

Patch-based Image inpainting

Notes:

Your program needs to be able to run directly, **if you need to use any input variables, please save it in advance**. Please submit your homework to spring2020cs270@163.com. With **both subject and file name** in this format. (CS270+ID+name+hw4) example, CS270_2019123321_张三_hw4. DDL:2020/6/28

One common and difficult task closely linked to the world of image editing is image “inpainting”. Generally speaking, this is the task of replacing the content of an image or video with some other content which is visually pleasing. We found a beautiful picture of grass, but a girl in the picture disturbed the natural scenery. Let's remove her using the technique we just learned. Before showing the final effect, let us recall Patch-based Image inpainting.



Step 1: In order to remove this girl, first we need to create a mask to identify her and find out the boundary to facilitate the next step.

Step2: Combining unknown region size and gradients, we can calculate the priority of the boundary point. From left to right are the mask picture, boundary picture, priority picture(The brighter part of Figure 3 means higher priority).

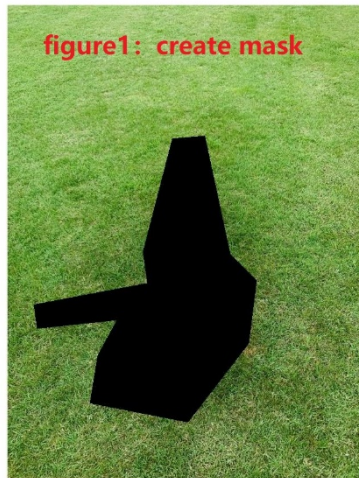


figure1: create mask

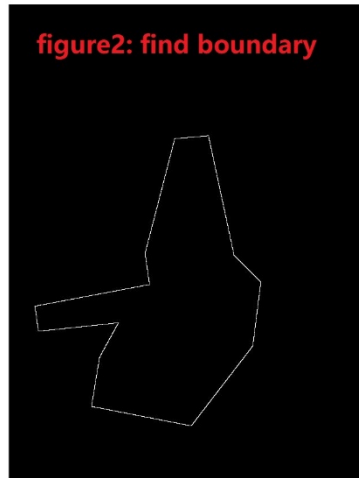


figure2: find boundary



figure3: calculate priority

Step 3: Through the priority, we can find that the point in the lower left corner has the highest priority. In order to show the patch better, we set the size of the patch_A to 51(For good results, we do not need to set the patch size so large). By searching the full image, we can find a most similar patch_B. A new patch_C can be obtained by fusing the patch_B with the patch_A. From left to right are A,B,C.



Step 4: Fill in the new patch_C, and we get the result of the first step.

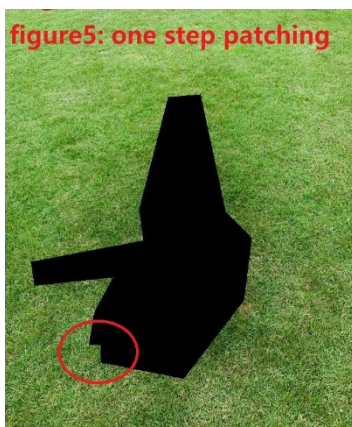


figure5: one step patching

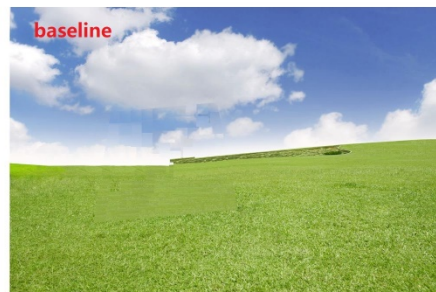
Step 5: Update the priority, and iterate all the steps above, the girl is completely removed.

If the patch size is set to a suitable value, we can achieve better results.



Task:

1. Use language and mathematical formulas to describe the process of calculating priority of boundary points(hint: slides ,page 25) 2'
2. Implement the program and display the relevant results.
Corresponding scores,
Step1 : 2'
Step2: 2'
Step3: 2'
Step4: 2'
Step5: 2'
3. Try your program on this picture, and show your result. 3'



Bonus:

- How to detect whether the picture has been processed? Describe your method in language or algorithm diagram, and implement the program. 5'

