Survey on Exemplar Based Image Inpainting

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Abstract: *Image inpainting is nothing but the removing the undesired object in the image and filling the missing area of the image. A lots of research has been done on the image inpainting. Image inpainting is useful to recover the damaged image and recover it. In this paper we have proposed a novel method to repair the videos from damaged videos. We are applying the exemplar based image inpainting to fill the missing part of the videos. First we are taking images from the videos and then applying exemplar-based inpainting reconstruct the video by removing the obstacle from the video. Proposed system is helpful to reconstruct the damaged images and damaged films. This paper explains the work of filling the missing place in the video by using the exemplar based method.*

Keywords: Inpainting, Super resolution, exemplar based, textures, missing areas.

1. Introduction

Now a day's lot of research is going on the image inpainting. Image inpainting is the process of filling up the missing field of the image. There are no of tools are available on the internet to recover the image. But the efficiency of this applications is not accurate. Applications of image inpainting are numerous it can be helpful to recover the undetectable part of the image and to remove the some part from thefrom matching lines are place in the region where we want to recover the image. Image inpainting also have wide applications such as remove the texture part from the advertisements and to recover the undetectable image. In this paper we have proposed novel image inpainting algorithm named as exemplar based algorithm. This algorithm have more efficiency than other inpainting algorithm. We are extending our work and applying same algorithm to recover the videos. First of all we are taking images from the videos and then applying the Exemplar based image inpainting method to recover that images and finally append this images

and again form a video. Image and videos having large missing part is the very challenging task to fill that region of the image. Our method is depends on the super resolution based inpainting by using exemplar based method. TO recover the image with more accuracy we first applying the algorithm in the low resolution image and then make high resolution image as a output. First we are building low resolution image from the input image and then quality of the inpainted image is improved by matching the inpainted result images. To overcome the drawbacks of the partial differential equation based method we have proposed this Exemplar based method.

The proposed method is helps to remove the damaged part from the images and also from the videos. The following figure shows architecture of the proposed system. In the proposed system first video is taken as a input to recover it. This video is then divided into frames this frame is then take as a system input and then exemplar based algorithm is applied on that image.
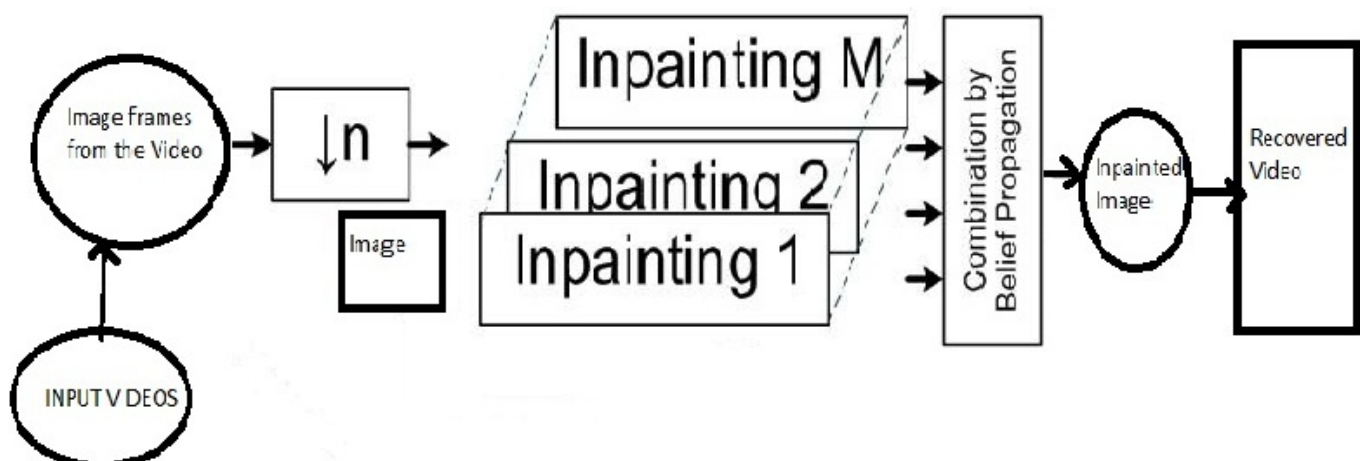

Figure 1: Example of binarization

2. Literature Survey

There are no of methods exist which have been used to feel the missing parts of the images. No of papers are there which have been worked on the exemplar based method of the

image inpainting. Let us see some of them in the details in the next section. There are some research which also works on the inpainting. In this paper we have described some selection publications.

