Report : Assignment 2
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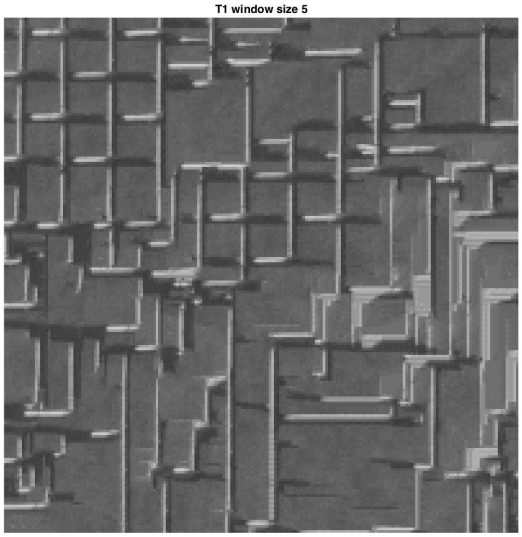
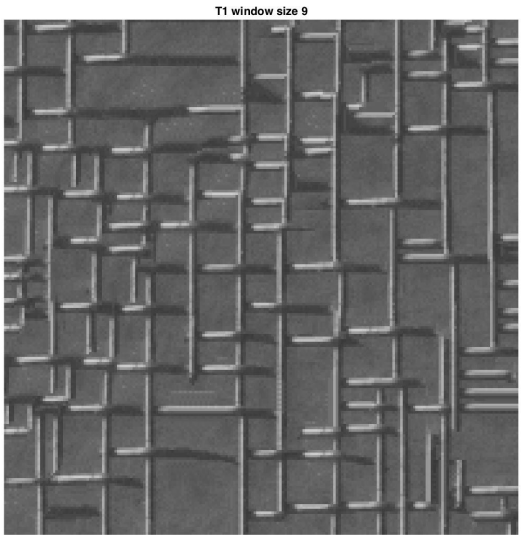
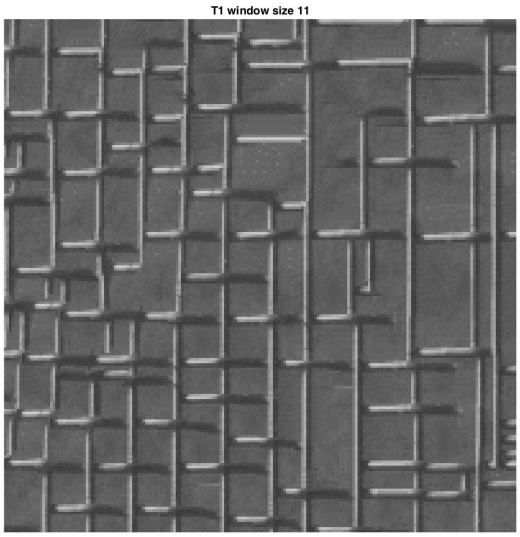
How to run:
Texture Synthesis: Run GrowImage.m [4]
Image Inpainting: Run image_inpainting.m
Specify the filename
Object Removal: To run criminisi et.al [3] run example.m with appropriate filename.

