COL 783: Assignment 3

Pyramids and Wavelet

Ayush Verma 2016CS10374 & Kartik Kumar 2016CS10294

1.Image blending using pyramids

Step1. Construct the Laplacian pyramids of source and destination images and Gaussian pyramid of Mask.
Step2. Blend each level of pyramids as `(Source*mask+destination*(1-mask))`

Sample output 1-

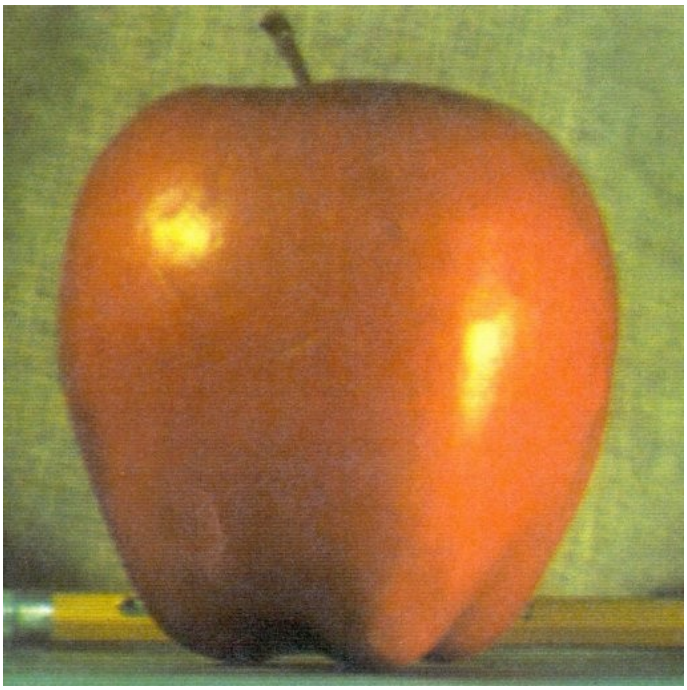
Source image

