

CS663 Course Project

Image Quilting for Texture Synthesis and Transfer

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Texture Synthesis Process

Images are formed by stitching in raster scan order

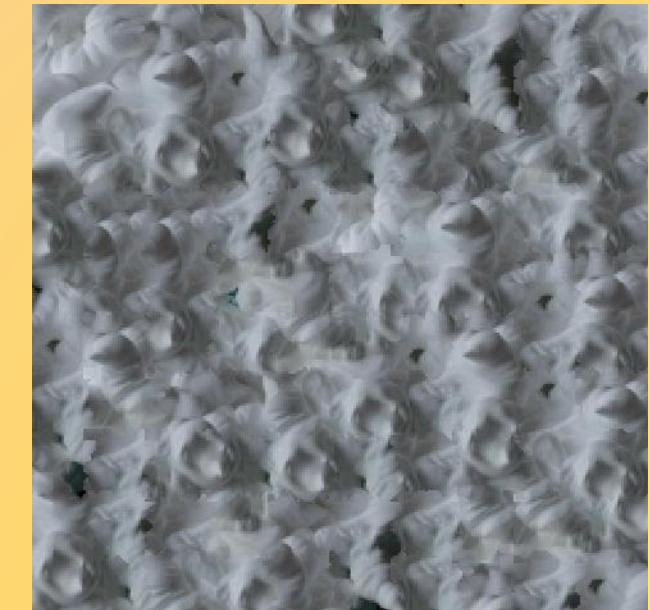
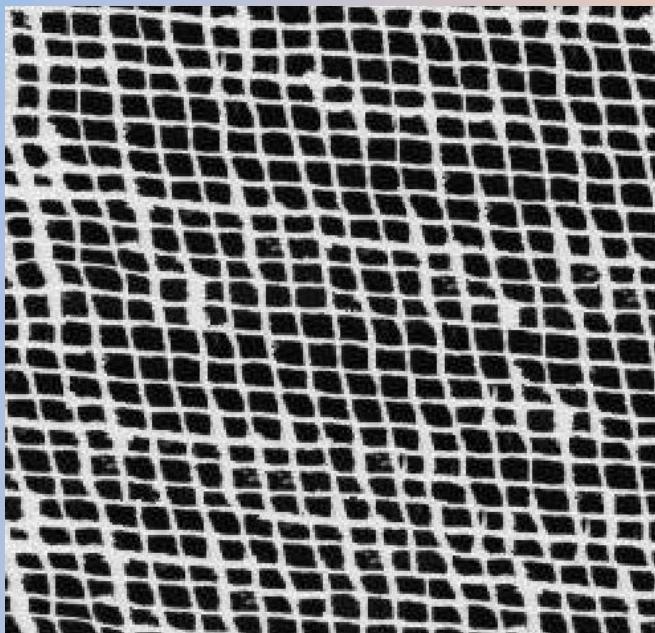
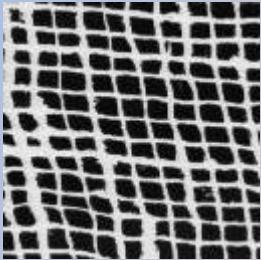
Choose a block from the set of all overlapping blocks of specified size which minimizes error in overlap region

Find the minimum error path in the overlap region to make the optimal cut

The cut block is stitched together with the image formed so far

Block size and overlap factor in both directions is chosen by user

*The following quilted images are for a
block size of 32 and overlap factor of $\frac{1}{4}$.*