T1.gif Windowsize 5, WindowSize 9 and Windowsize 11 respectively

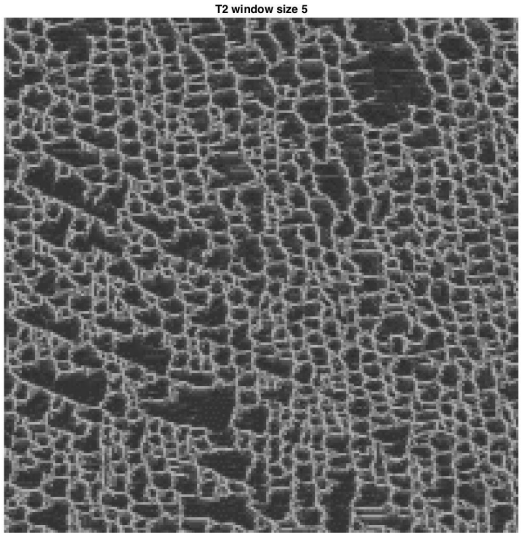




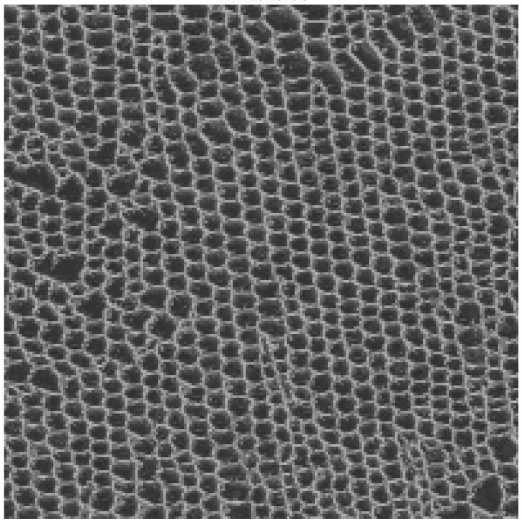


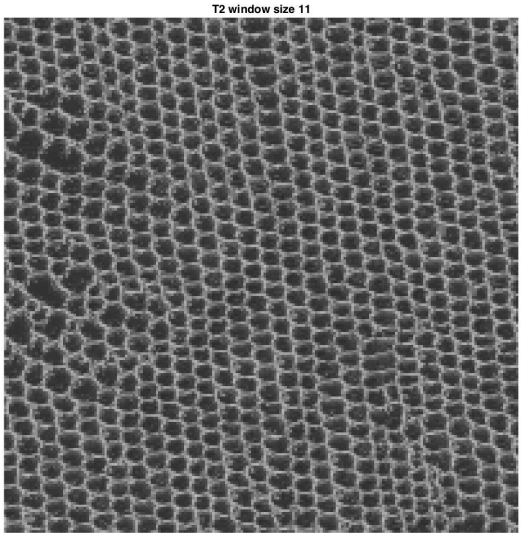
T2.gif Windowsize 5, WindowSize 9 and Windowsize 11 respectively

T2 window size 5

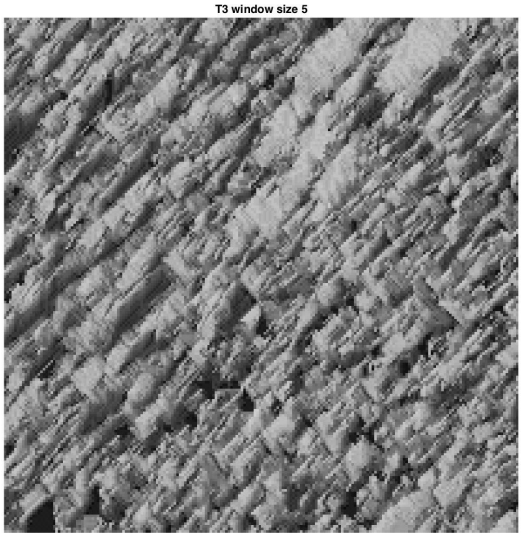


T2 window size 9

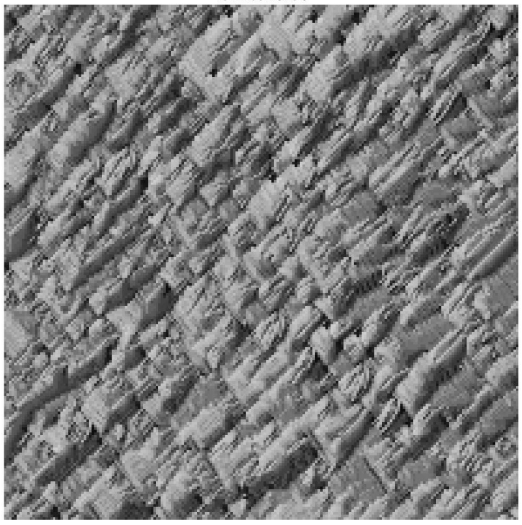




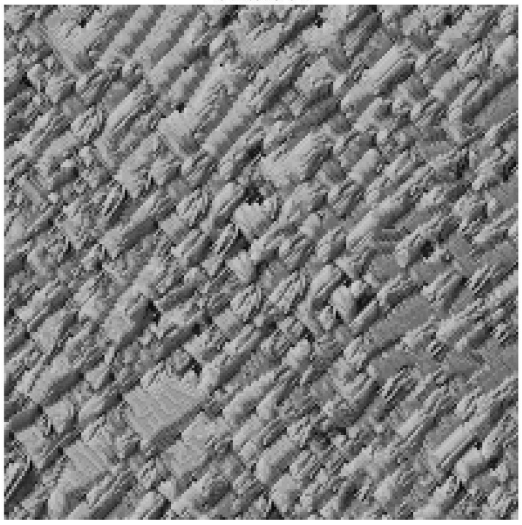
T3.gif Windowsize 5, WindowSize 9 and Windowsize 11 respectively



