**Indian Institute of Information Technology, Allahabad**

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**Software Requirements Specification**

**Document**

**On**

**“Video inpainting”**

***Submitted By:***

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**Scope &Objectives**

SCOPE- video inpainting is the process of removing a particular object either stationary or moving from a video. It has got wide application in Cinema world. This technique can be used to remove logos and stamped date from videos. Video modification for privacy protection .This can be used for creative effect in videos .

OBJECTIVES- In this project we focuses on removing objects from a video and blending the gap with the surroundings as if nothing was present there.

**Literature Survey**

Video inpainting started as a natural extension of image inpainting algorithms and it has attracted a great deal of attention due to its potential applications in video error hidden in video transmission, multimedia editing and visualization and new applications such as video modification for privacy protection . A straightforward extension of image inpainting algorithms to video inpainting is to treat the underlying video data as a set of distinct images and apply image inpainting algorithms to them individually. This mode of operation does not take full advantage of the high temporal correlation that exists in video sequences and hence the quality of video inpainting across the frames are usually unsatisfactory.

For example, one of the earliest efforts in extending the Partial Differential Equation (PDE) based image inpainting to video was performed. The focus of this method is to fill in the hole spatially by extending the edges and filling the hole with smoothed color information by a diffusion process using Navier-Stokes equation. It does not take into effect the temporal information available in the video and treats the video as individual images. Due to extensive smoothing, it does not reproduce the texture information and suffers from severe blurring artifacts. Consequently this method is effective only in restoring small scratches or spots occurring in archival footage. A video completion scheme based on motion layer estimation followed by motion compensation and texture completion has been proposed . After removing a particular motion layer, motion compensation is used to complete moving objects and non-parametric texture synthesis is used to complete the static background regions. The inpainted layers are then warped into every video frame to complete the holes. Video completion by motion field transfer(transfer of spatio-temporal patches of motion field instead of direct color sampling ) .This technique is extremely sensitive to noise as they involve local motion estimates by a derivative-based process. It has difficulty inpainting large motion as their motion estimation techniques focus solely on measuring small local movement. In addition, as the scheme transfers only motion information, it suffers from blurring artifact due to the use of a re-sampling process to estimate color information. A video completion algorithm for perspective camera under constrained motion has been proposed recently . The foreground and background layers are separated and objects in foreground volume are rectified to compensate for perspective projection. The pixels in the foreground are completed by modeling it as a graph labeling problem as described in and a dynamic programming is used to solve it.

Deviating from the patch-based methods, an object-based inpainting system which utilizes a user-assisted segmentation to inpaint holes in foreground regions that exhibit cyclic motions . To complete the missing foreground regions they explicitly estimate the periodicity of the moving foreground object and align them with the partially damaged pixels in the hole boundary to complete missing regions. Temporal consistency is achieved by a movel (moving pixel) wrapping and regularization process using tensor voting. A similar technique that utilizes mean shift tracking to limit the search space and nonparametric texture synthesis coupled with graph cuts has been proposed . This method currently does not have a mechanism to handle moving cameras and also reports artifacts at the boundaries of the hole region.

**Language & library/tools**

1. We are going to use C++ language with openCV library in our project to implement algorithm.

OpenCV: is an open source computer vision library originally developed by Intel. It is free for commercial and research use under a BSD license. The library is cross-platform, and runs on Mac OS X, Windows and Linux. It focuses mainly towards *real-time* image processing, as such, if it finds Intel's Integrated Performance Primitives on the system, it will use these commercial optimized routines to accelerate itself. OpenCV library supports:

* real-time capture
* video file import
* basic image treatment (brightness, contrast, threshold, …)
* object detection (face, body, …)
* blob detection

Future versions will include more advanced functions such as motion analysis, object and color tracking, multiple OpenCV object instances.

**Activity time chart**

**Before Mid Sem:-**

*Week 1*

Initial discussion on various concepts like Analysing about what to do, what are the requirements, how to use library,tools etc. Read the research papers based on this.

*Week 2*

We discussed about the problem domain, constraints and challenges concerned with the domain. Read the research papers based on this.

*Week 3*

Discussion on algorithm and limitation and it’s implementation. Read the research papers based on this.

*Week 4*

In 4thweek,we analysed the problems and challenges and then apply the algorithm based on these according to suitability under occlusion condition.

**After Mid Sem:-**

*Week 5*

We shall apply the algorithm based on suitability under occlusion condition into coding form and continuously check whether algorithm is feasible or not.

*Week 6*

We started working on the implementation of algorithm in C++ language.

*Week 7*

We tested the datasets using suitable algorithm and started working on the algorithm.

*Week 8*

Apply video inpainting on self-recorded videos.

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