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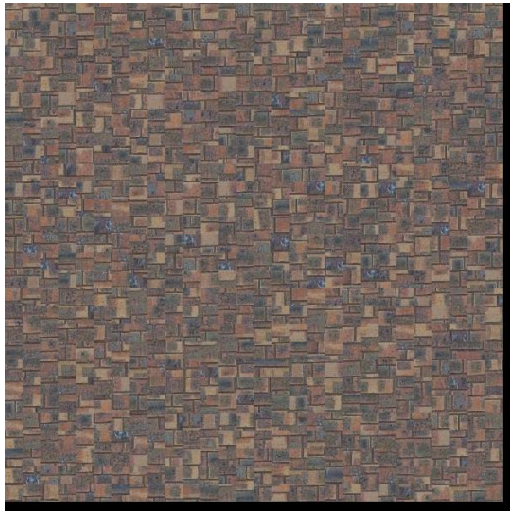
CS 445 - Project 2: Image Quilting

1. Randomly Sampled Texture

Sample:



Patch_size:21, out_size:600



2. Overlapping Patches

Sample:



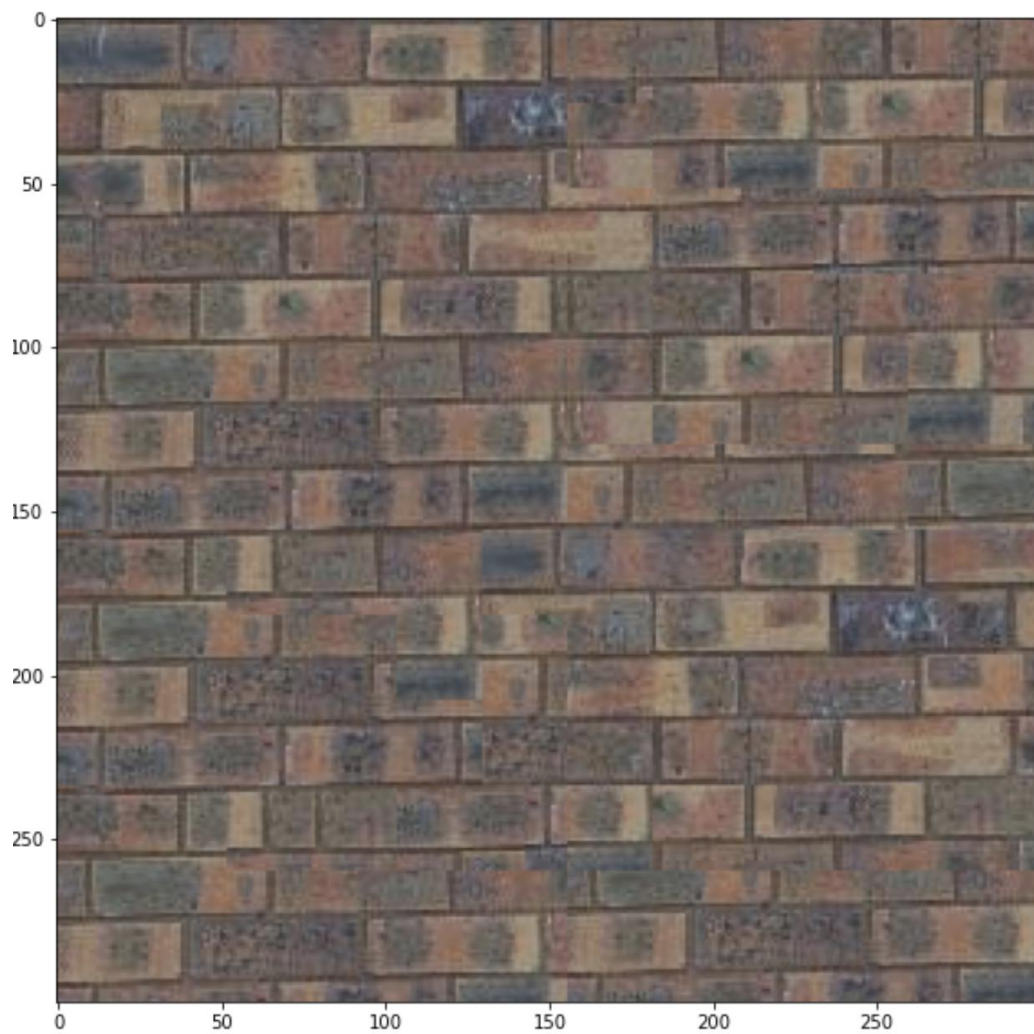
out_size = 300

patch_size = 40

overlap = 14

tol = 3

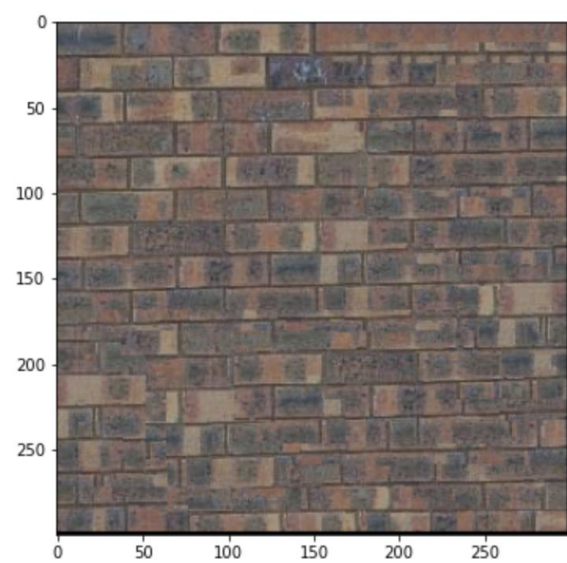
Result:



3. Seam Finding

Patch_size = 25,

Overlap = 10



Display:

To make it easier, I change the parameters: patch_size = 10, overlap = 5

A cut of a vertical overlapping region:

```
[[0. 0. 1. 1. 1. 0. 0. 0. 0. 0.]
 [0. 1. 1. 1. 1. 0. 0. 0. 0. 0.]
 [0. 0. 1. 1. 1. 0. 0. 0. 0. 0.]
 [0. 0. 0. 1. 1. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 0. 0. 1. 1. 0. 0. 0. 0. 0.]