T3 window size 9

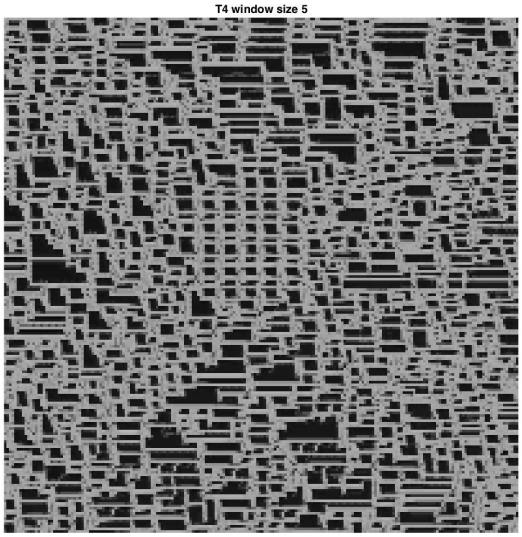


T3 window size 11

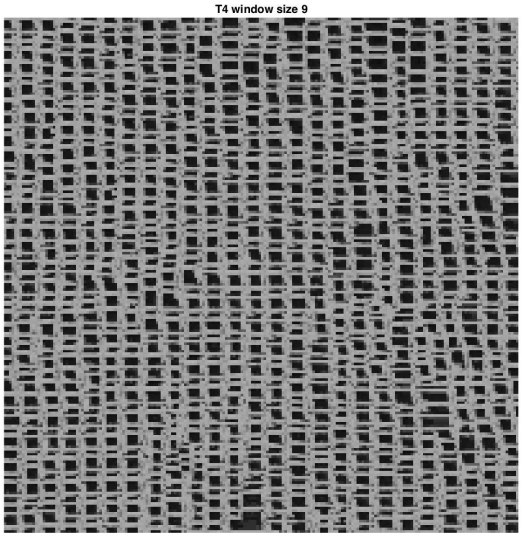


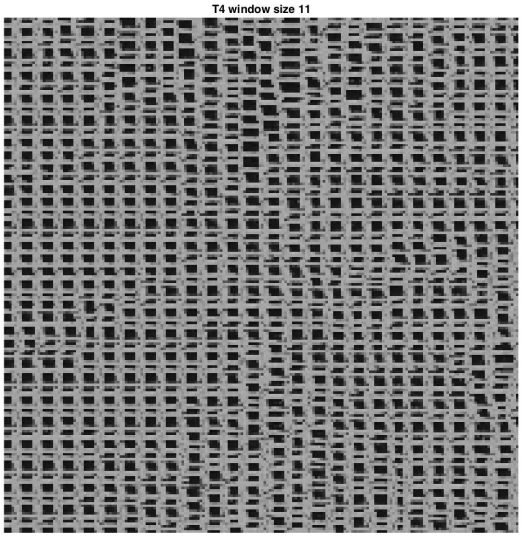
T4.gif Windowsize 5, WindowSize 9 and Windowsize 11 respectively

T4 window size 5

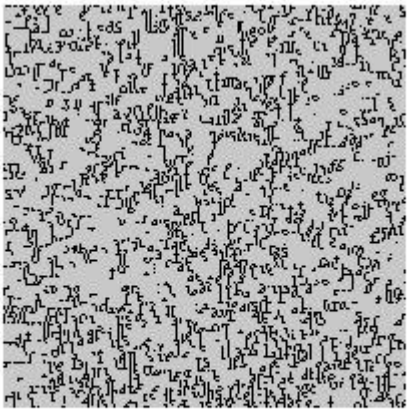


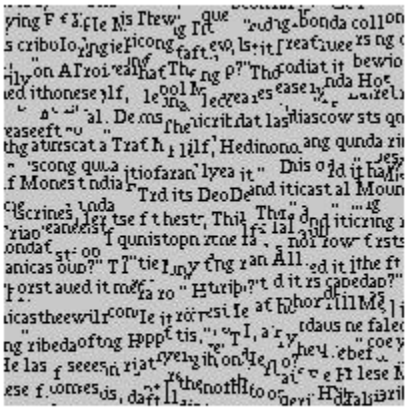
T4 window size 9





T5.gif Windowsize 5, WindowSize 9 and Windowsize 11 respectively





Q2. Image Inpainting

Increasing the window size gives better results.

