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Effective techniques for Inpainting and Coloring to images in the image processing system.

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Abstract — **In this paper, In the paper the system is using two effective techniques which are used to inpaint the part of the image as well as coloring the image.For the First part, I am using Patch Based In painting algorithm in which Inpaint the missing part of the image.Of course it is patch based Algorithm So first the image is divided into patches and selected part of the image is inpainted.In the second Part I am using minimum Color Difference Algorithm by using luminance evaluation of the reference & target images. Which is used for coloring the Gray scale image by using color from the given image with color dffernence.Both are very effective and speedy techniques to develop the system.**

Index Terms — Based, Color Differnece, in paint, Gray scale, Luminance.

I. INTRODUCTION

Image inpaitning performs multiple task such as reconstructng of mising region in an image,removal of unwanted part of the image,recovery missing part..etc.In my paper ,I am using inpainting algorithm for removing the unwanted part & reconstruction the image.There are some techniques for Image Inpaitning .Many algorithms were used to develop the for the image inpaitning.Algorithms such as

1. Diffusion based algorithms.
2. Texture based algorithms.
3. Exemplar and search based algorithms
4. Sparsity based algorithms

In my system,I am using the recent technique Patch Sparsity based algorithm,which is very effective & speedy technique to remove the part of the image and fill the missing part of the image.Sometimes it happens most of the automatic techniques of image inpaitning are unable to repair large holes & computationaly complex.Therfore to overcome this problem,I am using the most effective technique **Novel Object Removal in Image Using Patch Sparsity**.This the patch based algorithm which is used to remove the unwanted part of the image & reconstruct it.In image inpaitning algorithm first I select the region to inpaint and then compare this with other patches to inpaint.If the matching patch found then replace it with that matched patch.There are some researchers who were introduced some techniques /algorithms for this but because of some faults of these previous techniques I found the effective technique which overcomes these problems of the old techniques.

This is what I studied about image inpainting but in my paper I am also using the other useful & speedy technique which is used to color the images. Gray scale image colorization is a useful application in the world of image processing. This work present a general technique for “colorizing” grayscale images by transferring color between a source or color image and a destination or target or grayscale image by matching luminance and texture information between the images. In this work I will successfully colorized gray scale images of various sizes in YCbCr color space.Here I take a reference colored image or source image which is similar in texture to the target gray scale image, it is not necessary that this image is colorized version of the target gray scale image, it can be any similar colored image. The quality of output depends on the choice of this reference or source image. I convert both the target and source images in YCbCr decorrelated color space, to avoid cross channel artifacts, and divide the

source image in windows of equal size. The properties of these windows are compared with those of target image based on texture features matching to find the best matching window. Then the luminance values of the pixels in this best matching window and gray scale image are compared and the chromatic properties of best matching pixel in source window are transferred to the corresponding gray scale image pixel.

I. Literature Review:

There are two parts for literarure review such as **I)For image inpainting** and **II)Coloring for images**.Firstly, I introduce literature for the corruptive artifacts which is removed ny image inpaitning and about their techniques, after that lierature for second part is for Coloring the images .

I.For Corruptive Artifacts

1. Image Processing Using Smooth Ordering of its Patches

In this paper [1], The authors presented paper for image processing technique which is based on smooth 1D ordering of the pixels in the given image.They also used designed permutation matrices and 1D operations such as linear filtering and interpolation, the scheme is also used for image denoising and inpainting, where it achieves high quality results.By this scheme a possible solution could be to develop a scheme which allows patches to be revisited more than once. These may both improve the image denoising and inpainting results.This allow to tackle other applications such as image deblurring, Additionally, Image inpaitning algorithm is also used for removing the unwanted parts of the image.

