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A survey of Literature on image inpainting Techniques

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Abstract: ***Inpainting is the technique of modifying an image using different algorithm. In this paper we surveyed different methods of image inapainting and made a comparison with proposed system. The proposed system introduces a novel framework for super resolution based in- painting. A super-resolution algorithm is then used to modify the particular image. Various algorithm can be used for this application first take input from the user then apply the particular algorithm the we get output as high resolution image. The advantage of this approach is that it is easier to inpaint low-resolution images to the high-resolution. After getting result we can compare with original images.***

Key words: Resolution, super resolution, Inpainting, missing area, pixel.

I. INTRODUCTION

Inpainting is the process of reconstructing lost of deteriorated parts of images & videos. For instance, in the museum world, in the case of a valuable painting, this task would be carried out by a skilled art conservator. In the digital world, inpainting (also known image interpolation or video interpolation) What is image? An image is an array, or a matrix, of square pixels (picture elements) arranged in columns and rows. Each & every pixel having specific address.

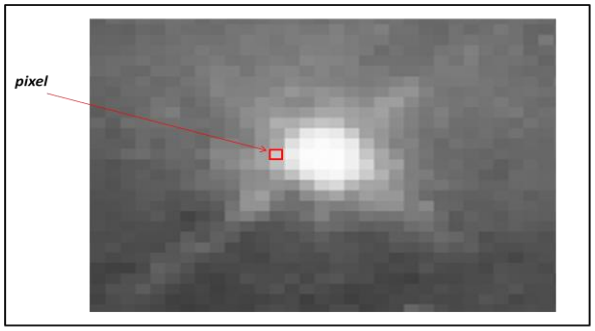


Fig 1: An image — an array or a matrix of pixels arranged in columns and rows.

Inpainting is the art of restoring lost/selected parts of an image based on the background information in a visually plausible way.

Large areas with lots of information lost are harder to reconstruct, because information in other parts of the image is not enough to get an impression of what is missing.

IMAGE inpainting refers to methods which consist in filling in missing regions (holes) in an image [10]. Existing methods can be classified into two main categories. The first category concerns diffusion-based approaches The authors in [6] improve the search for similar patches by introducing an a priori rough estimate of the inpainted values using a multi-scale approach

which then results in an iterative approximation of the missing regions from coarse-to-fine levels. The two types of methods (diffusion- and examplar-based) can be efficiently combined, by using structure tensors to compute the priority of the patches to be filled in as in [9]. Which propagate linear structures or level lines (so-called isophotes) via diffusion based on partial differential equations [10]. Details that are completely hidden/occluded by the object to be removed cannot be recovered by any mathematical method.

Therefore the objective for image inpainting is not to recover the original image, but to create some image that has a close resemblance with the original image.

Fig: Inpainted Image

Low-resolution images inpainted successfully with the help of image processing based inpainting with super resolution. to restored image or painting seems as natural as its original version. for many researches field image has become useful phenomenon.

With the help of super resolution we can maintain the image quality after inpainting. Remove unwanted object or missing important part from images. We know that in photo shop when we editing some picture after editing that image we can observe there are some blur on the image as compared this application will editing the image we can observe their are some blur on the image as compared to photoshop this application will be better.

II. Problem Definition

Low resolution image convert into the high resolution using super resolution that the most important things in that case. As compared to Photoshop this is better. How? When we editing some images then that image will be blur in this application that will be solve using different algorithm this is the most important fact Problem is that the image resolution should be high.

A low resolution image is built from the original picture. To fill the holes in the low resolution image inpainting method is adopted. Single-image Super-Resolution algorithm is applied to improve the quality of the inpainted region. The entire document should be in Times New Roman or Times font family. Other font types may be used if needed for special purposes.

III. Literature Survey

As there are many techniques for image inpainting some of them are listed below with each technique having its advantages and disadvantages.

Tremendous progress has been made in the past years on examplar-based inpainting. Diffusion-based approaches which propagate linear structures or level lines. The diffusion-based methods tend to introduce some blur when the hole to be filled in is large. Most important problem is related to the parameter settings such as the filling order and the patch size.

