Full Length Research Article

IMAGE INPAINTING USING SUPER RESOLUTION

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ABSTRACT

Image inpainting is the process in which damaged images and unwanted objects are removed based on information gathered from surrounding areas. Different methods has been introduced regarding image inpainting i.e. Diffusion, exemplar-based inpainting etc. Different algorithms are present today but more efficient algorithms are required. In this paper, using exemplarbased method and Super-Resolution method inpainting is explained with result and Analysis.

INTRODUCTION

Image inpainting is the process of filling in missing parts of damaged images based on information gathered from surrounding areas. For inpainting a damaged image or an ancient painting with missing regions is to guess and fill in the lost image information in such a consistent way that the restored image or painting seems as natural as its original version. Existing techniques can be categorized into two ways. The first category is diffusion-based method which tends to introduce some blur when the image is restored. The second category consists of exemplar based method which sample and copy finest matches texture patches from the known image neighborhood.Super Resolution is a process that creates enhanced image quality from multiple low resolution images. In this, the estimation of high frequency details is the problem which are missing in the input image.The SR problem is ill-posed since multiple high-resolution images can produce the same low-resolution image. Solving the problem hence requires introducing some prior information. The prior information can be an energy functional de-fined on a class of images which is then used as a regularization term together with interpolation techniques. This prior information can also take the form of example images or corresponding LR-HR

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(Low Resolution - High Resolution) pairs of patches learnt from a set of un-related training images in an external database or from the input low resolution image itself.

Literature Survey

Diffusion based Inpainting

Diffusion based inpainting was the first digital inpainting approach. In this approach missing region is filled by diffusing the image information from the known region into the missing region at the pixel level. Basically these algorithms are based on theory of variation method and Partial Differential equation (PDE). The diffusion-based inpainting algorithm produces superb results or filling the non-textured or relatively smaller missing region. The drawback of the diffusion process is it introduces some blur, which becomes noticeable when filling larger regions. All the PDE based in painting models are more suitable for completing small, non-textured target region**.**

Exemplar based Inpainting.

The exemplar based approach is an important class of inpainting algorithms. And they have proved to be very effective. Basically it consists of two basic steps: in the first step priority assignment is done and the second step consists of the selection of the best matching patch. The exemplar based approach samples the best matching patches from the

known region, whose similarity is measured by certain metrics, and pastes into the target patches in the missing region. Exemplar- based inpainting iteratively synthesizes the unknown region i. e. target region, by the most similar patch in the source region. According to the filling order, the method fills structures in the missing regions using spatial information of neighboring regions. This method is an efficient approach for reconstructing large target regions.

System Architecture

This system will be performing real time super resolution based in painting. Initially the user will select the image on which he wants to perform editing. Then the region of interest is selected which user wants to edit. Then training samples are generated and dictionary is created. Once it is formed then the inpainting process begins and then eventually the desired image is formed.
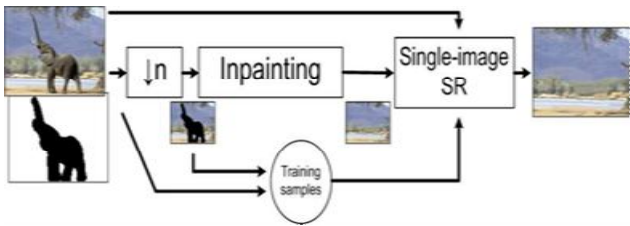
The following steps are performed:

- A low-resolution image is first built from the original picture.
- An inpainting algorithm is applied to fill-in the holes of the low-resolution picture.
- The quality of the inpainted regions is improved by using a single-image SR method.

System Description

Image In-painting: Inpaintingis the process of reconstructing lost or deteriorated parts of images

Region of Interest: A region of interest (ROI) is a selected subset of samples within a dataset identified for a particular purpose.

Down sampling: Down sampling is the process of reducing the sampling rate of a signal.

This is usually done to reduce the data rate or the size of the data.

1. **Image restoration:** Image restoration is the operation of taking a corrupted/noisy image and estimating the clean original image.
2. **Super Resolution:** Super resolution (SR) is a class of techniques that enhance the resolution of an imaging system

RESULT AND ANALYSIS

The result of image inpainting on following images is shown below.

(1) Original   Inpainted
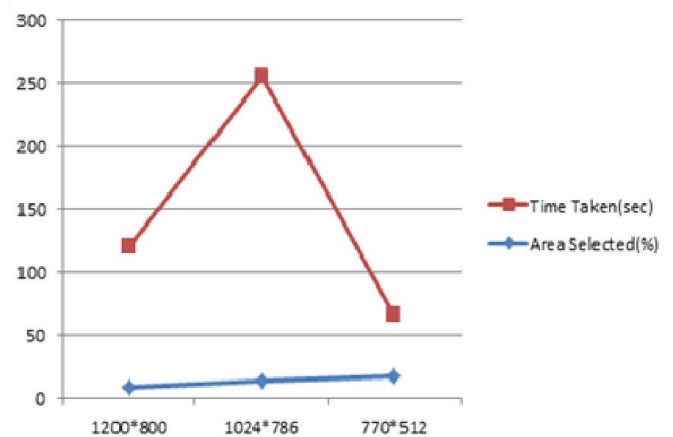

(2) Original   Inpainted

(3)Original   Inpainted

Table 1. Result

Sr No.	Image Resolution	Area Selected (%)	Time Taken(sec)
1	1200*800	8.3	112
2	1024*768	13.7	242
3	770*512	17.6	49

Analysis Graph

Conclusion

In this paper, few image Inpainting techniques such as Diffusion based Inpainting, exemplar based inpainting has been discussed. The time essential for inpainting process depends on the size of the image and the region to be inpainted and it ranges from few seconds to minutes for larger images as per the table. Inpainting has few limitations too due the

background of the image. To get clear inpainted image the region should be properly selected and background should be clean enough.

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