2.Image Inpainting Using Patch Sparsity

In this paper[2], the authors discussed a modified exemplar-based inpainting method through sparsity of natural image patches. In the exemplar-based algorithms, with the help of available information the unknown blocks of target region are inpainted by the most similar blocks extracted from the source region. To decide the filling order of missing pixels ensures the connectivity of object boundaries. The priority term shold defined. In the exemplar-based patch sparsity approaches, a sparse representation of missing pixels was considered to define a new priority term. Here, I discuss modification of the priority term and take measures to compute the similarities between fill-front and candidate patches. Image inpainting by patch propogation using patch sparsity shows the effeteness over traditional exemplar based inpainting.

Disadvantages:

- The exemplar-based inpainting algorithms have performed plausible results for inpainting the large missing region.
- Speed is slow as compared with Examplar-based Image Inpainting algorithm.

3.The Examplar-based Image Inpainting algorithm through Patch Propagation

This paper presents[3] a novel and efficient examplar-based inpainting algorithm through natural image patches and used for the applications of scratch/text removal, object removal and block completion. Two novel concepts of sparsity at the patch level are proposed for modeling the patch priority and patch representation. First, patch structure sparsity is designed to measure the confidence of a patch located at the image structure (e.g., the edge or corner) by the sparseness of its nonzero similarities to the neighboring patches. The patch with larger structure sparsity will be assigned higher priority for further inpainting. Second, it is assumed that the patch to be filled can be represented by the sparse linear combination of candidate patches under the local patch consistency constraint in a framework of sparse representation.
Compared with the traditional examplar-based inpainting approach, structure sparsity enables better discrimination of structure and texture, and the patch sparse representation forces the newly inpainted regions to be sharp and consistent with the surrounding textures.

Advantages

- The exemplar based approach is used removing large objects from digital photographs.
- Speed efficiency
- Accuracy in the synthesis of texture (less garbage growing
- Accurate propagation of linear structures.

Disadvantages:

- Fail to repair large holes image
- Compuuttionaly the technique is complex in nature.

4.Novel Object Removal in Video Using Patch Sparsity(Base Paper)

In this paper [4], the process of repairing the damaged area or to remove the specific areas in a video is known as video inpainting.By this algorithm I modified this algorithm for Image inapinting for object removal in Images using Patch sparsity. To deal with this kind of problems, not only a robust image inpainting algorithm is used.

This is the most simple algorithm and easy to undersatnd & implement.In the iamge procesingm most of the automatic techniques of video/image inpainting are computationally intensive and unable to repair large holes. To overcome this problem, inpainting method is extended by incorporating the sparsity of natural image patches in the spatio-temporal domain is proposed in this paper.

Advantages:

- Efficient technique.
- Large size images can be repaired

II.For Coloring the images

5)Corruptive Artifacts Suppression for Example-Based Color Transfer

In this paper[5], the authors presented paper which includes Example-based color transfer which is used for a critical operation in image editing but easily suffers from some corruptive artifacts such as grain supression, color fidelity and about detail appearance..etc. in the mapping process. First, an iterative probabilistic color mapping is applied to construct the mapping relationship between the reference and target images. Then, a self-learning filtering scheme is applied into the transfer process to prevent from artifacts and extract details. The transferred output and the extracted multi-levels details are integrated by the measurement minimization to yield the final result.

In this paper,the authors evalute the quality in color transfer and also show the applicabilty of this framework.It is a tadius task to transfer the colors from reference image to target image and because of the complexity of the color distribution, it is difficult to avoid the corruptive artifacts such as color distortion, grain effect or loss of details in the result of color transfer.For dealing such types problems A novel color transfer framework is used by integrated a self-learning filtering scheme into the iterative probabilistic color mapping model.

Advantages:

- From this technique I can modify algoritham and perform different editing operations
- Efficient technique for color mapping.

Disadvantages:

- If the amount of the referred colors is limited, it is likely to produce two major problems. One is the inharmony of color appearance; the other is the color bleeding-like artifacts

6.Conversion of Gray-scale image to Color Image with and without Texture Synthesis

In this paper[6], the authors introduced a general technique for coloring the gray-scale images into the color images with and without texture synthesis. The general problem of adding chromatic values to a gray-scale image has no exact solution.This system convert the entire color to the gray-scale image by matching luminance and texture information between the images.The system choose only chromatic information and retain the original luminance values of the gray-scale image.

