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Video Inpainting with Image Inpainting using Super Resolution.

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Abstract— Image plays an important role in life. Image inpainting is use to recover the missing part of image effectively. A novel framework for exemplar-based inpainting in which the image inpainting is performed on coarse version of the inpainting image. The inpainting of the low resolution images are simpler than that of the high quality images. It will show complexity and high visual quality image. The low resolution image is inpainted using different inpainting techniques and then all the results are combined to form the highly inpainted image. For this purpose our system uses the super resolution algorithm which is responsible for inpainting of single image.

Keywords— Examplar based inpainting, Single image super Resolution.
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I. INTRODUCTION

Nowadays, Image in painting gives some methods that contains in missing and in filling- regions of an image. Current system can be confirmed into two main categories. First one is the diffusion-based that inseminate level lines or linear structures by diffusion based on variation methods and partial differential equations. Unluckily, to introduce some blur the diffusion based method contribute when the large hole to be filled. The exemplar-based methods is the second family of approach concerns which sample and copy best identical texture patches from the neighborhood known image. From techniques like texture synthesis these methods have been stimulated and in cases of regular or repeatable textures are known to work well. The exemplar based techniques is used for removing the objects. By using structure tensors these two types of methods can be combined efficiently to figure out the patches priority to be filled. Although in the past years there are made progress on the inpainting, difficulties exist related to the large hole to be filled. By considering a hierarchical approach these two issues are here addressed in which first a lower resolution of the input image is figure out and in painted using a K-NN (K Nearest Neighbors) exemplar based method. From the input image correspondences between K-NN high-resolution and low- resolution patches are determine first and stored in a dictionary.

(a) Before Inpainting   (b) After Inpainting

Fig 1.Image Inpainting

It creates the modification in the image which will not recognize by the observer. In this article we introduce a novel algorithm for automatic digital inpainting, being its main motivation factor to reflect the simple techniques used by professional recovery. in computer graphics The image inpainting technology is a hotspot and has many applications such as renovation of old movies, object elimination in digital photos, red eye alteration, super resolution, compression, image coding, transmission etc. Image Inpainting is method of restoring lost/selected parts of an image based on the background information in a visually possible way. Therefore the objective of image inpainting is to create image that has a close resemblance with the original image not to recover the original image.

Object removal from images is an image manipulation technique. The purpose of region completion differs from remove-undesired object to improve the quality of the image. With mask out the undesired object the process of removing objects from image starts making area where the gap is occupied by object previously. Then the gap will be filled by using graphical techniques. To fill the gap after object removal the graphical techniques which are used among two most commonly used are as image inpainting and texture synthesis.

II. LITERATURE REVIEW

A. Overview Of The Algorithm

There are many techniques exists which can be used for inpainting of the image. These techniques can be the diffusion based or the examplar based techniques. Some limitation of above approaches has lead to the development of hierarchical approach of super-resolution based inpainting.

B. Traditional Image Inpainting

The traditional way of image inpainting is only responsible for filling the some portion of the image. But this approach is

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not suitable for high quality images. It uses patch based inpainting. The area at which the inpainting algorithm is to be apply is selected here manually by the user. Here this area is marked as the sigma notation. The sigma means masking done on the image and it is removed by using Efros and leungs algorithm.

C. Examplar-Based Inpainting

In [4] author presented a technique which introduce a novel examplar based Image Inpainting Algorithm with an improved priority term which defines the filling order of patches in the image. This algorithm is based on propagation of patch by propagating the image patches from the source region into the interior of the target region patch by patch.The block effects are removed by the PDE. Because the examplar-based model could not be used for complex geometric structures completion, then the novel model could be used to restore the natural image with both large target regions and complex geometric structures.

The exemplar-based method follows two classical steps are:

1) The Filling Order and

2) Texture Synthesis

1) Filling Order by Patch Priority: For each patch a measure of priority defines by the filling order computation in order to distinguish the structures from textues.

2) Texture Synthesis: The process of filling starts with the patch which are having the priority is highest. The similarity metric is used for this purpose.

D. Image Regularization Using PDE's

In [2] author gave an overview of a this method uses vector valued algorithm for elaborate the diffusion. It is mainly based on the following approaches.

1. Functional minimization.

2. Divergence expression.

 3. Oriented laplaciouns. [2]

E. Fragment Based Inpainting

The principles of figural simplicity as well as figural familiarity introduced in [5] by author. Thus, in the low confidence areas an approximation is obtain by applying a simple smoothing process. The process iteratively generates smooth reconstructions to guide the completion process which is based on a training set derived from the given image.