Image 1 Window Size 5

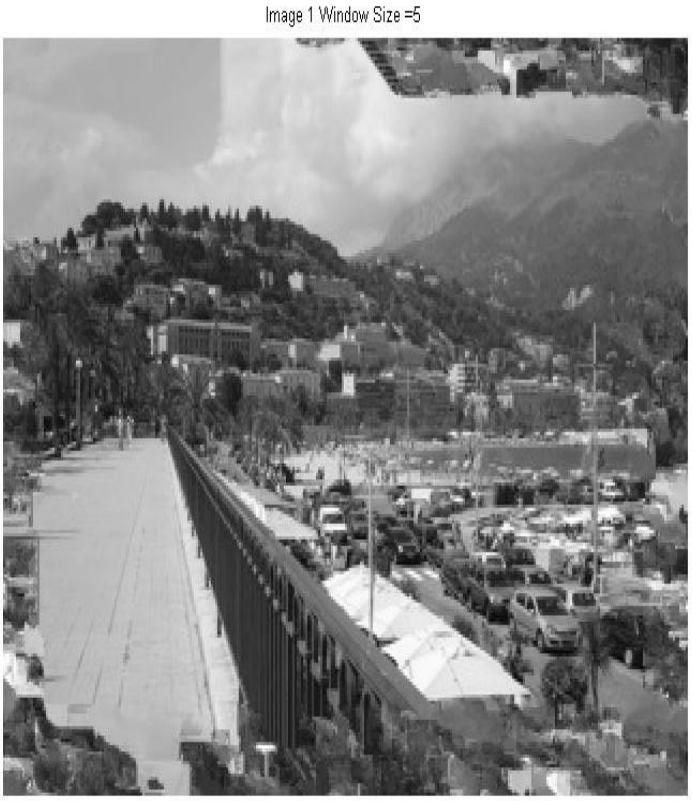


Image 1 Window Size 9

Image 1 Window Size =9

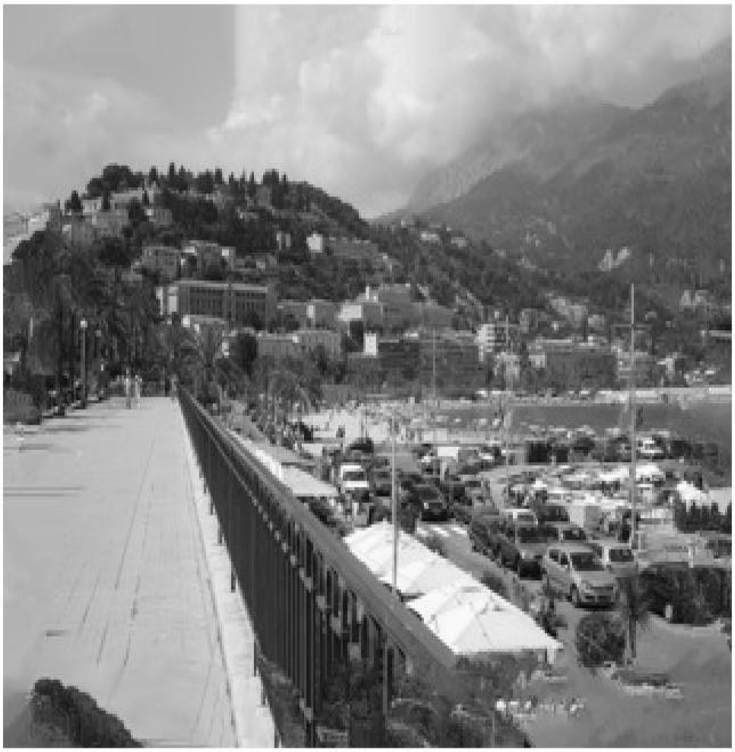


Image 1 Window Size 11

Image 2 Window size 5

Image 2 Window size 9

Image 2 Window Size =9

Image 2 Window size 11

Q3.
Criminisi et.al. Method yields result even for RGB images but performs slower than Efros and Leung approach.

