

Object Removal using Image Inpainting

Hemangini G. Patel¹ Narendra Limbad²

²Assistant Professor

^{1,2}Department of Computer Engineering

^{1,2}L.J. Institute of Engineering and Technology, Ahmedabad, India

Abstract— Image inpainting means reconstructions of missing or damaged portions of images. In the case of removal of object, the challenge is to fill in the hole that is left behind in a best visually way. There are various algorithms for removing large objects from digital images. In this work my goal is use “inpainting” techniques for filling in small image gaps. All the images have one property “spatial redundancy”. That is, pixel values in neighborhood surroundings are same. In this paper exploited spatial redundancy of the image. This property of the image for the region filling process using median filter. This concept is useful for improve the quality of object as well as computational complexity.

Key words: Inpainting, object Removal, median filter

I. INTRODUCTION

The goal of any image Inpainting algorithm is to reconstruct the missing or damaged regions in a visually plausible way. Thus, inpainted images that are significantly different from the original, undamaged images, but exhibit visual pleasantness are approved outcomes of the Inpainting process. Adding to the latter the fact that a reference image might not always be available for comparison, that is why Inpainting quality evaluation is still considered a challenging task, has been only narrowly researched in the recent years.

Image Inpainting is the art and science behind reconstructing parts of an image in a visually undetectable way. Inpainting has been an art form for many centuries, being carried out by a skilled image restoration artist. Research in partnership with these artists and the general increase in computing power gave rise to sophisticated algorithms for recovering the lost of corrupt portions of an image. While image Inpainting is related to noise removal, and sometimes algorithms share a majority of their ideas, image Inpainting is fundamentally a different problem to noise removal. Noise often carries some sort of information about their underlying data. For example, additive noise contains the original image data, but with some amount of noise "added" to the image. Image Inpainting, on the other hand, the "lost" regions contain absolutely no information relating to the original data.

In Inpainting, the technique of reconstructing small damaged portions of an image, has received considerable attention in recent years. Digital Inpainting serves a wide range of applications, such as removing text and logos from still images or videos, reconstructing scans of deteriorated images by removing scratches or stains, or creating artistic effects. Most Inpainting methods work as follows. First, the image regions to be inpainted are selected, usually manually. Next, colour information is propagated inward from the region boundaries, i.e., the known image information are used to fill in the missing areas. In order to produce a perceptually plausible reconstruction, an Inpainting technique should attempt to continue the

isophotes (lines of equal gray value) as smoothly as possible inside the reconstructed region. In other words, the missing region should be inpainted so that the inpainted gray value and gradient extrapolate the gray value and gradient outside this region.

Image inpainting is the process of reconstructing damaged parts of an image in a plausible way [15]. Image inpainting is technique in which mainly used to filling the region which are damaged and want to recover from the neighboring pixels [18]. We are also used inpainting for produce special effect. Inpainting is the art and science behind reconstructing parts of an image in a visually undetectable way. One of the use of inpainting is in creating special effects by removing unwanted objects from the image. Image inpainting is the process of filling in missing parts of damaged images based on information gathered from surrounding area.

Various image inpainting methods are like PDE-Partial differential equation, Multi-resolution Image Inpainting, Texture synthesis, Fast Marching Method. Digital inpainting serves a wide range of applications, such as removing text and logos from still images or videos [4]. Image inpainting technique has many applications such as, object removal in digital photos, removal of occlusion (date, starches, logo etc.), such as large unwanted regions, red eye correction, super resolution, restoration of old films and paintings etc [1]. Unwanted objects may range from microphones, ropes, some unwanted person and logos, stamped dates and text etc. in the image. During the transmission of images over a network, there may be some part of an image that is missing. These parts can then be reconstructed using image inpainting [3]

Image inpainting is used for film restoration in photography. It is used for removal of occlusion like cracks in photographs or scratches and dust spots in film. It is used for removing objects in the images and also produces special effects. It can also be used to remove logos in videos.