256x256



496x496



128x128



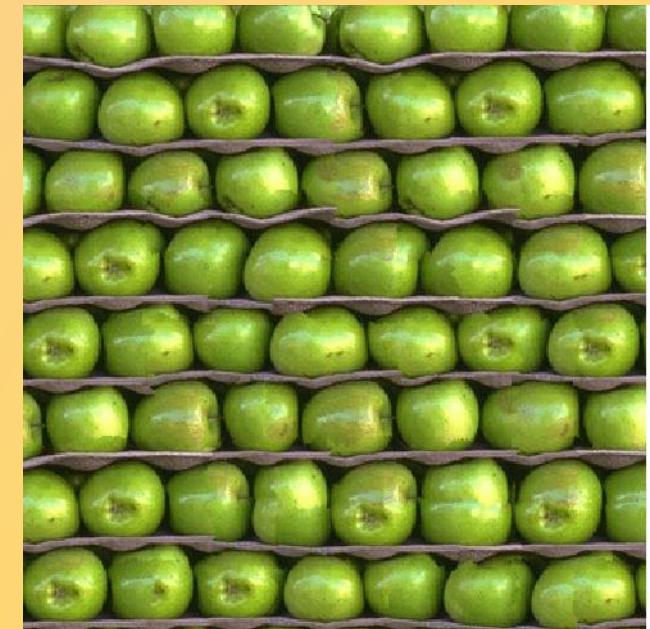
248x248



124x185

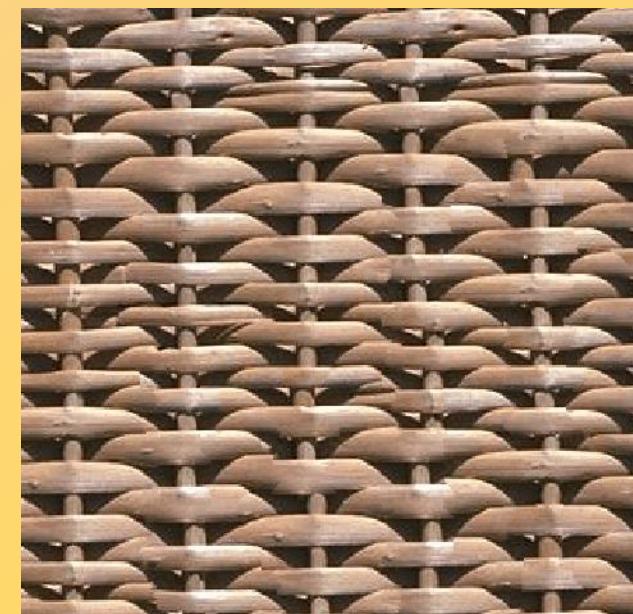
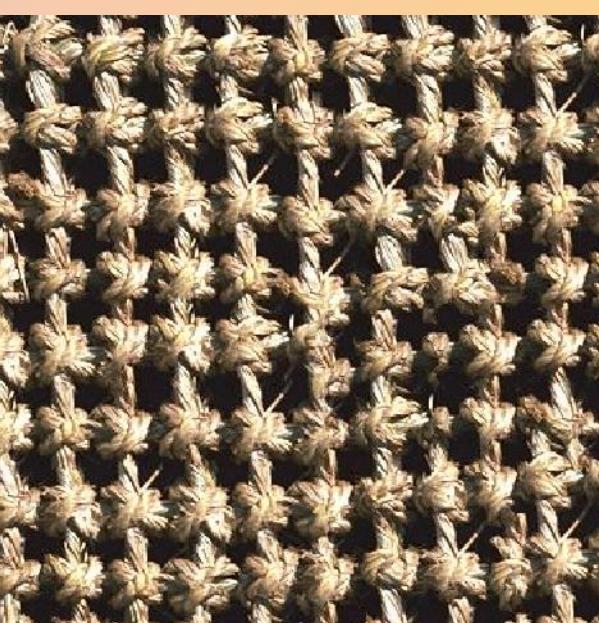
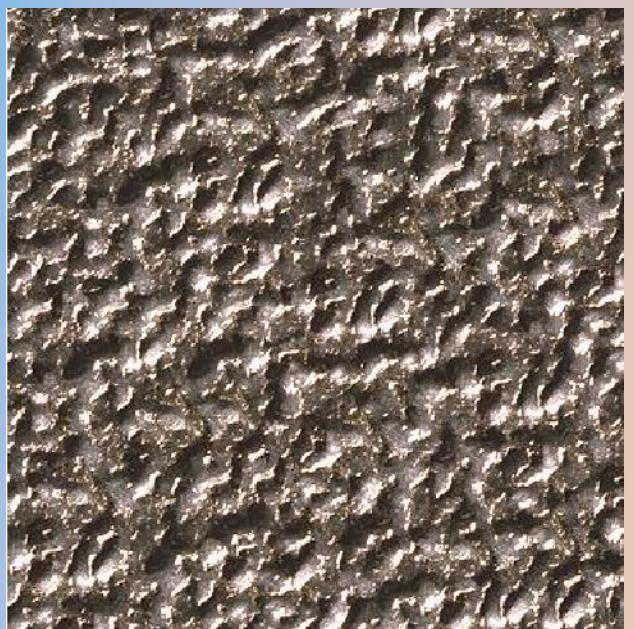
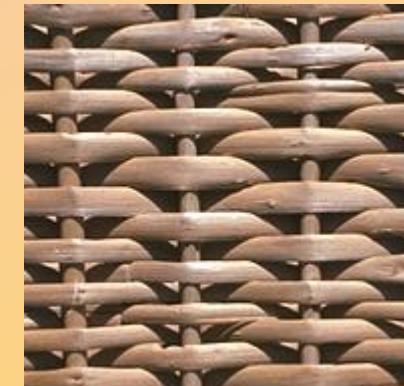


