Video Inpainting with Inpainting technique using Super Resolution.

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Abstract—Image plays an important role in life. Image inpainting is used 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 result. 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—Exemplar based inpainting, Single image super Resolution.

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 inpainted 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.

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
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 examplar-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 textures.
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 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 Laplacians. [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, inpainting algorithm is applied.
3. By using a single-image SR method the quality of the inpainted regions is increased.
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 difficulty is to find higher resolution patch from a database of examples.
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 with the comparison of a raster-scan filling order the quality of inpainted picture is increased.

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

The above figure is the original input image. This image is damaged image.
The above figure is the output image. It is recovered from damaged image by using image Inpainting.

1. Registration Page
This is the registration window, here user can register and get his username and password. If username 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 user can get the OTP as email on registered mail id. User can get OTP at every login.
2. Login window
This window shows 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.
3. File Menu
After login user can see this window, in the menu of this window multiple menu items. User can select 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.

4. Selection of Video
When user select the open video menu item from main frame, this window will opened. Here user can browse the video for frame extraction purpose. After click on browse button file dialogue box will opened for selecting the video. When video file found, play and frame extraction button are enabled. Play button can play the selected video in another window and frame extraction button can extract the frames from 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 file. Frames can extract from the selected video. If video 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 extracted from the video, after clicking it this window will appeared. Here user can view single frame also by 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 image where object is placed. User can select the area simply selecting the pixels which are surrounding to the targeted object. This window clearly shows the selected pixels. Red
square is the first pixel 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 user can 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 Inpainting
Finally, if selected area of the object completed then this message will displayed to the user for intimation 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 can change the path for save the in painted image by clicking save as menu item. Finally, user can create the video by using in painted frames. All frames are in painted those were contains object. After completion of inpainting, 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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