II. IMAGE INPAINTING ALGORITHM

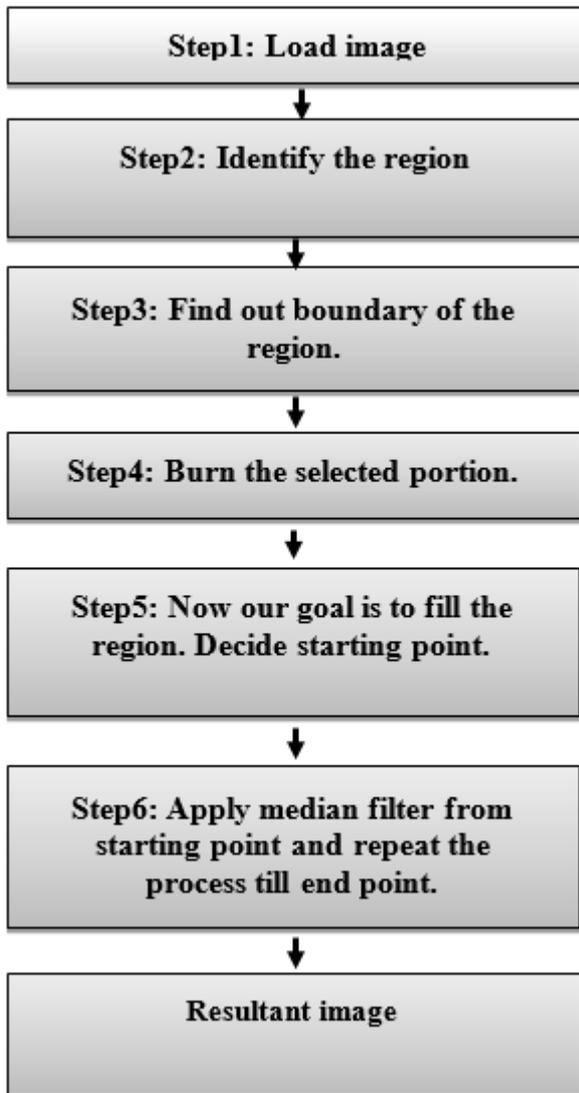


Fig. 1: Flowchart for image inpainting algorithm Each step is explained in detail to show the concept of image inpainting.

- Step-1: Load input image.



Fig. 2: Original Image

- Step-2: Select area to be removed. Here the selection of object is rectangle shape only.

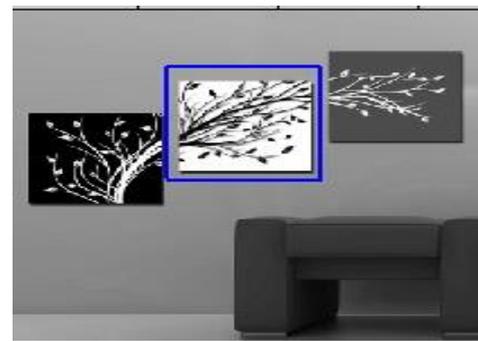


Fig. 3: selection of area

- Step-3: Create mask. This mask will have all zeros or 255. It is called Burned image: image in which selected portion is removed.

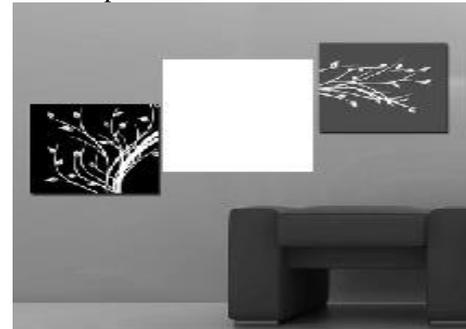


Fig. 4: selected area is shown separately

- Step-4: Now filled burned portion and selecting starting point.

Initially find out center of the image. If image size $m*n$ the center will be $(\frac{m}{2}, \frac{n}{2})$ then find out distance between center and end points of region.

$$\text{distance} = \sqrt{(c - a)^2 + (d - b)^2}$$

- Step-5: Select starting point then find out the eight neighboring pixel of that pixel and apply median filter.
- Step-6: At the end all pixels will have values and region will be filled and we get final result.

III. EXPERIMENTAL RESULTS

In this section we have shown some experimental results for object removal using Image inpainting.

As shown in fig. 5, original image was taken as the input. And the resultant image is shown in fig.6. As It can be seen clearly, object has been removed.



Fig. 5: Original Image

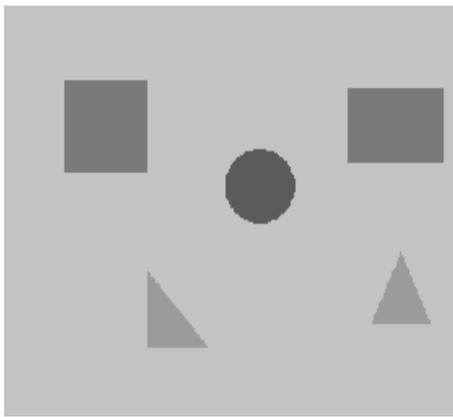


Fig. 6: Resultant Image

IV. CONCLUDING REMARKS

From this paper, we can conclude that the object is being removed and the image is being restored by using the image inpainting algorithm. In future the given inpainting algorithm can be applied to remove the object from the video.

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