destination image

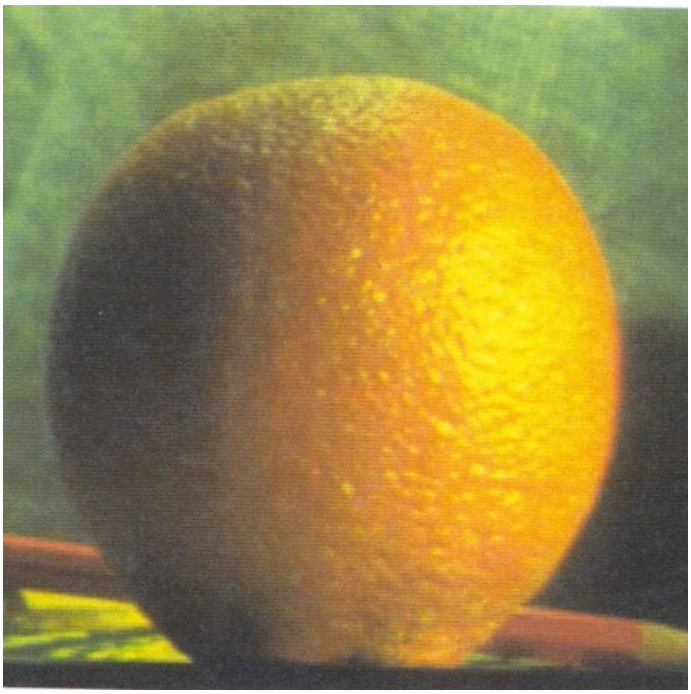
Blended image

Sample output 2

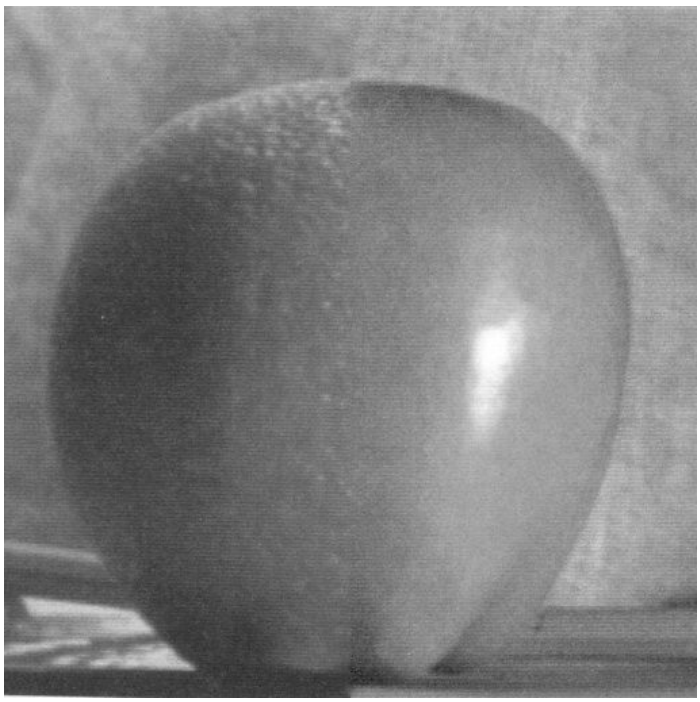
source image



destination image



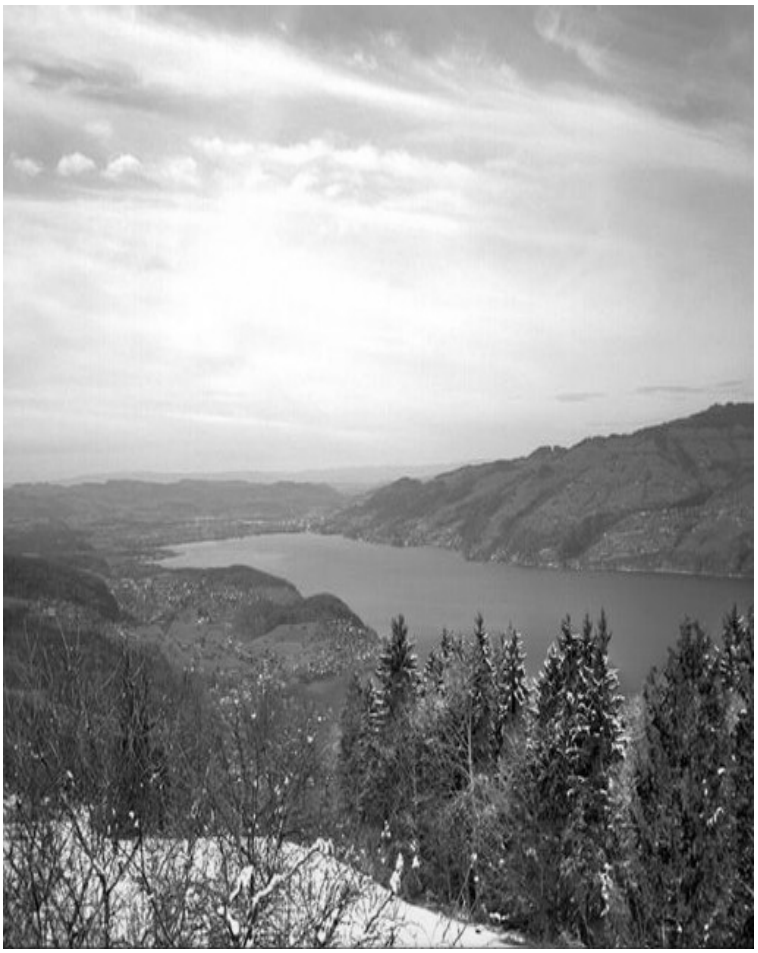
Blended Image



Sample output 3

Source image

Blended Image



destination image

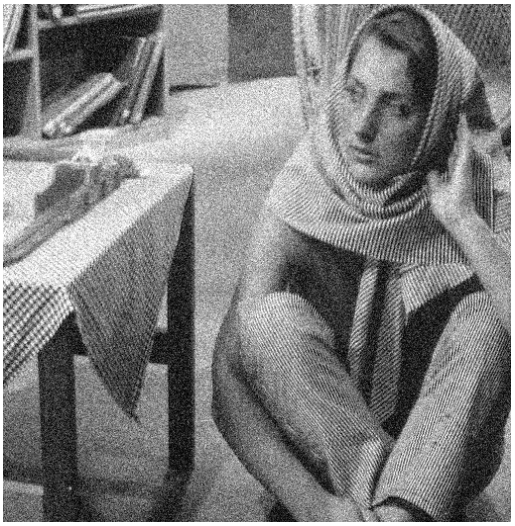
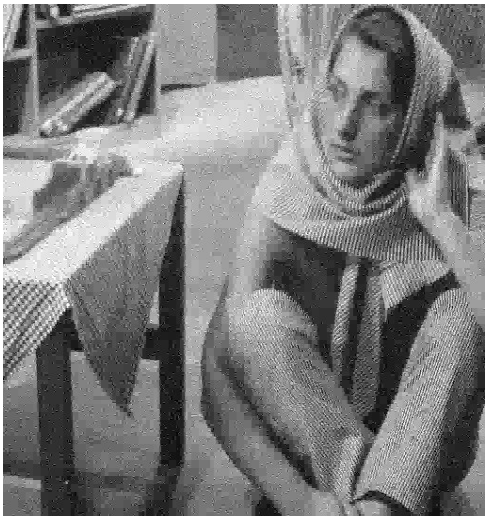
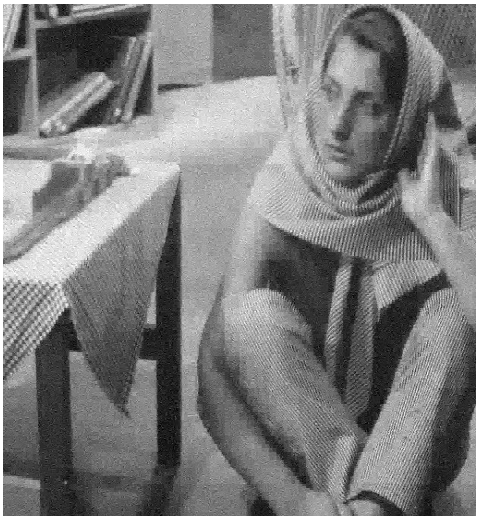
2a. Haar wavelets

- *Implementation of Haar wavelet transform for images, which recursively decomposes an image into approximation and detail coefficients with scaling the coefficients by $\sqrt{2}$ at each step.*

Source image

Harr wavelet transform

2a. Denoising using Haar wavelets

IMAGE WITH GAUSSIAN NOISE	SOFT-DENOISING OF IMAGE	HARD-DENOISING OF IMAGE
		
		
		