Land Removed

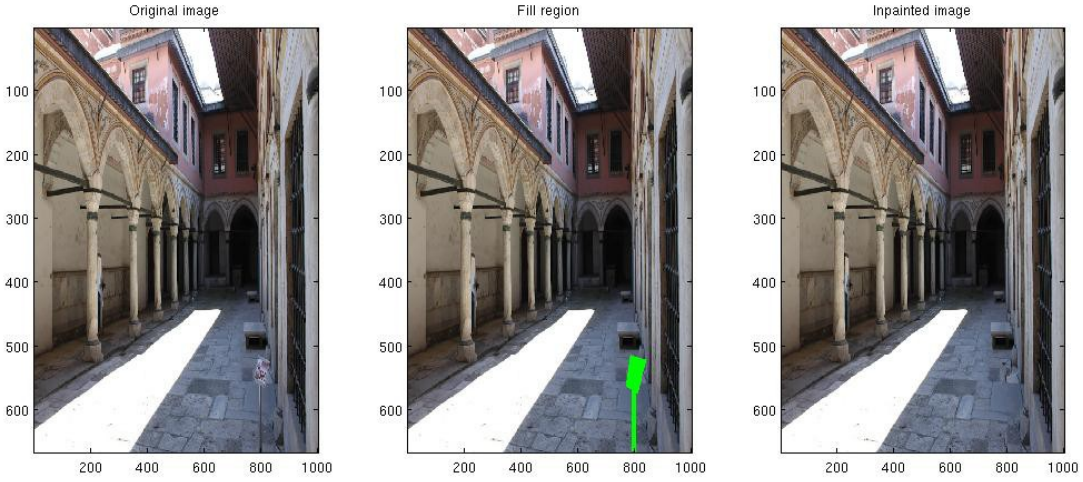
Sign Removed

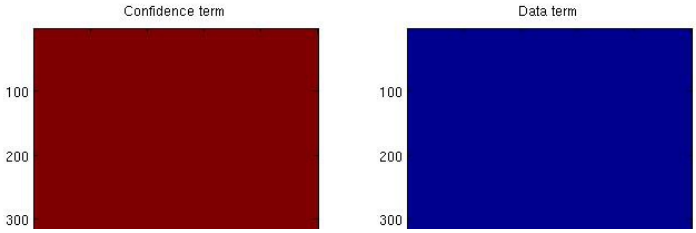
Man Removed

Criminisi et.al. Method

Man removed

Man and Pole removed





All components removed

Q4. Texture Synthesis using non-parametric sampling vs Image Quilting for texture synthesis and transfer.

Texture Synthesis using non-parametric sampling grows a new image outwards from an initial seed filling one pixel at a time. In doing so it preserves the local structure of the image. A problem with such an approach is that for most complex textures very few pixels actually have a choice of values that can be assigned to them and hence for such an image, most pixels have their values determined from what has been synthesized up to that point.[1]

This method models the texture image as a Markov Random Field and like mentioned above, the conditional pdf of a pixel given its neighbors synthesized thus far is estimated by searching the sample image for similar neighborhoods.

Image Quilting for texture synthesis and transfer

The complete quilting algorithm is as follows: Go through the image to be synthesized in raster scan order in steps of one block (minus the overlap). For every location, search the input texture for a set of blocks that satisfy the overlap constraints (above and left) within some error tolerance. Randomly pick one such block. Compute the error surface between the newly chosen block and the old blocks at the overlap region. Find the minimum cost path along this surface and make that the boundary of the new block. Paste the block onto the texture. Repeat [1]

This method synthesises the new image by stitching together small patches of existing images. It's computationally more expensive than Efros & Leung approach but with smaller chance of producing garbage regions in the image. Also, this method is significantly faster than Efros and Leung approach.

Similarities: Both the methods use L2 Norm on pixel as a measure of computing error
Both find matching regions by calculating SSD.
Dissimilarities:
-Efros and Leung grows the image pixel by pixel. Efros and Freeman stitch together patches of existing image i.e. unit of synthesis in Efros and Leung is a pixel and for it's a block.
-Efros and Freeman is much faster than Efros and Leung
-Efros and Leung is non-parametric while Efros and Freeman uses 2 parameters: Size of block, size of overlap.

Referneces:
[1] Texture Synthesis by Non-parametric Sampling , Efros and Leung ICCV 1999
[2] Image Quilting for Texture Synthesis and Transfer. Efros and Freeman SIGGRAPH 2001
[3]Efros & Leung "http://graphics.cs.cmu.edu/people/efros/research/EfrosLeung.html
[4]Image Quilting, "http://www.mathworks.com/matlabcentral/fileexchange/35828"