III. IMPLEMENTATION DETAILS

The System architecture of project is shown in Fig 2. It works in following steps:

1. First build a low-resolution image from the original image;

2. Then to fill-in the holes of the low-resolution picture, in-painting algorithm is applied.

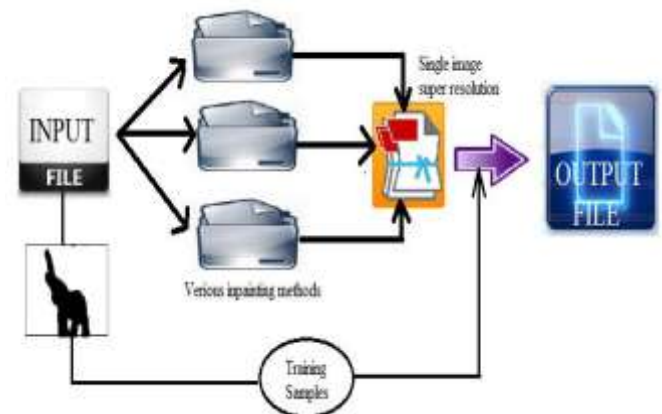3. By using a single-image SR method the quality of the in-painted regions is increased.

Fig 2.System architecture

A. Image Inpainting

In the in-painting process there are reconstruction of lost or parts of videos and images are deteriorated. For example, in the museum world, in case of a valuable painting, by art restorer or a skilled art conservator this work would be carried out. In digital world, in painting refers to the application of practical algorithms to replace lost or corrupted parts of the image data.

B. Image Restoration

Taking a noisy /corrupted image and generating the clean original image is nothing but image restoration. In many forms corruption can come such as camera miss focus, noise, motion blur etc.

C. Super Resolution

To enhance the resolution of an imaging system the Super resolution (SR) is very useful. There are term called optical SR which is the diffraction limit of systems is transcended, while in the geometrical SR there are enhancement of the resolution of digital imaging sensors.

1) Super Resolution Algorithm:
If there are completed the painting of the low-resolution picture then to recreate the high resolution of the image a single image super resolution approach is very useful. In order to model the texture synthesis at the higher resolution there use of low resolution in painted areas. The dificulty is to find higher resolution patch from a database of examples.
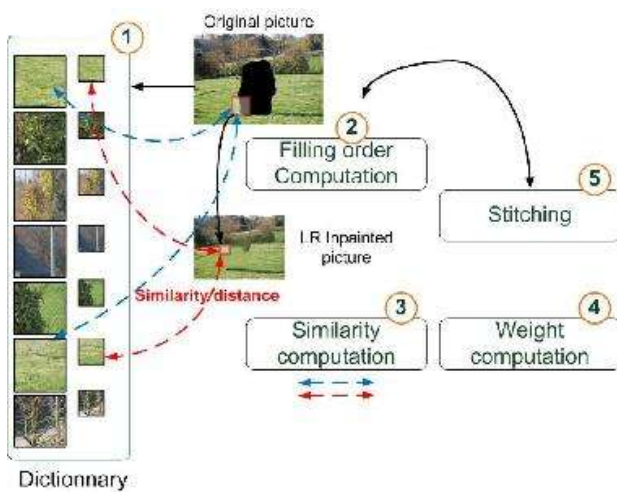
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Fig 3. Flowchart of super resolution algorithm

1.Dictionary building:

It consists of the coincidence between high and low resolution image patches. The unique constraint is the high-resolution patches have to be valid which is absolutely composed of known pixels. In the proposed system, from the known part of the image high-resolution and valid patches are evenly obtain. The dictionary size is a user-parameter. For storing the spatial coordinates of HR patches (DHR) an array is very useful. By using the decimation factor the LR patches are simply deducted.

1.Filling order of the HR picture:

A measure of priority for each patch is the estimation of the filling order. With the scarcity-based method it is estimated on the HR images. So that whit the comparison of a raster-scan filling order the quality of in painted picture is increased.

2.For the LR patch corresponding to the HR patch :

In the in painted images according to its K-NN of lower resolution which patch having the highest priority are desired. There are only best candidate is kept.

