory of each occluded posture is matched. After key-posture collection processing, key-postures are labeled with an identical number. A present neighboring sequence of postures and virtual contours can transfer into sequence of key-posture labels based on temporal order. If virtual contours mismatches then only particular label is assigned to it. The main problem is that, in given input sequence of codes, finds for best match substring in a long string of codes. The occluded objects postures are restored by retrieved one. After encoding process there is a problem of extracting the best match posture sequence for a sequence of virtual contours which become a substring matching. Result shows partly labels in the starting string are derived from available postures and remaining labels are obtained from the afterword virtual contours.

Synthetic posture creation:
Usually there is a problem of deficient available postures, for inpainting objects occlusion patch. When period is short to collect a sufficient set of non-occluded postures, skeleton-based virtual contour sequence cannot find best match in posture database search area. In many reconstructed virtual contours, objects are having large amount of non-occluded. It also uses to take out the skeletons of objects all available postures. Then, the components of selected key-posture are decomposed on the basis of allocation of variance in alignment errors between every associated key-postures pair. Components decompose result in key-posture sequence which is used to support segment to extracted skeletons into their constituent components. Segmented skeleton components are uses a virtual contour construction to extract similar posture components, used to synthesize fresh postures.

Authors	Title	Publication Year	Technique used	Merits	Demerits	Future work
Chih-Hung Ling, Chia-Wen Lin, Chih-Wen Su, Hong-Yuan Mark Liao, and Yong-Sheng Chen.	Video Object Inpainting Using Posture Mapping	2009	Posture Mapping Technique	Inpainted object looks good in individual frames. It developed synthetic posture generation scheme to enhance different available postures in database.	Result shows flickering artifacts at boundaries of both the original and inpainted objects due to uneven transitions.	The big challenge is that to overcome over-smoothing artifacts.
B.A.Ahire, N. A. Deshpande,	Video inpainting of objects using modified Patch based technique.	2013	Modified Patch based technique.	Our experiment results removes occluded objects and maintain good subjective quality in terms of object's spatial consistency and temporal motion continuity. It avoids over-smoothing artifacts & compensates insufficient available postures.	This method does not deal with the illumination change problem that occurs if lighting is not uniform across the scene.	The big challenge is the illumination change occurs if lighting is not uniform across the scene.

Alasdair Newson, Matthieu Fradet, Patrick Pérez, Andrés Almansa, Yann Gousseau.	Towards fast, generic video inpainting.	2013	Modified Exemplar-Based Image Inpainting.	Automatic generic video inpainting with reducing execution time is possible. It able to provide a fast, useable video inpainting algorithm.	Results contain degraded images when entire image is used as a search space. In case of image inpainting, restricted search space is non-significant problem, in vast cases the necessary information is situated around the occlusion.	It uses spatio-temporal structure means that may be ambiguous at coarse resolutions; It has not exploited the parallel aspect of both random search step and reconstruction that make it slow.
Waykule J.M.	Modified Image Exemplar-Based Inpainting.	2013	Modified Exemplar-Based Image Inpainting.	Results show that, inpainted images are visually satisfactory and computational efficiency is enhanced using Exemplar-Based Inpainting. It works well for textured and structured Images and removes large objects.	When Method Divides the image in Exemplar-Based Inpainting, it is not so good for all type of images. It completely gets fail on synthetic Images.	The current algorithm is still slow, and To use this algorithm in video applications improvements is needed in performance.

Table: - Some speedy approaching Inpainting Techniques are compared above.

IMPLEMENTATION DETAILS

Introduction of overall system will be specified. Review of available literature & work already done related with video inpainting will be deliberate. Theory & techniques involved in proposed system will be considered. Appropriate tools for implementation will be chosen. Testing of overall system will be carried out. Results of the system will be discussed. Conclusion will be drawn from results & future scope will be analyzed for further research work.

CONCLUSION

This proposed system presents a framework for hole removal, signature removal and object tracking and inpaint in a video sequence. The proposed system is comprised in three steps virtual contour construction, Key-posture selection and mapping and Synthetic posture generation. For Object based inpainting, we modified patch based inpainting algorithm for getting improved results as compared to the previous methods. Our experiment results will show that the proposed method removes objects with good quality in terms of the object's spatial consistency as well as temporal motion continuity. It avoids over-smoothing artifacts and compensates for insufficient available postures. The non-linearity of the occluded objects is also allowed to work. It may not compose sufficiently accurate postures, if an object moves nonlinearly during an occlusion period, due to virtual trajectories. The proposed method does not deal with the illumination change problem which occurs when lighting is not uniform across the scene. It also helps to make an object based inpainting method fast as well as intelligent.

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