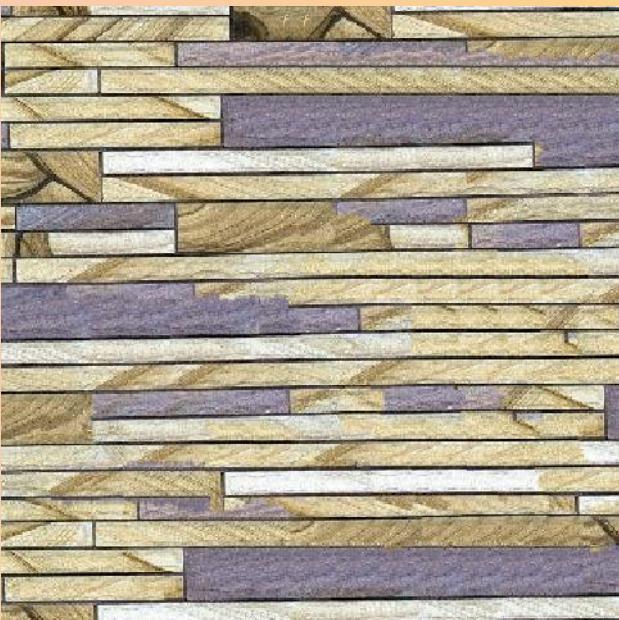
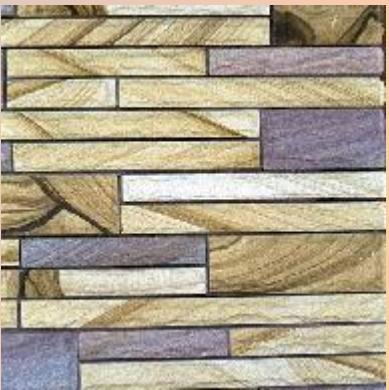
357x357

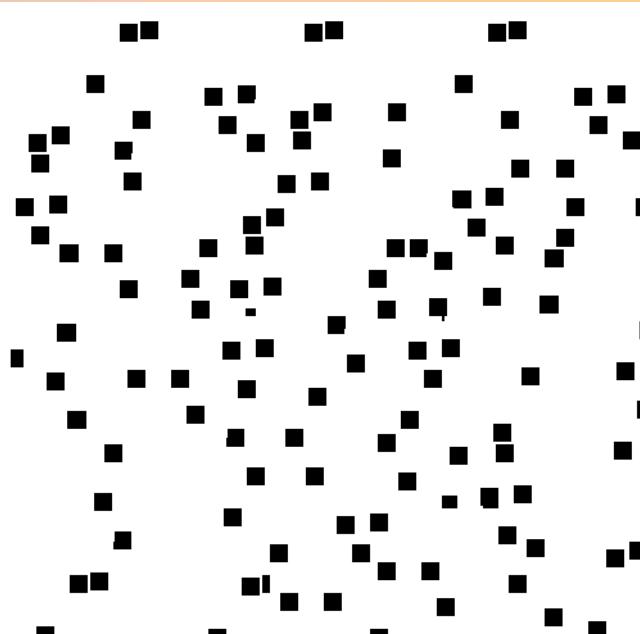
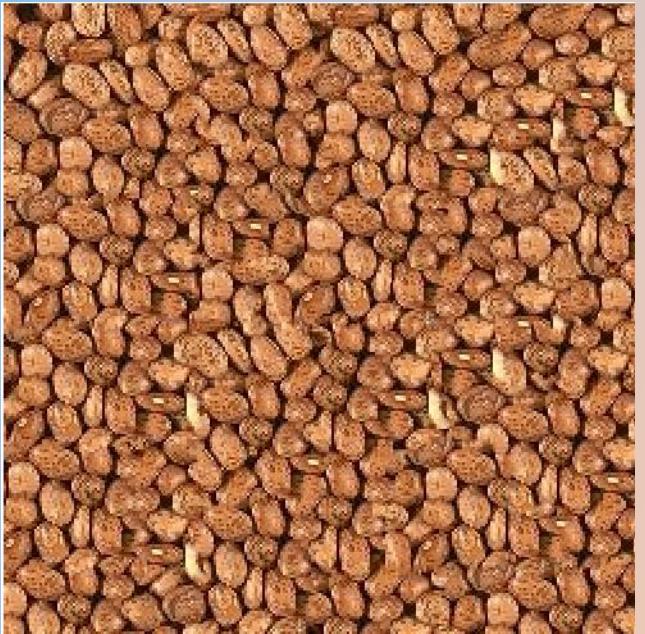
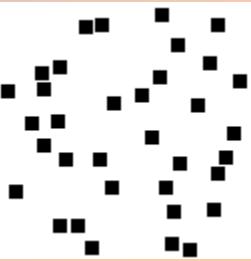


