HOMEWORK – 3

Ans 1 d)

Image Name	Sub-Sampling Where Image Details Substantially Lost	Sub-Sampling at which Aliasing or Moire Occurs (if any)	What details were most important that were lost?
TBK_Kite	50	8	Kite's thread and Kite's middle wooden stick
TBK_BRICKS	32	8	Edge of the bricks
Aries_Merritt__shirt_at_olympics.jpeg	32	4	Pattern on shirt and the face
Chelsea_and_Hillery_Clintons_Selfies.jpg	24	4	Line pattern on Hillary's shirt and then the faces
Obama with Striped shirt in front of fence…	16	4	Stipes on the shirt, the fence and then face details
Might_or_Might_NOT.jpg	32	8	Text on boat and the house were not clear. Hard to differentiate among the background and objects in image

1 e. Write a modified version of your program, called Check_Resizing_Default(fn).
   It is the same as the previous program, but remove both uses of 'nearest' in imresize.
   Is this better or worse? What changes do you observe?

Ans 1 e) Construction of new data points/pixel points within specified range of discrete set is called interpolation. We have 3 types of interpolation in MATLAB:

   I)   *nearest*
   II)   *bilinear and,*
   III)   *bicubic*.

The default interpolation algorithm that is used is *bicubic*. But here in part 'a' we have provided *nearest* interpolation method. In *nearest* interpolation, block uses nearby translated value of pixel while in *bicubic*, block uses weighted average value of four translated pixels. (Learnt from MathWork's website: https://www.mathworks.com/help/vision/ug/interpolation-methods.html)

Without using nearest, the image started getting blur as we increase the sampling factor. Also, we are not getting aliasing effect. For a few images, without using 'nearest' and low values of sampling factor creates smooth edges.

Ans 2 d)

Image Name	Quantization Where Image Details Lost	What else weird did you notice?
TBK_Kite	64	Colors started getting darker. Sky color is distorted the most as I increase the factor. Kite thread is also lost.
kod_kid.png	32	Left side of face started getting darker, lost the eyebrow and the due to this circle around eyes looks illuminated.
kod_parrots.png	40	As we increase the factor image looks more like a brush painting / pallet painting. All the color values are affected the most.
Might_or_Might_NOT.jpg	32	Water color and the edges of boat becomes darker.

2 e. Which image did you think suffered the most from this processing? What did you notice?
Ans 2 e) In my view the images with <u>colors</u> are getting affected the most. Color value changes can be observed for the full color images.

Q.3 Write a routine to read in the image Might_or_Might_NOT.jpg and enhance it. We wish to enhance the shadows in the image to read the back of all the boats. Try methods mentioned in class, imadjust, histogram equalization histeq(), and adaptive histogram equalization adapthisteq( ). [See the documentation on adapthisteq().]
What do you think is the best method and parameters for seeing into the shadows?
Describe your solution and methods. (2 pts)
Ans 3) I think the best method to read the text of all the boats is Adaptive Histogram Equalization adapthisteq().
      1) imadjust adjusts intensity of values in image. The output image has higher contrast.
      2) histeq also enhances the contrast of image by changing intensity values so that the histogram of output image matches a specified histogram.
      3) adapthisteq also enhances the contrast of image, but it does not work on entire image in one go, rather it takes blocks of tiles and enhances each tile at a time.
Since we have to read white letter in shadow which is darker, adapthisteq proves to be the best.

Q.4 Write a routine to read in the image and enhance the contrast of the writing on the integrated circuit. We wish to enhance the text on the integrated circuits in the image Integrated_Circuit_sm.jpg. Try methods mentioned in class, imadjust, histogram equalization histeq(), and adaptive histogram equalization adapthisteq( ). What do you think is the best method to enhance the contrast on the writing on the Integrated circuit? Describe your solution for this image.
Ans 4) For this image also, I think Adaptive Histogram Equalization adapthisteq() is the best method to read the text written on IC's. Using other two methods entire IC becomes dark and we barely see anything written on it. I have to convert the given image into gray scale first.
I tried the above operations by using grayscale image(imdouble), taking square root of elements in grayscale(imdouble) and taking square of elements in grayscale(imdouble). By taking square, all the values in matrix will decrease as actual values are between 0 and 1, which gave darker image. Taking greyscale image directly and by taking square root of pixel elements on gray scale image gives most clear and almost similar output with adapthisteq. I tried the same three things for <u>question 3</u> as well and there also I found similar results.