CS 663
Fundamentals Of Digital Image Processing

Image Quilting for Texture Synthesis and Transfer

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Problem Statement:

To implpement a simple mimage based method of generating novel appeareance in which a new image is synthesized by stitching together small patches of existing images. This process is known as **Image Quilting.**
We 1st use quilting as a method to synthesize large textures (**Texture Synthesis**) , then, we extend the algorithm to perform T**exture Transfer** i.e. rendering an object with a texture taken from a different object

Detailed problem statement and algorithm can be found on:

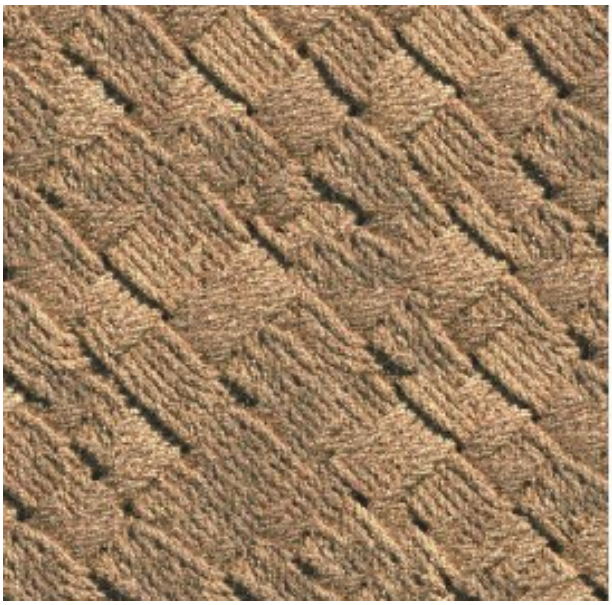
https://www2.eecs.berkeley.edu/Re /CS/vision/papers/efros-siggraph01.pdf

Experimental Results:

Some Quilting Results:

1) Jute

Quilted

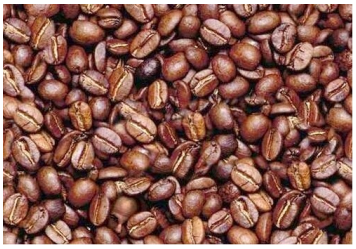


original

2)Coffee

Quilted

Original



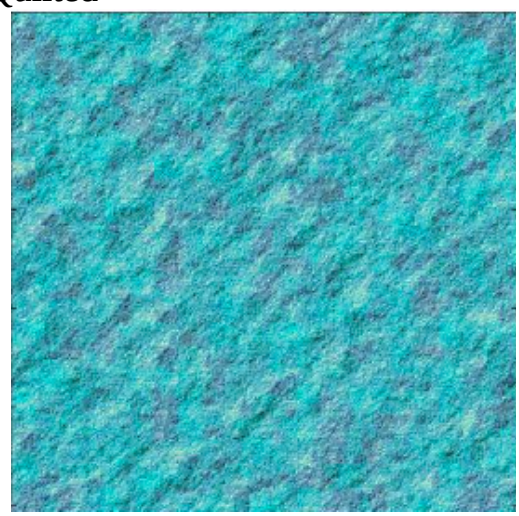
3) Wall

Quilted

Original

4) Bluerock

Quilted

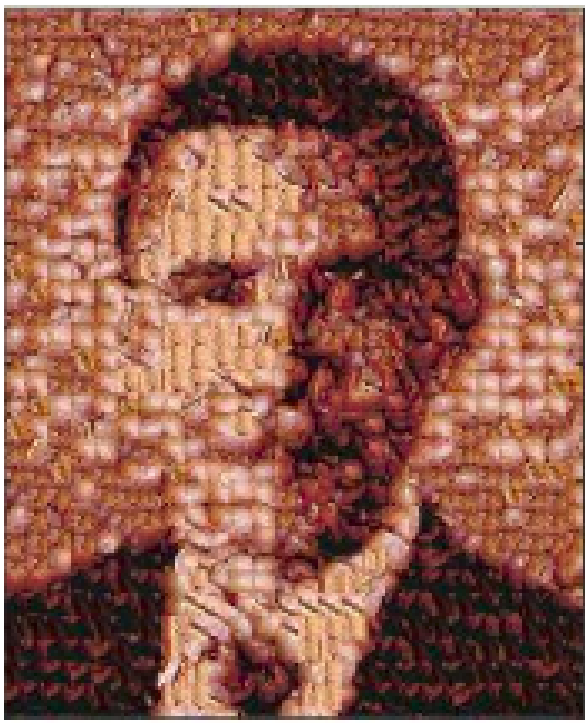


Original

Some Texture Transfer Results:

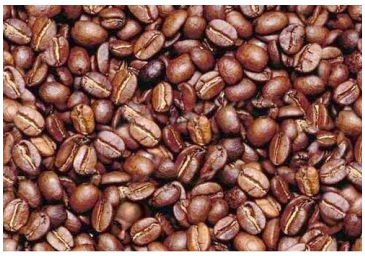
1)Obama With a Texture of Coffee beans

Output Image



Target Image

Texture



2) Ajit Sir With a Texture of Jute

Texture

Output Image

Target image

3) Donald Trump with a texture of blurerock

Output Image

Target Image

texture

4)Obama with a background of Wall

Output Image

Target image

Texture

More results Can be found in the output folder in the image folder

Observations and Conclusions:

- The Image quilting algorithm which uses the minimum cut edges produced way better reults then the random block generation algorithm
- The results of Texture Synthesis Agorithm are better for more random textures (like bluerock.jpg , text.jpg , bacteria.jpg etc.) than that for images with some order (like jute.jpg, wall.jpg etc.)
- For Texture Transfer, on decreasing the patch size, the silimarity to the Target image will increase (due to less blurrness and more attention to all edges) but the resemblence to texture will decrease. Same thing will happen on increasing alpha (i.e. the weightatge of dissimilarity between Target image and atch neing inserted)

Functions Used:

1. **quilt_synthesize**: call this function to sythesize larger texture from given texture
   Parameters : a) b_size : block/patch size (x,y)
   b) o_size : overlap size (x,y)
   c) im : input texture image
   d) out_size : size of output texture (x,y,z)

2. **quilt_transfer**: call this function to transfer the given texture to a target image
   Paramters : a) trans : target image
   b) b_size :block/patch size (x,y)
   c) o_size : overlap size (x,y)
   d) im : input texture image
   e) alpha : weightage of

3. **find_patch** : called by quilt_synthesize to find the patch with the least overlap error

4. **find_patch_transfer**: called by quilt_transfer to find the bezt fit patch

5. **find_top_cut** : to find the minimum cut edge in horizontal direction

6. **find_left_cut** : to find the minimum cut edege in vertical direction