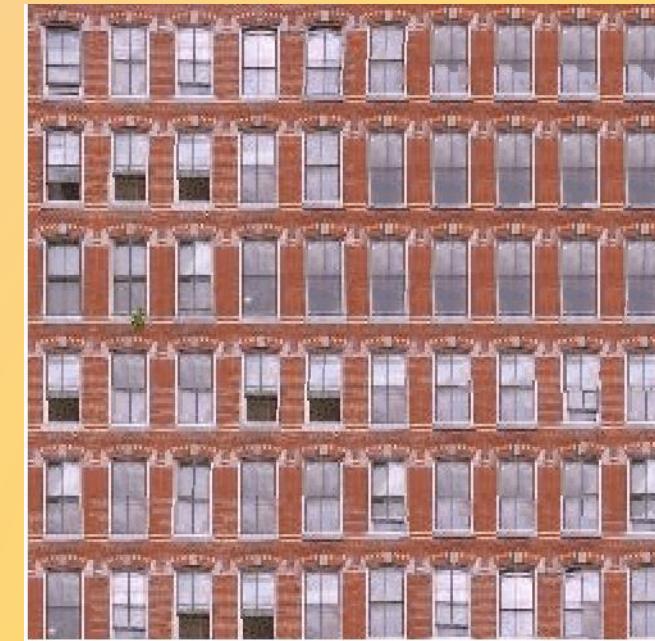
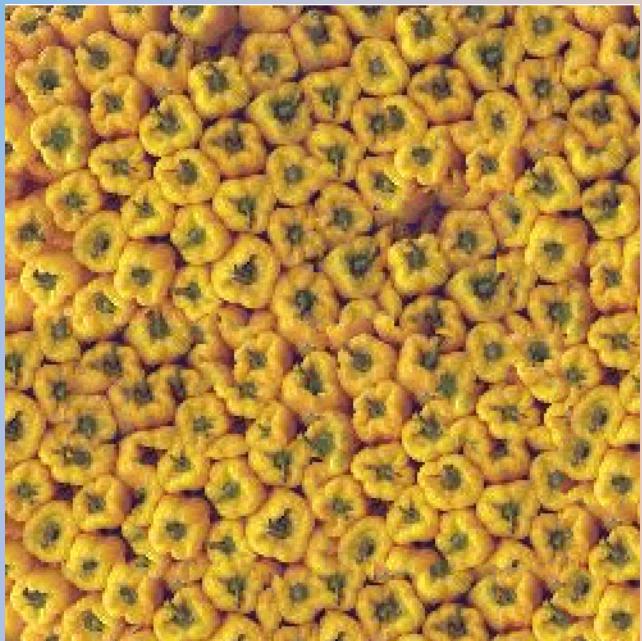
These images were made with an overlap factor of $\frac{1}{6}$, which was mentioned in the paper. $\frac{1}{4}$ has better results than $\frac{1}{6}$ overlap factor since the overlap is higher.











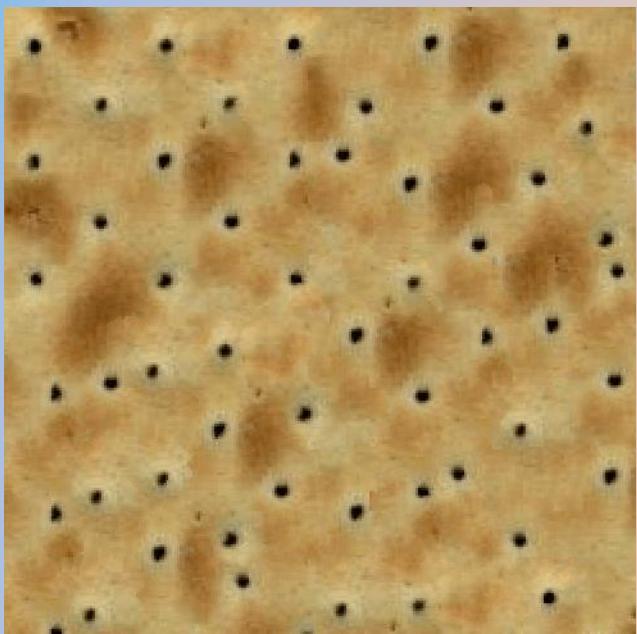
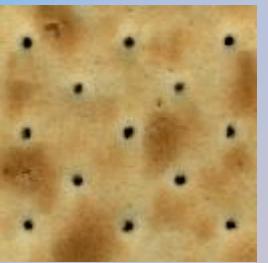