 [0. 0. 0. 1. 1. 0. 0. 0. 0. 0.]
 [0. 0. 1. 1. 1. 0. 0. 0. 0. 0.]
 [0. 1. 1. 1. 1. 0. 0. 0. 0. 0.]]
```

A cut of a both vertical and horizontal overlapping region:

```
[[0. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [1. 1. 1. 1. 0. 0. 0. 0. 0. 0.]
 [1. 1. 1. 1. 1. 0. 0. 0. 0. 0.]
 [1. 1. 1. 1. 1. 1. 1. 0. 0. 1.]
 [1. 1. 1. 1. 1. 1. 1. 1. 1. 1.]
 [0. 0. 1. 1. 1. 0. 0. 0. 0. 0.]
 [0. 0. 1. 1. 1. 0. 0. 0. 0. 0.]
 [0. 0. 0. 1. 1. 0. 0. 0. 0. 0.]
 [0. 0. 1. 1. 1. 0. 0. 0. 0. 0.]
 [0. 1. 1. 1. 1. 0. 0. 0. 0. 0.]]
```

A cut of a horizontal overlapping region:

```
[[0. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 1. 1. 0. 0. 0. 0. 0.]
 [0. 0. 1. 1. 1. 1. 0. 1. 0. 0.]
 [1. 1. 1. 1. 1. 1. 1. 1. 1. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 0.]]
```

SSD:

A left L2:

```
leftL2 [[9.38100730e-04 4.61361015e-04 7.07420223e-04 7.07420223e-04
1.50711265e-03]
[8.30449827e-04 1.69165705e-03 2.15301807e-04 3.99846213e-04
2.04536717e-03]
[3.69088812e-04 8.61207228e-04 1.23029604e-04 4.61361015e-05
1.69165705e-04]
[9.38100730e-04 7.68935025e-04 3.99846213e-04 2.61437908e-04
3.99846213e-04]
[1.61937716e-02 7.08958093e-03 2.29142637e-03 6.45905421e-04
6.45905421e-04]
[2.53748558e-03 6.28988850e-03 2.15301807e-03 6.30526720e-04
8.30449827e-04]
[4.19838524e-03 3.41407151e-03 5.75163399e-03 6.21299500e-03
1.18415994e-03]
[3.02960400e-03 1.93771626e-03 1.55324875e-03 6.30526720e-04
2.78354479e-03]
[8.38139177e-03 9.07343329e-04 2.15301807e-04 1.18415994e-03
3.22952710e-03]
[4.44444444e-03 1.01191849e-02 9.91926182e-03 6.45905421e-04
1.32256824e-03]]
```

A upL2:

```
upL2 [[9.22722030e-05 1.55324875e-03 1.66089965e-03 4.45982314e-04
1.18415994e-03 1.43021915e-03 1.13802384e-03 6.67435602e-03
4.05997693e-03 1.15340254e-03]
[5.44405998e-03 3.33717801e-03 3.07574010e-03 7.68935025e-05
2.55286428e-03 3.98308343e-03 7.68935025e-04 1.05959246e-02
8.75048058e-03 6.92041522e-04]
[2.24529027e-03 1.05036524e-02 2.24529027e-02 6.35140331e-03
5.84390619e-04 5.61322568e-03 7.53556324e-04 3.96770473e-03
8.75048058e-03 5.38254517e-04]
[3.07574010e-04 7.38177624e-04 4.61361015e-03 2.98346790e-03
7.68935025e-04 1.81468666e-03 2.47597078e-03 9.99615532e-04
5.70549789e-03 5.99154171e-02]
[1.78392926e-03 3.50634371e-03 2.79892349e-03 4.45982314e-04
4.76739715e-03 1.63014225e-03 2.26528258e-02 8.91964629e-04
1.52249135e-03 2.17301038e-02]]
```

4. Additional Quilting Results

Result1:



Result2:

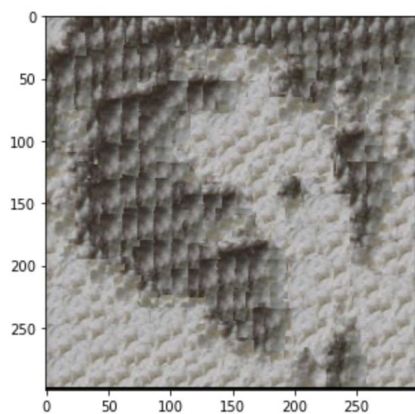
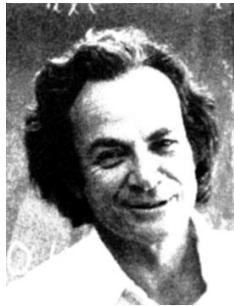


5. Texture Transfer

In texture transfer, we calculate 2 parts of SSD, one is the original overlapping region SSD(with alpha parameter), and the other is the square difference between the patch and the guidance image(with 1-alpha parameter). When calculating the latter one, we use correspondence maps(grayscale and gaussian-filtered images).