M. Bertalmio, G. Sapiro, et. All gives one approach in Synthesizing natural textures Conclusion is that this present a simple texture synthesis algorithm that is well-suited for a specific class of naturally occurring textures.

IV. METHODS OF SUPER RESOLUTIONS

A) TYPICAL RECONSTRUCTION METHODS

There a few methods widely used in blind deconvolution, including Priori Blur Identification Method, Zero Sheet Separation, Auto Regressive Moving Average (ARMA) Estimate and Nonparametric Finite Support Restoration Techniques (NFSRT). This section will describe these methods in general.

(a) Priori Blur Identification Methods –[21]

Priori Blur Identification Methods restore the image by recognizing PSF before restoring image. When using these methods to restore image, we usually assume that PSF is symmetrical, and the parametrical model of PSF is given. Widely used parametrical models include motion blurring caused by relative linear motion of camera and defocus-blurring of camera.

Based on this assumption, people put forward methods that make use of some features of blurred or original image to estimate PSF. These features can be special point and line in image or other features. Once PSF is determined, typical image restoring methods can be adopted to estimate original image.

Priori blur identification is widely used in image restoration because of its simplicity, but its main restraint is that the parametrical model of PSF must be given while in many situations, it is not available. Additionally, in astronomical or X ray images, PSF is usually of Gauss form which makes the zero point of PSF do not exist, so this method is not applicable.

(b) Zero Sheet Separation [21]

Zero Sheet Separation was put forward by Lane and Bates (1987). Its principle can be described as follow.

In multi-dimension z-transfer, zero points of z-transfer of a k dimensional sequence are almost sequential and positions on a (2k-2)dimensional hyper-surface. Assume that there are r convolutions of multi-dimensional sequence f1, f2,…..,fr, and its Z-transformation is : Fr×Fr×Fr×…Fr. If the hyper-surface which each zero point of Fi is on can be separated from each other, we can obtain each efi, where c is ratio factor. That is the concept of zero sheet separation.

Under the concept of zero sheet separation, the restoration of 2D image is translated into factorization of 2D polynomial. It is intuitive, but when bringing it into practice, serious problems appear. The main problem is it is very difficult to associate, cluster and trace all the roots of the polynomial and the roots are sensitive to the noise. So no real practical algorithm has been put forward.

(c) Auto Regressive Moving Average (ARMA) Estimate. [21]

This method regards the original image as a 2 dimensional AutoRegressive (AR) process and PSF model as a 2 dimensional Moving Average (MA) . So the blurred image can be described as a noised observation of AutoRegressive Moving Average (ARMA). Therefore, blind deconvolution is translated into the problem of determining the parameter of ARMA.

There are several algorithms, including Maximum Likelihood, Generalized Cross Validation (GCV), Neural Network and High Order Statistics (HOS) and so on. They all have good robustness on noise, but when there are too many parameters, they cannot convergent to global optimality.

(d) Nonparametric Finite Support Restoration Techniques (NFSRT) [21]

Nonparametric Finite Support Restoration Techniques don't need to establish the parametric model of original or blurred image, and there are not too many strict restraints, so they are widely used in image restoration. Various methods of wavelet domain image inpainting e. g Variational PDE Technique, Gradient Decent Algorithm, Variational Inpainting Model, Total Variation (TV) Minimization, Fast Optimization Transfer Algorithm.

(e) Super Resolution through Neighbor Embedding [22]

This method is used for solving single-image super-resolution problems [22]. Given a low resolution image as input, objective is to recover its high-resolution counterpart using a set of training examples. In a recent neighbor embedding method based on Semi-nonnegative Matrix Factorization (SNMF) only nonnegative weighs are considered. In LLE the weights are constrained to sum up to one, but no constraints are specified for their sign. This might explain the unstable results, since possible negative weights can lead to having subtractive combinations of patches, which is counterintuitive. This method is based on assumption that small patches in the low- and high-resolution images form manifolds with similar local geometry in two distinct spaces. In this method each low- or high-resolution image is represented as a set of small overlapping image patches. Each patch is represented by a feature vector. The feature may be contrast, correlation, entropy, variance, sum of average, sum of variance, homogeneity, variance of difference, sum of entropy, difference of entropy, change of luminance.