IV. RESULTS AND DISCUSSIONS

Original Image   Inpainting   Exemplar method   Output image

Input Image   Output Image

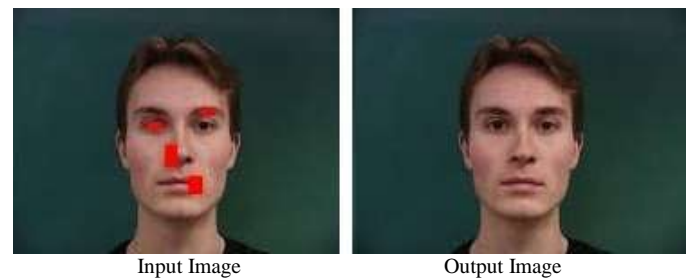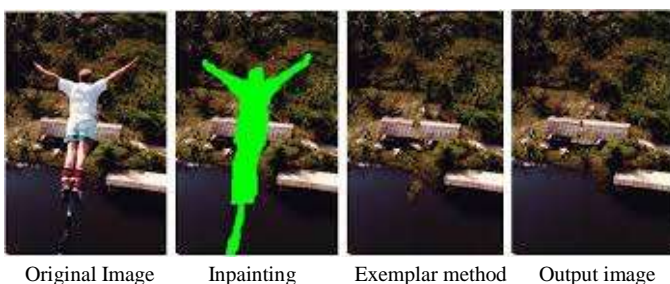Input Image   Output Image
Figure 4. Input and Output images

The above figure is the original input image. This image is damaged image.

The above figure is the output image. It is recovered from damages image by using image inpainting.

1. Registration Page

This is the registration window, here user can register and get his username and password. Ifusername already present then system just validate and display the message to respective user.In this window, email and mobile number is accepted only when both are valid. Register usercan get the OTP as e-mail on registered mail id. User can get OTP at every login.
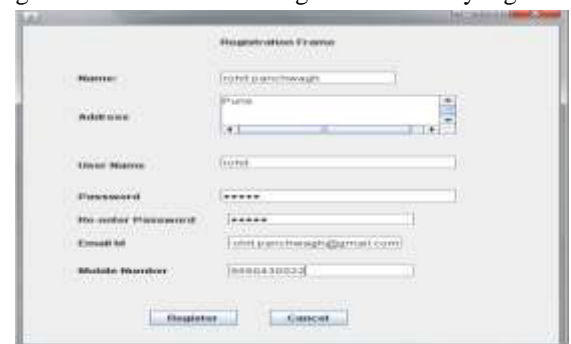

Figure 8.1: Registration Page

2. Login window

This window show login frame, here registered user can login by using username and password generated at registration window. User can receive an email on his registered mail id which contains the OTP for the login. This OTP is only for authentication purpose only. After entering correct OTP which was sent on mail by the system user can access the next window. On this window one link also available for new user, they can click this link and register themselves.

Figure 8.2: Login window

3. File Menu

After login user can see this window, in le menu of this window multiple menu items. User canselect his video for inpaint, also he can open an image for inpaint directly. He can save image,also he can click on save as menu item. Here need to select video for frame extraction. After clicking on open video menu item, browse video for inpaint will be opened.

Figure 3: File Menu

4. Selection of Video

When user select the open video menu item from main frame, this window will opened. Here usercan browse the video for frame extraction purpose. After click on browse button file dialogue boxwill opened for selecting the video. When video le found, play and frame extraction buttonsare enabled. Play button can play the selected video in another window and frame extractionbutton can extract the frames from video.

Figure 4: Selection of Video

5. Played Video

This is the window where selected video can play. After selecting the video, play button can enabled. Clicking on play button, video can play in this window. Video can play only when format of the video is correct for jmf.

Figure 5: Played Video

6. Frame Extraction completion

The next step after selecting video is frame extraction. Here Frame Extraction button can enabled after selecting the correct video le. Frames can extract from the selected video. Ifvideo format is not correct then it can through the exception for select the correct file format. If frames are extracted from video successfully then view frame button can be enabled.

Figure 6: Frame Extraction completion

7. Extracted frames

All frames extracted from the video can displayed here. View frame is enabled if frames extractedfrom the video, after clicking it this window will appeared. Here user can view single frame alsoby clicking the same.