Result1:

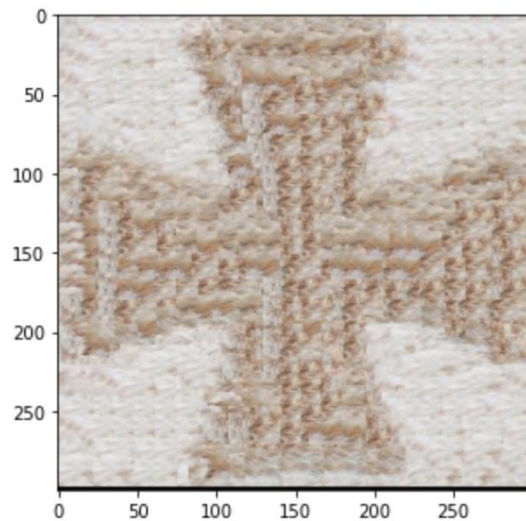
Input: white_small.jpg, feynman.tiff



Result2:

Input:



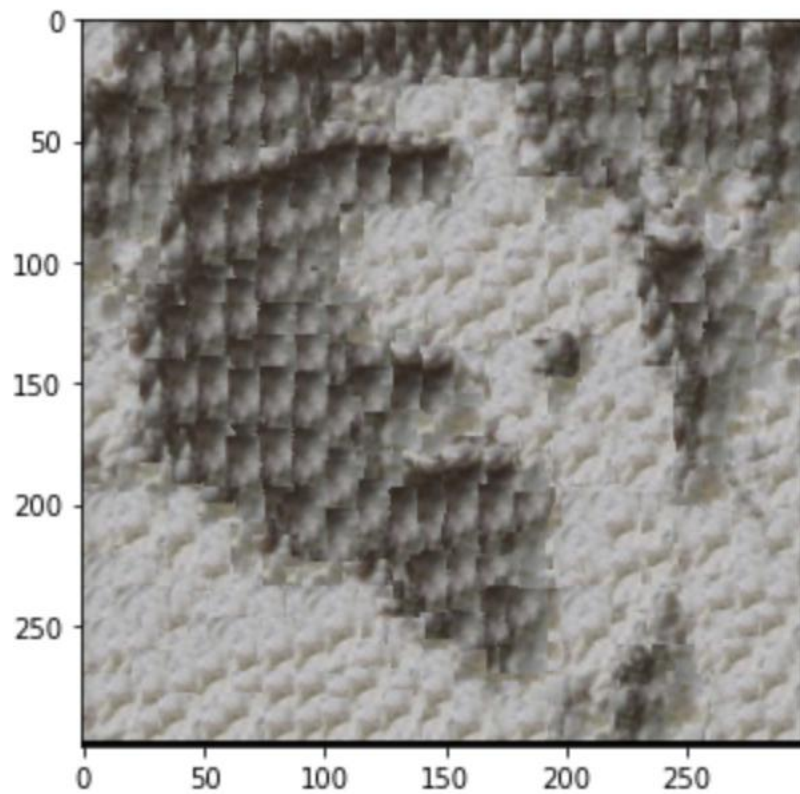


7. Iterative Texture Transfer (B&W)

In the iterative texture transfer, we make sure that the blocks are matched not just with their neighbor blocks on the overlap regions, but also with whatever was synthesized at this block in the previous iteration. In this task, I did 3 iterations, reducing the block size by roughly a third each time, and setting the alpha using the following calculation(i stands for i th iteration):

$$\alpha_i = 0.8 * \frac{i-1}{N-1} + 0.1$$

Result:



Reference:

http://www.cs.cmu.edu/afs/andrew/scs/cs/15-463/f07/proj_final/www/wwedler/
https://openaccess.thecvf.com/content_cvpr_2018/papers/Men_A_Common_Framework_CVPR_2018_paper.pdf
<https://devashi-choudhary.medium.com/texture-synthesis-generating-arbitrarily-large-textures-from-image-patches-32dd49e2d637>
<https://github.com/rohitango/Image-Quilting-for-Texture-Synthesis/tree/master/utils>
<https://github.com/vikasTmz/Texturize>
<http://jmecom.github.io/projects/computational-photography/texture-synthesis/>