Advantages:

- It is Used as Friendly approach and easy to implement
- Speed is good during colorization for grayscale images
- This technique can be made applicable to a larger class of images In this mode

7. Colorization of Gray Scale Images in YCbCr Color Space Using Texture Extraction and Luminance Mapping(Base Paper)

In this paper[7],the authors presented and studied conversion of gray images into color image .This work presents a general technique for "colorizing" grayscale images by transferring color between a source or color image and a destination or target or grayscale image by matching luminance and texture information between the images. This technique of the gray image coloring uses a very simple algorithm that chooses a decorrelated color space and then applies simple operations there.

Colorization of a gray scale image is achieved here by matching texture features of gray image with texture features of windows of colored image and then by imposing mean and standard deviation onto the data points in a simple operation.Thus believable output images are obtained given suitable input images. I use texture features like energy, entropy, homogeneity, contrast and correlation based on correlation matrix for the purpose of texture matching between two images. The quality of output depends on the choice of this reference or source image. Then the luminance values of the pixels in this best matching window and gray scale image are compared and the chromatic properties of best matching pixel in source window are transferred to the corresponding gray scale image pixel. This system compare the results with the output obtained by colorization using very popular technique of using only mean and standard deviation in lαβ color space and come to the conclusion that the results obtained by colorization in YCbCr color space using our method are of better quality visually .

III.Proposed System

I studied all above mentioned algorithms and techniques from the various papers,by studying review papers I decided to use the better techinques or algorithms which will be used for image inpainting to remove curruptive artifacts as well as coloring the images.From the base paper,I am using inpainting algorithm which is used for removing the unwanted parts of the images throug patch based inpaniting algorithm.This algorithm select the region which will be inpainted and divide the image into patches and find the similar patch from neighbouring area of the image which I matched with selected patch.After finding matching patch ,I replace the that patch which I want to remove from the image.

For coloring the image, I am using the luminance mapping algorithm which is modified from the base paper.In this I will use the reference or source and target image.Reference image will be color image and target image will be grayscale image.

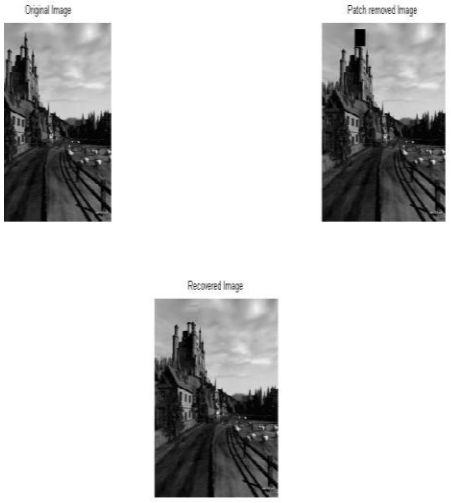

Diagram –I (Removing Unwanted Part by using Inpainting Algo)

IV.Methodology:

- Input gray image
- Converting to ycbcr color space
- The luminance layer contains all the data for colorization
- Do the same for the gray scale
- Luminance matching
- Find the difference, between the image color pallete and the %current gray scale image
- Replace the colors here
- construct the colored image

Reference Image Target Image (Gray Image)

Color Image (Output image after Coloring)

V.Conclusion

Here,I studied some research papers which are related to image inpainting and color mapping.From these papers I decided to modify base papers[4][7] and extend the functionaly of these papers.**For part I**, I am going to use Novel Object Removal[4] in Images Using Patch Sparsity instead of video.And **For part II**,I will use base paper [7]to create modified version for the base paper[7] "Colorization of Gray Scale Images in YCbCr Color Space Using Texture Extraction and Luminance Mapping".This system is used for coloring the images from reference color image to target grayscale image.These both algorithm are very efficient , user friendly and easy to implement .

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