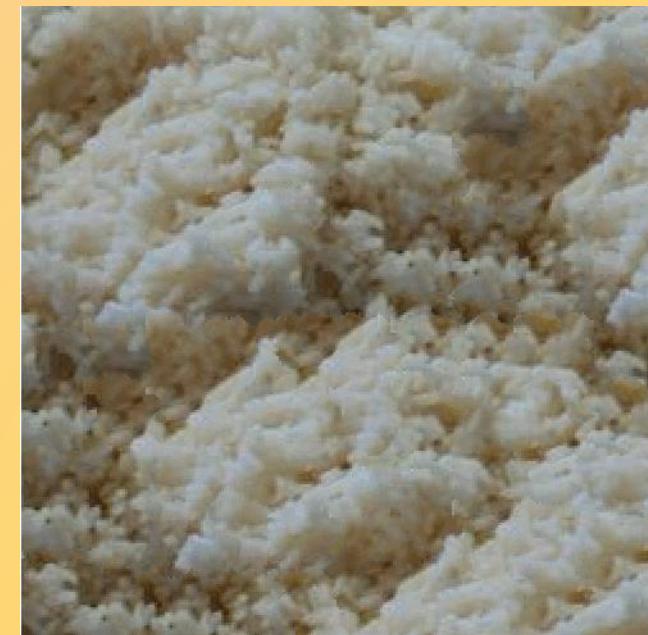
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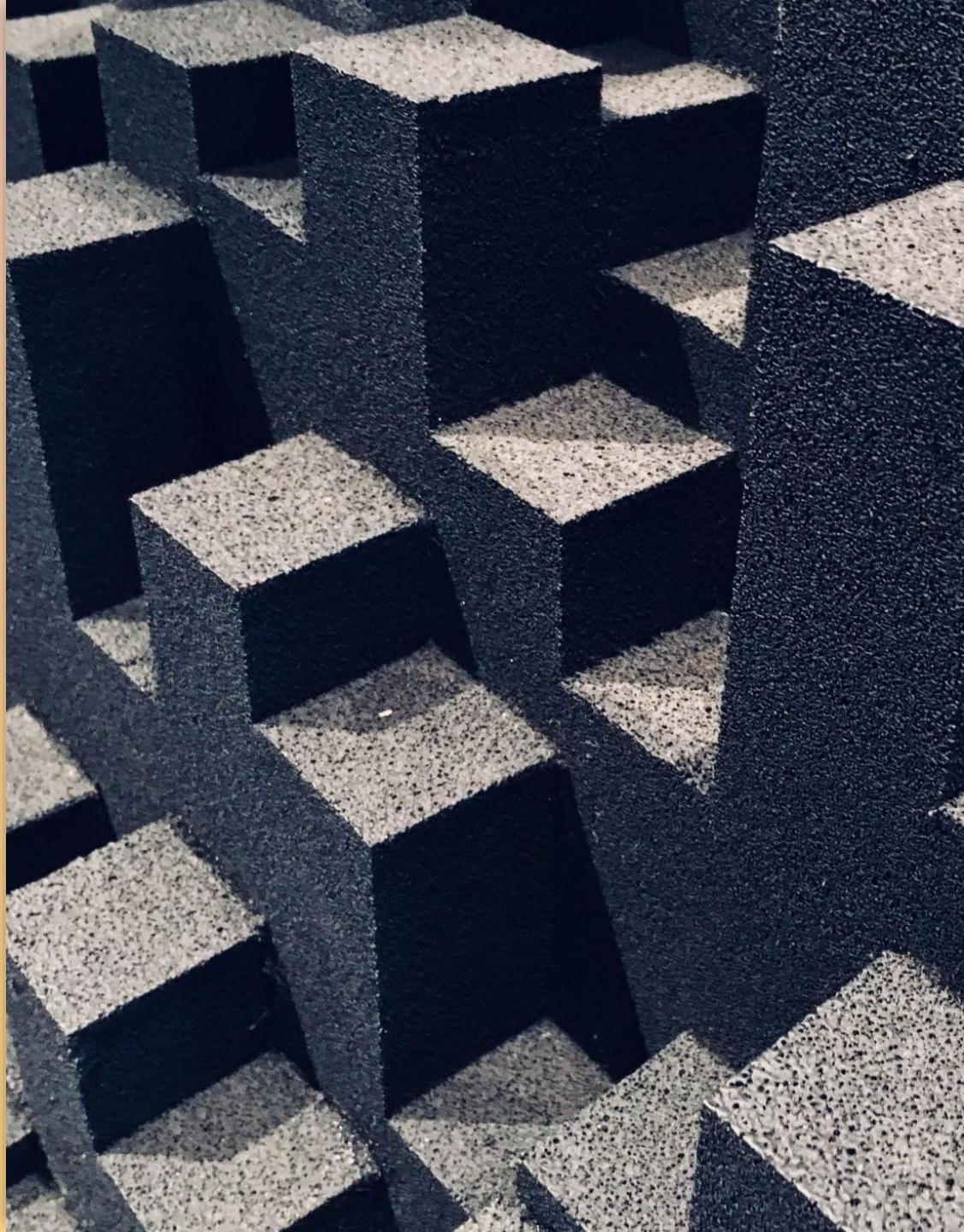






Texture Transfer

- Texture Transfer is a method of transferring a stylized texture from a source image to a target image while maintaining the details and characteristics as accurately as possible.
- We completely recreated the target image which manifests as completely made out of the texture.
- We divided the source texture into multiple overlapping blocks. Different blocks covered different corresponding details of the target image.