3. image compression-

Source image

Harr transform of image

Reduced detailin f Harr transform

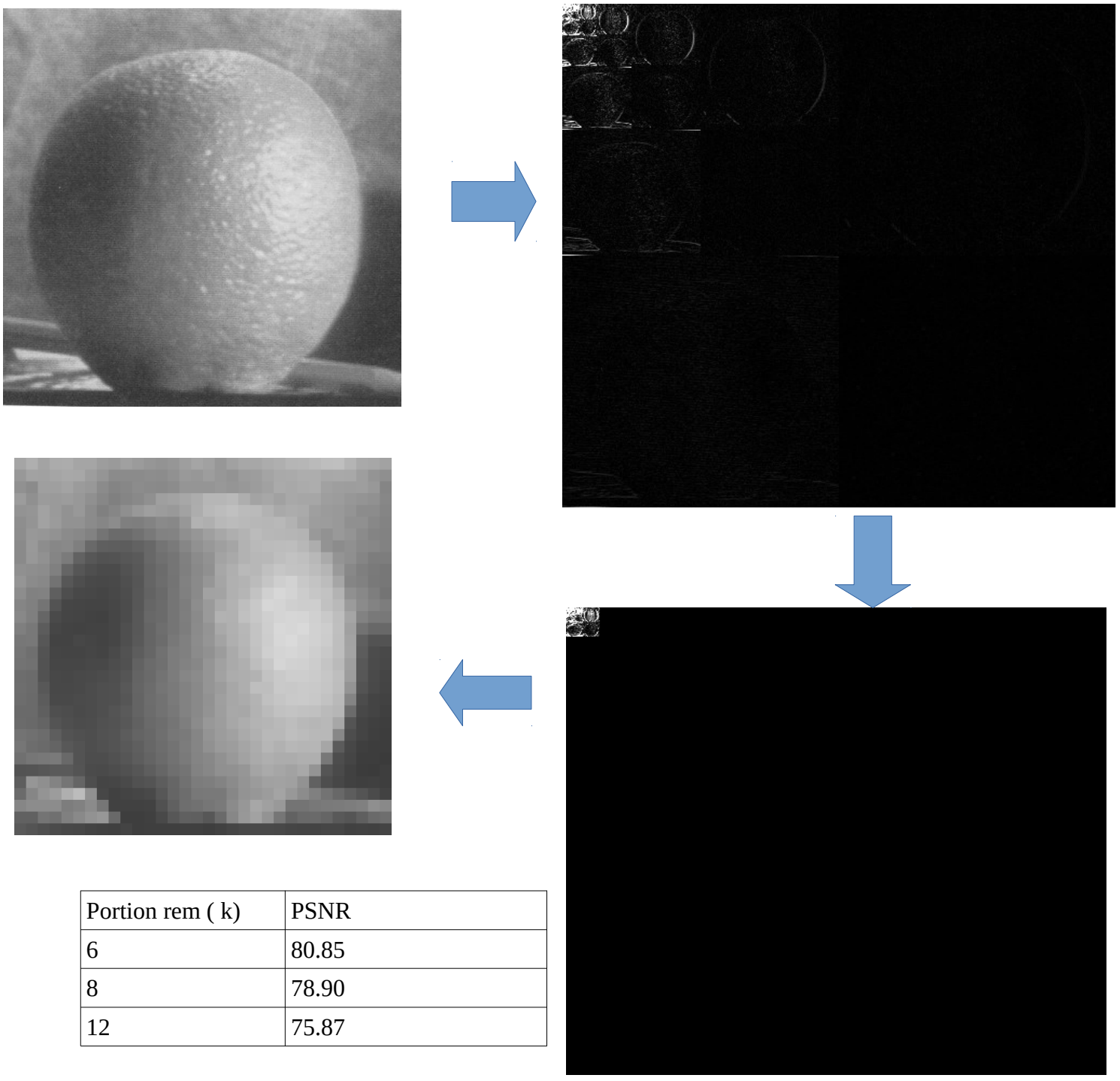
Compressed Image.