A. Region feeling and removal of object by exemplar method

In this paper author have proposed a novel method to remove the large object from the pictures. Author have been combines two methods in one algorithm and find a better algorithm to fill the large missing region in the digital images. Author have studied both exemplar based algorithm and also then formation of structure is achieved in the only one algorithm. In this paper author is success to remove the large object from the image and again feeling the background from the source region. This method is depends on the exemplar based method and then scheme to determine the fill order in the targeted region. This algorithm is useful to recover the linear images and also two dimensional images. The main limitations of this paper is that the synthesis of the region which does not having matching region cannot produce the efficient result. Proposed algorithm can not handle the curved structure in the images. Depth ambiguity also cannot handle by using this algorithm. This limitations are challenges for this paper.

B. Regularization of image with partial differential equation

In this paper author has extend the work of the watershaded image inpainting. This paper proposed a vector based image segmentation using partial differential equation method. The water shaded segmentation was depends on the rain falling simulation and other one is the immersion simulation. In this paper author have used immersion based image segmentation. The regularization is needed to minimize the region in the image After doing the sharpening of the image there is need to do the region merging in which need to merge the no of regions of the images. In this paper user have find the extension on the watershed algorithm of the image segmentation and also have done some modifications in it. Here problem of the watershed is totally reduced by using partial differential equation techniques.
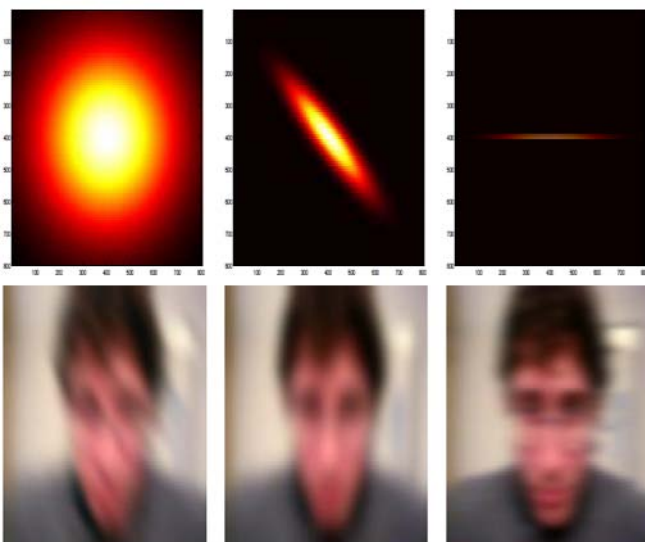

Figure 2: Image inpainting using PARTIAL DIFFERENTIAL EQUATION.

C. Exemplar Based Method

Image inpainting is nothing but the reconstruction of the image or removal of some region of the image so that image can look natural. Images can be modelled as some smoothness of the image. The new formed image is don't having the unwanted region in it.
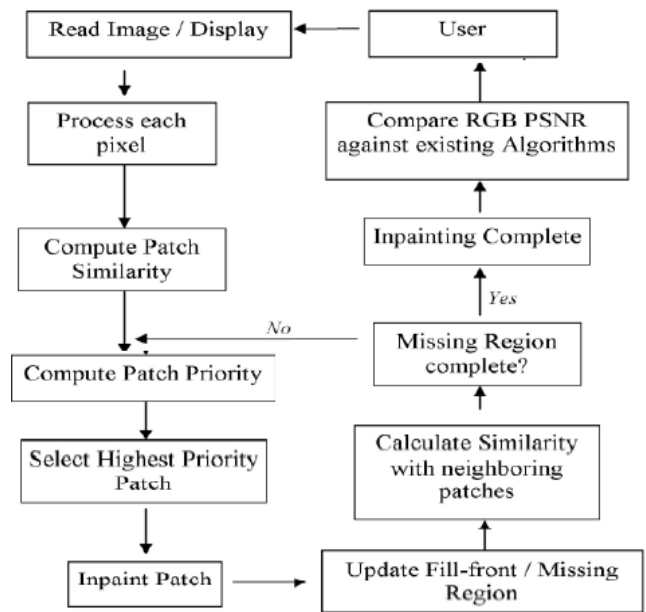

Figure 3: Exemplar based inpainting.

D. Fragment Based Image Inpainting

This method of image inpainting is depends on the smoothening of the image and applying the fragmentation method on the low confident area of the image. The low confident area is filled by using known area of the high confident area. This paper introduce the iterative process of image smoothening and sharpening. The image fragmentation method have limitation such as if the high confident region is small than the low confident area .Then the expected result may not be correct.