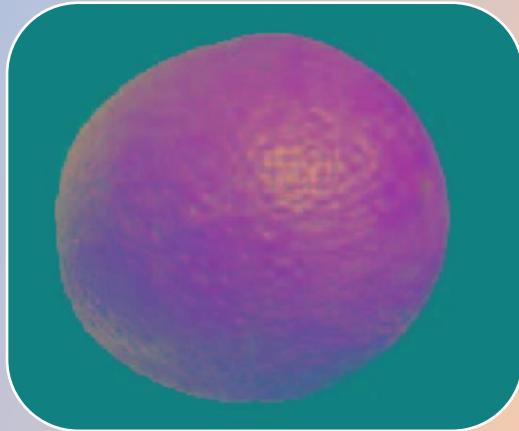




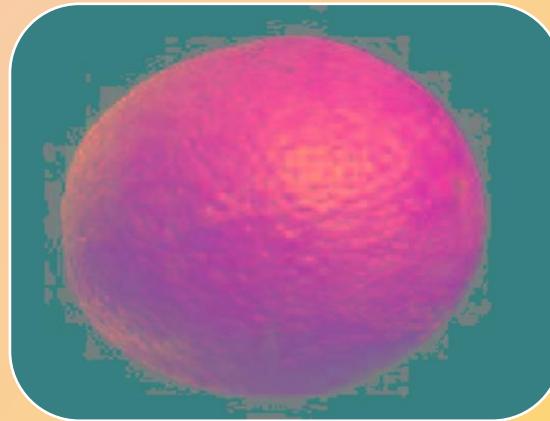
Algorithm

- Converted the RGB images to YCbCr since luminance captures the details between the source and target.
- Used histogram equalisation of both images to get the maximum correlation between the two.
- We iterated over the overlapping blocks of source texture to get the best matching block which we get by minimising an error function containing the weighted mean of overlapping regions and squared difference between source and target images.
- We used our Image Quilting algorithm to merge the blocks to the result images.
- The parameters involved are $\alpha = 0.1$ (for weighed mean in error) and block size.

**Without Histogram equalization
of only Y on the YCbCr image**



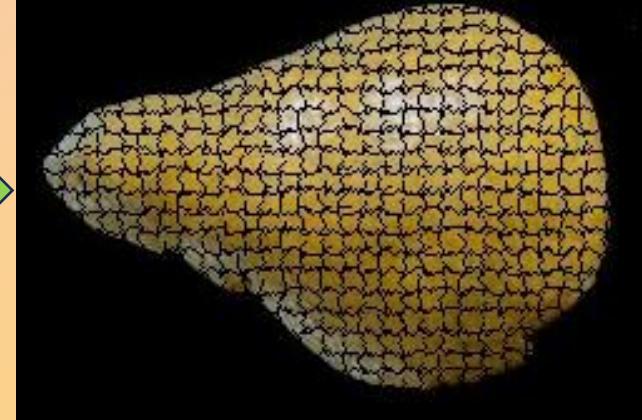
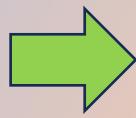
**After histogram equalization of
only Y on the YCbCr image**



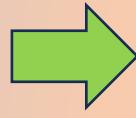
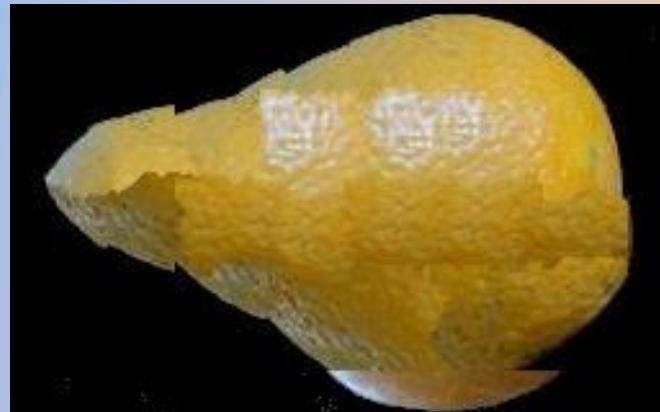
From the above slide:

- The YCbCr images are closer for those cases when the luminescence are equalised.
- Luminescence is better than RGB as it gives accurate texture transfer for cases when the pixel vectors in RGB form a basis (they are independent)