Portion rem (k)	PSNR
6	70.36
8	69.43
12	55.6

Implementation detail

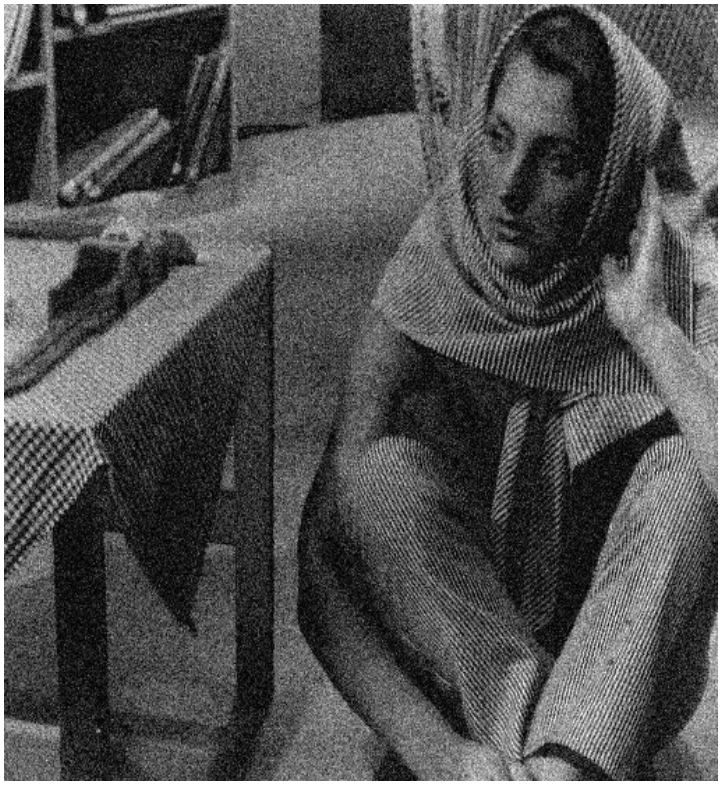
Step1. First i*mplementation of Haar wavelet transform for image and take parameter k (compression parameter k∈[0,100])*
Step2. Remove proportionate non-detailing sections of Haar transform and make correspoding pixel value to 0.
Step3. Thus compressing the image which can be later decompressed by computing inverse wavelet transform of compressed file.

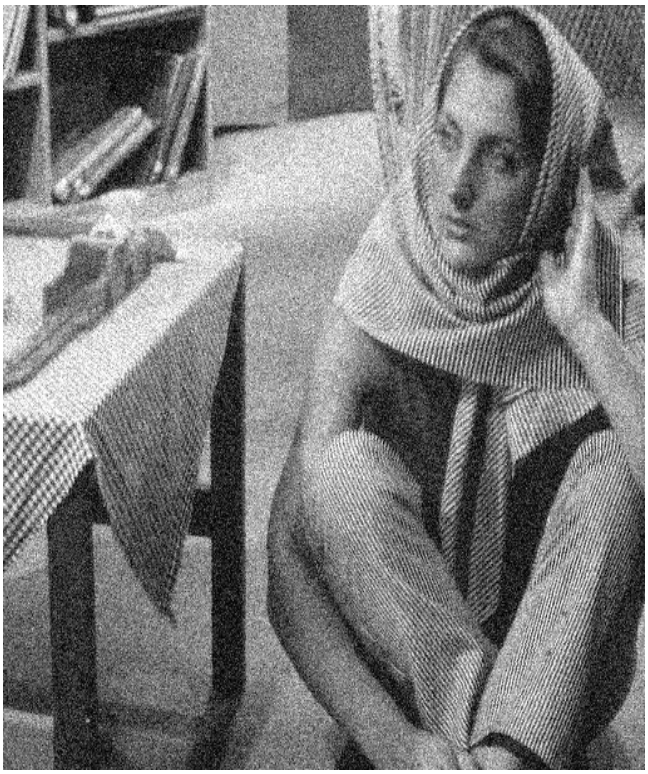
Compression of image with large region of constant color



Portion rem (k)	PSNR
6	80.85
8	78.90
12	75.87

Image denoising using laplacian pyramid





Using Laplacian denoising, we notice that the noise mostly remains unchanged, however, due to an effect similar to contrast stretching, we are able to resolve more details better than the original noisy image.

Resources -
[1]. Stackoveflow
[2]. Wikipedia - https://en.wikipedia.org/wiki/Haar_wavelet
https://en.wikipedia.org/wiki/Wavelet
[3]. Github - https://github.com/stheakanath/multiresolutionblend
https://github.com/yiuwin/LaplacianPyramidBlending
https://github.com/jocelynguo/Implement-of-Haar-Transform
[4]. Research papers -
https://www.cns.nyu.edu/pub/eero/simoncelli96c.pdf
http://persci.mit.edu/pub_pdfs/spline83.pdf