Figure 7: Extracted frames

8. Region selection

After frame extraction user can select the images from where frames saved. User can select one image at a time. Here user needs to be select the image frame of the video that contain the object which needs to be removed from the video. All frames needs to be in painted those are contains targeted object one by one. After selecting image user can select the area of an imagewhere object is placed. User can select the area simply selecting the pixels which are surroundingto the targeted object. This window clearly shows the selected pixels. Red

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square is the firstpixel which was selected by the user and all black square shows the next selected pixels. The green line can be drawn in between two adjacent pixels.
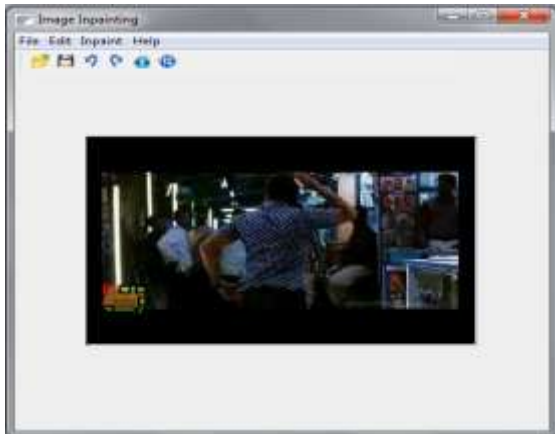

Figure 8: Region selection

9. Selected Region

If first pixel is the last pixel then it can be considered as selection process is completed and it can filled with green colour. It can be considered as selected area of the targeted object. Now usercan start his inpainting process for remove the object. User having two options for inpaint an image, first one is run means it can considered whole image as library from where it can search for best patch and second is the fast run where part of the image can considered for the best patch. After selecting one of them in painting process will start and according to the selection of type of inpaint it takes time

Figure 9: Region selected

10.Complete Inpaining

Finally, if selected area of the object completed then this message will displayed to the user forintimation purpose only.
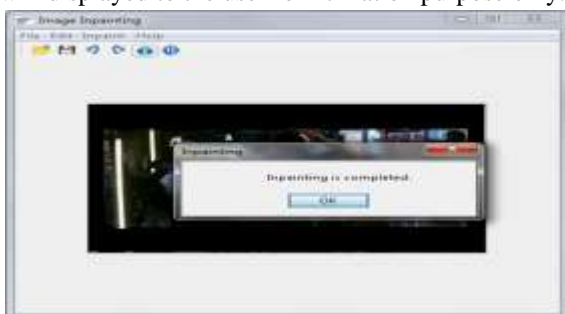

Figure 10: Complete Inpainting

11. In painted Video

After completion of inpainting, user can save an image from where it was selected. User canchange the path for save the in painted image by clicking save as menu item. Finally, user cancreate the video by using in painted frames. All frames are in painted those were contains object.After completion of in painting, these frames are combined are video is generated. This video is the in painted video.

Figure 11: In painted Video

V. CONCLUSION

A novel in-painting method is used for recovering the damage images or filling missing regions. By globally minimizing an energy term there are combined the low-resolution in-painted pictures. After completion of combination, to recover details at the native resolution a hierarchical single image super resolution method is applied.

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REFERENCES

[1] M. Bertalmio, G. Sapiro, V. Caselles, and C. Ballester, "Image inpainting," in *Proc. 27th Annu. Conf. Comput. Graph. Interact. Tech*, Jul. 2000, pp. 417–424.

[2] D. Tschumperlé and R. Deriche, "Vector valued image regularization with PDEs: A common framework for different applications," *IEEE Trans. Pattern Anal. Mach. Intell*, vol. 27, no. 4, pp. 506–517,Apr. 2005.

[3] T. Chan and J. Shen, "Variational restoration of non-flat image features: Models and algorithms," *SIAM J. Appl. Math*, vol. 61, no. 4, pp. 1338–1361,2001.

[4]   A. Criminisi, P. Pérez, and K. Toyama, "Region filling and object removal by examplar-based image inpainting," *IEEE Trans. Image Process.*,vol. 13, no. 9, pp. 1200–1212, Sep 2004.

[5]   I. Drori, D. Cohen-Or, and H. Yeshurun, "Fragment-based image completion," *ACM Trans. Graph*, vol. 22, no. 2003, pp. 303–312, 2003.

[6]   P. Harrison, "A non-hierarchical procedure for re-synthesis of complex texture," in *Proc. Int. Conf. Central Eur. Comput. Graph., Vis. Comput. Vis*, 2001, pp. 1–8.

[7]   C. Barnes, E. Shechtman, A. Finkelstein, and D. B. Goldman, "Patch-Match: A randomized correspondence algorithm for structural image editing," *ACM Trans. Graph.*, vol. 28, no.3, p. 24, Aug 2009.

[8]   O. Le Meur, J. Gautier, and C. Guillemot, "Examplar based inpainting based on local geometry," in *Proc. 18th IEEE Int. Conf. Image Process*, Sep. 2011, pp.3401–3404.

[9]   O. Le Meur and C. Guillemot, "Super resolution-based inpainting," in *Proc. 12th Eur. Conf. Comput. Vis*, 2012, pp. 554–567.