Input: image C, inverse matte $\bar{\alpha}$ ($\exists$ pixel with $\bar{\alpha} < 1$)

Output: completed image, $\bar{\alpha} = 1$

Algorithm:

for each scale from coarse to fine
    approximate image from color and coarser scale
    compute **confidence map** from $\bar{\alpha}$ and coarser scale
    compute **level set** from confidence map
    while mean confidence $< 1 - \varepsilon$
        for next target position p
            compute **adaptive neighborhood** $N(p)$
            search for most similar and frequent source match $N(q)$
            composite $N(p)$ and $N(q)$ at p, updating color and $\bar{\alpha}$
            compute **approximation**, **confidence map** and update **level set**

Figure 4: Algorithm for fragment based inpainting.

E. Image inpainting by Texture synthesis

This algorithm of image inpainting is old algorithm of the image inpainting. To complete the missing area of the images algorithm utilize the neighboured pixels of the missing parts. It can find out the new neighbourhood by using the existing neighbourhood of the missing area of the image. It is totally

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depend on the selection of the area by the user. The texture synthesis algorithm further classified into three types one is statistical one is parametric and other is the non-parametric method.

F. Hybrid Inpainting

It also an image inpainting method to fill the missing parts of the image. This method use both texture synthesis method and partial differential equation method. First image is divide into two parts one is texture part and one is the structure part. It can be completed by following texture completion by following the structure synthesis. And another is the synthesizing the structure based by following the colour segment.

G. Comparison Of all methods

We have studied different methods of the image inpainting or image fragmentations. Till now lot of research has done on the image inpainting in this paper we have studied some of them. We have studied image inpainting by fragmentation method watershed method of the image inpainting and examplar based image inpainting. As per the final analysis it is clear though all techniques are good but each technique has some limitations. In the listed methods of inpainting no any method is working on the videos. So we have extend our work on the examplar based inpainting and applied this method to recover the videos. Let us see our proposed method of inpainting in the next section.

H. Proposed method

By studying all the existing methods and limitations of that system I have proposed super resolution based and exemplar based image inpainting method and this method is applied to recover or to remove the noise from the videos.
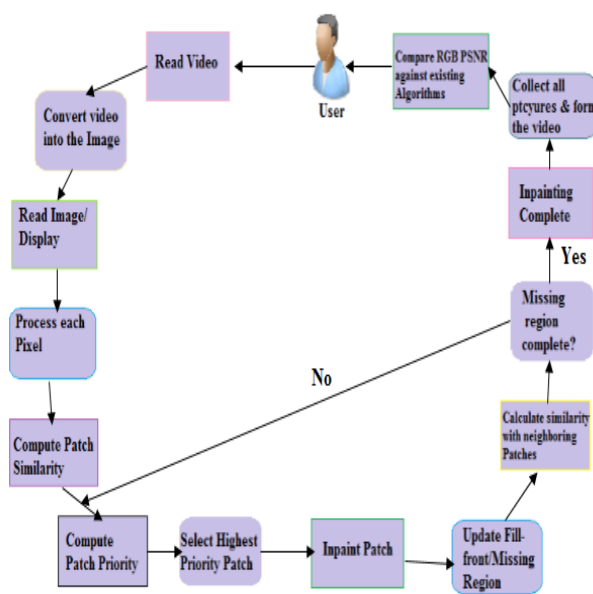

Figure 5: Flow of proposed system

In the proposed system we first take the frame from the video which have to be recover. Then the exemplar based super resolution is applied on the image then the unwanted part is removed from the image finally we append all this images and form the original video without noise or any unwanted

object. Before applying the exemplar based method on the input image we need to first downgrade or make a low resolution image and then apply the method and finally make the high resolution method. The examplar based algorithm consist of two main steps one is the filling order computation and other is the texture synthesis. Patch priority distinguish the structure to be compute. First we divide the original picture into number of sub picture and inpaint them indiually finally combining this all inpainted picture we form the final inpainted image. The following figure shows the working of the proposed method.

3. Conclusion

We can conclude that our proposed method is efficient as compare to all other methods. The result of proposed method shows that the proposed method have result with accuracy. Proposed method can overcome the all limitations of the existing methods of the image inpainting. As the result of examplar based inpainting combines the recovered videos. The proposed method can overcome the all limitations of the existing methods.

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