V. PROPOSED SYSTEM

From Above Literature survey, by studing all methodology of image inpainting proposed system having some useful concept of existing methodology and some aditional features.

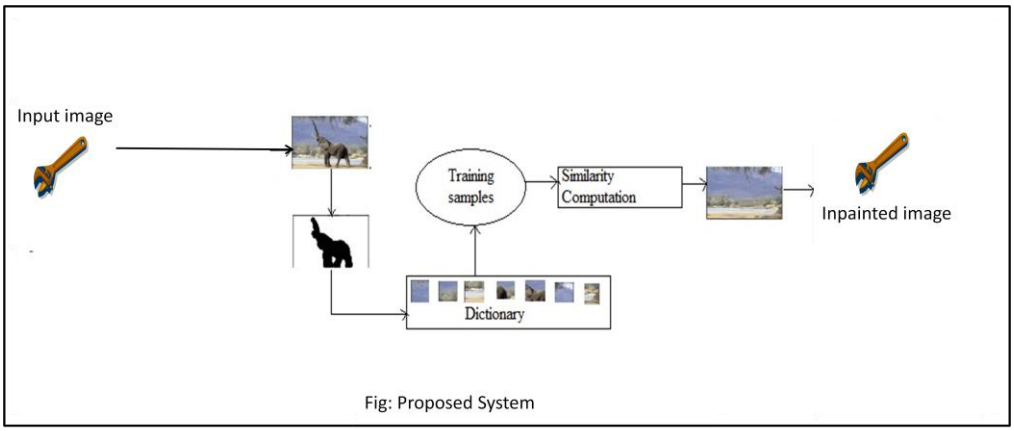


Fig: Proposed System

In this proposed system first the image which is to be process is taken as input image then dictionary is formed then through dictionary original patches of the image are match with at the place from where we have removed the object then inpainted image obtained as a output which is called inpainted image.

VI. SYSTEM ARCHITECTURE

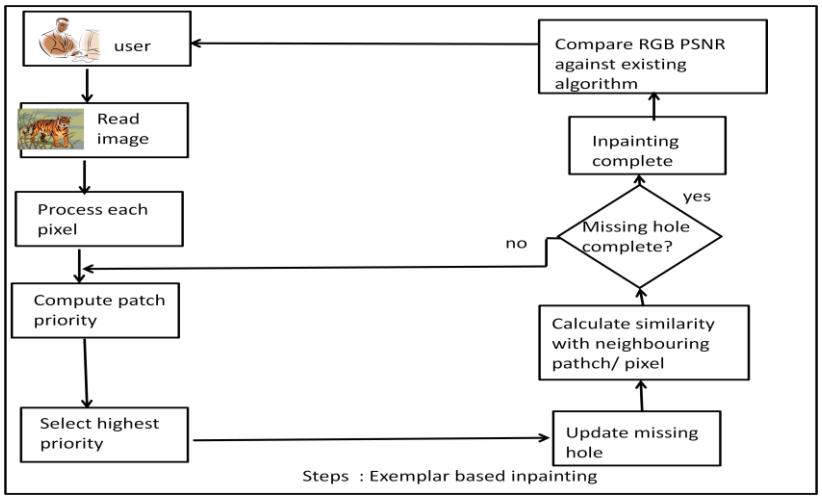
In this Image inpainting Image processing based inpainting with super Resolution algorithm is used for the modifying images.

Following are the steps of system architectures

Step1: User add the image which are stored in computer memory then the algorithm apply on the particular image

Step2: then the most important part is data dictionary or we can say that the patches or pixel.

Step3: After working we get output with high resolution image or we can say the inpianted image.



VII. Conclusion

Original patches of the image are match with at the place from where we have removed the object then inpainted image obtained as a output which is called inpainted image., the problem of pixel bluring which generally observed in other photo editing application is eliminated in this application. we studied different method of super resolution in this paper and concluded with a novel approach for inpating which remove the problems.

A novel inpainting approach has been presented. Image & Video inpainting using image inpainting , Low-Resolution images inpainted successfully.

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