Iterations with different block sizes

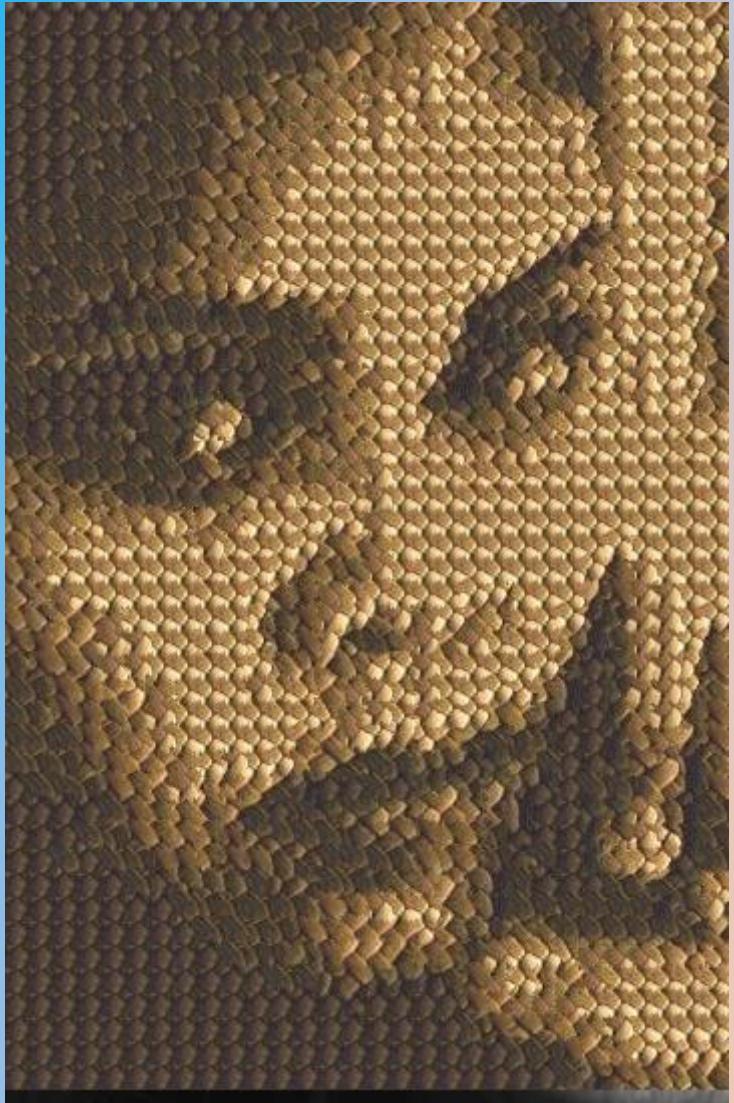


Iteration 1

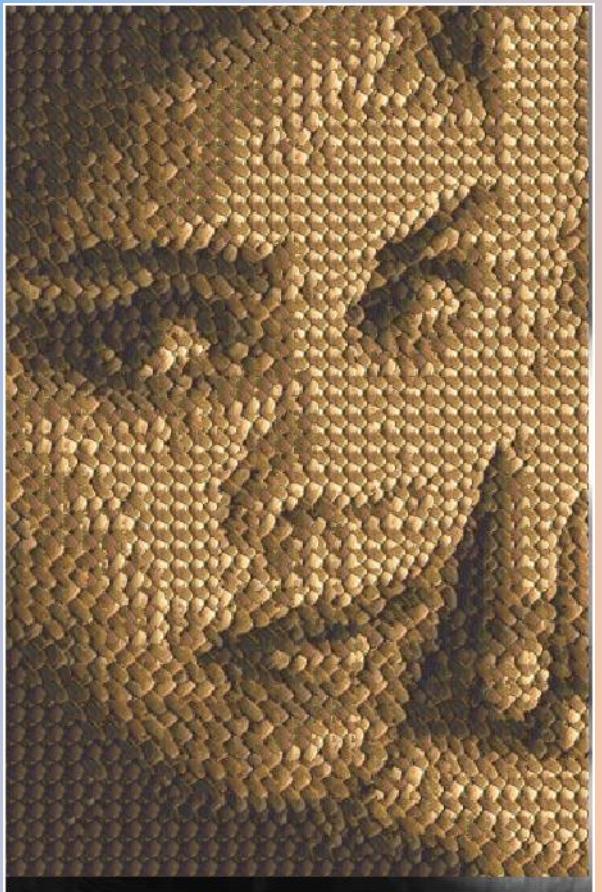


Iteration 3

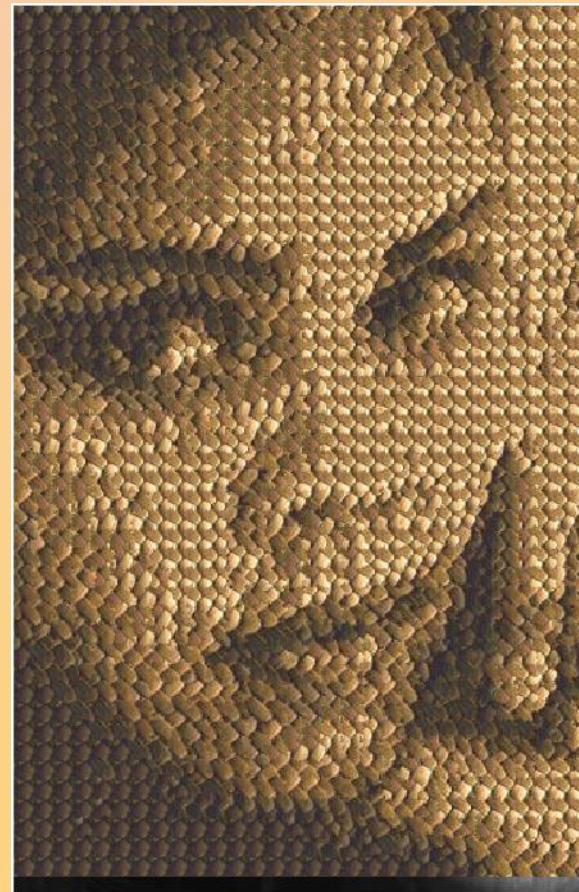
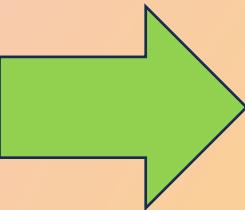




This image doesn't have distinct lips. The luminescence around the lips is similar. Thus, they get smudged. It can be seen that the contrast is high in this image. The following slide contains the image without histeq of the luminescence.



Iteration 1



Iteration 2



Iteration 1



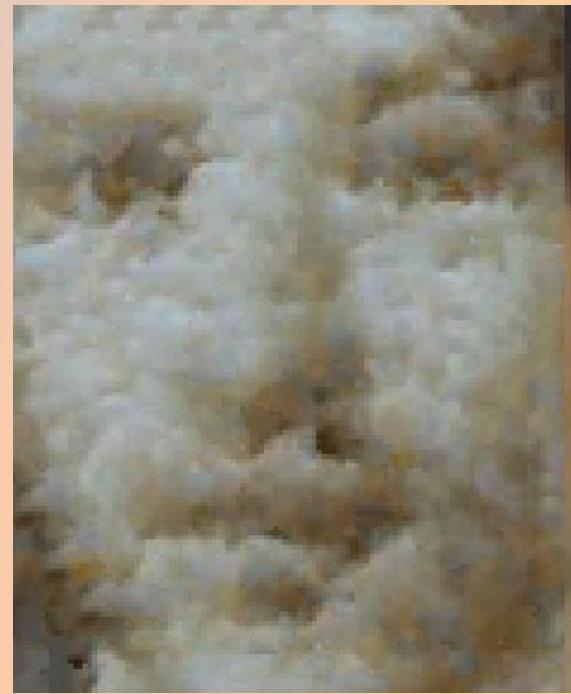
Iteration 2



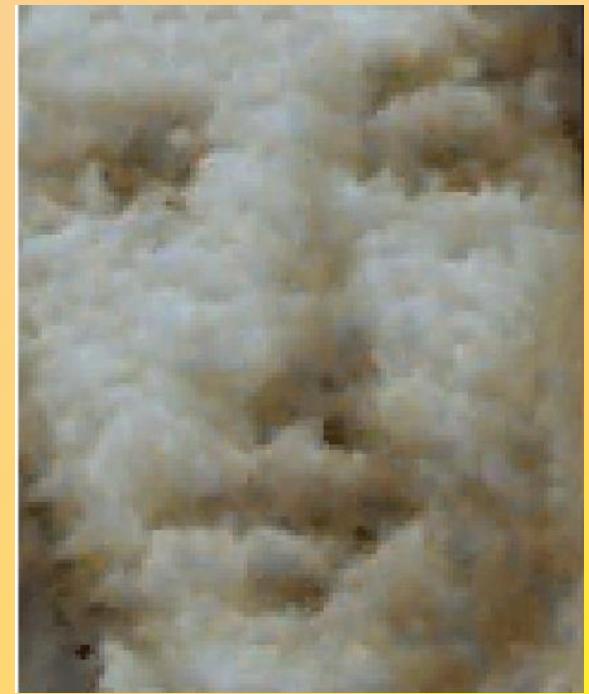
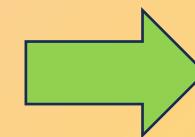
Iteration 3



Iteration 1



Iteration 2



Iteration 3

Things that didn't work

- Texture transfer for RGB images was not giving accurately results.
- Tried converting images format to HSI, using histogram equalised intensity value and comparing the source and target image intensities. That also didn't work well.
- Tried converting color images to grayscales and used the intensity mappings with color maps to process and later converting them back to color. That also didn't work well.

Thank You!

Have a nice day!

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