

ECE 435 Medical Image Processing

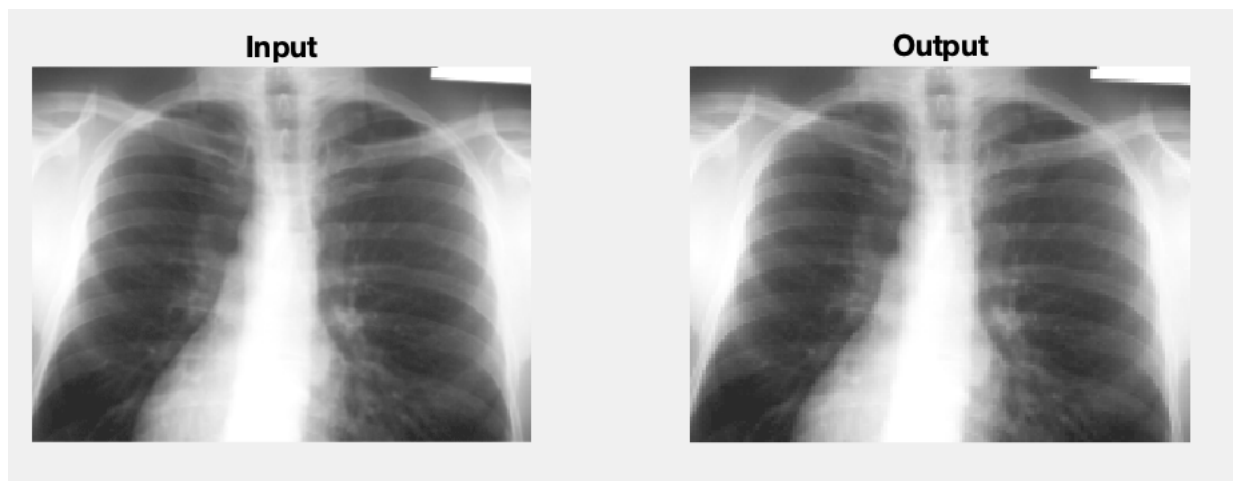
Assignment 1

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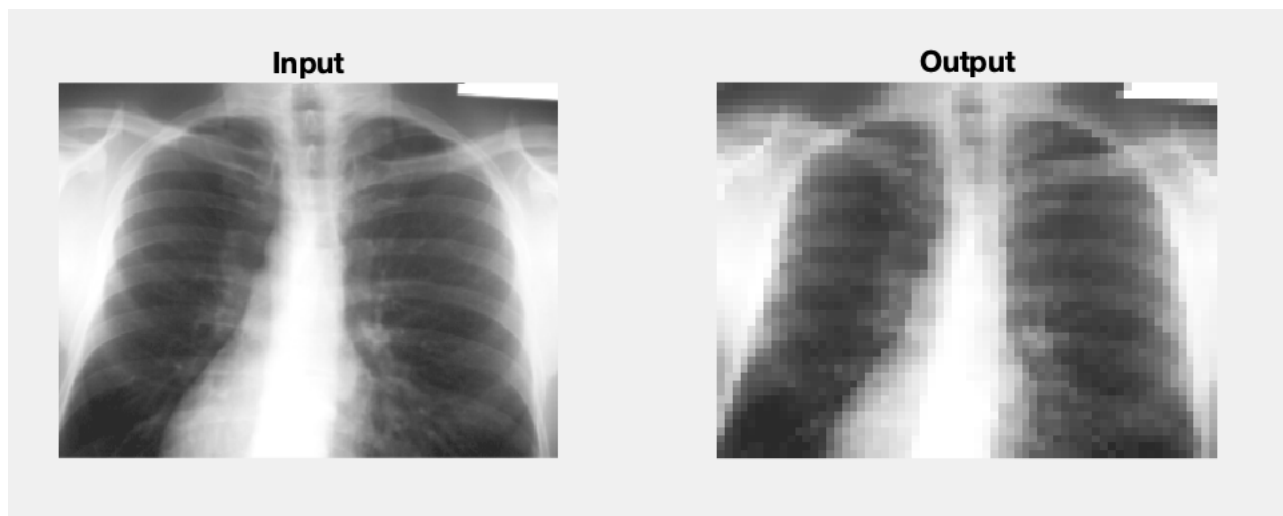
January 20, 2019

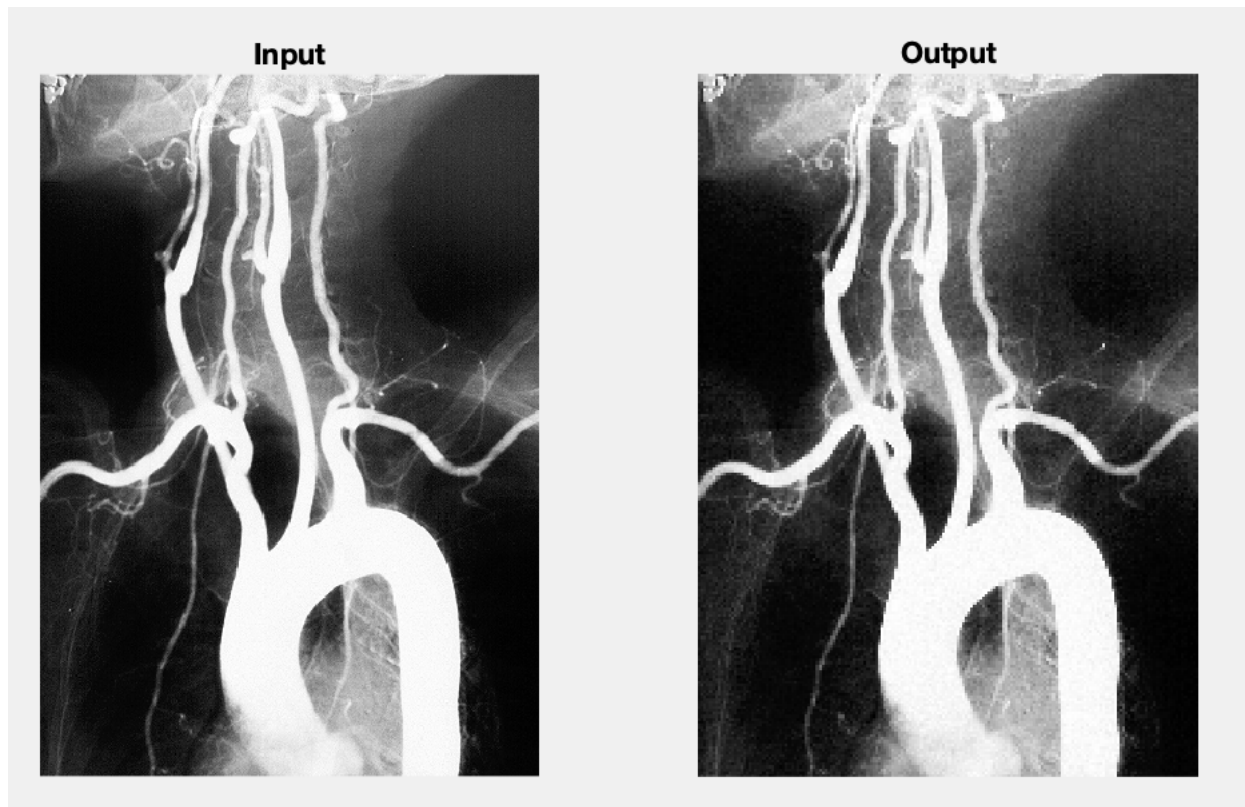
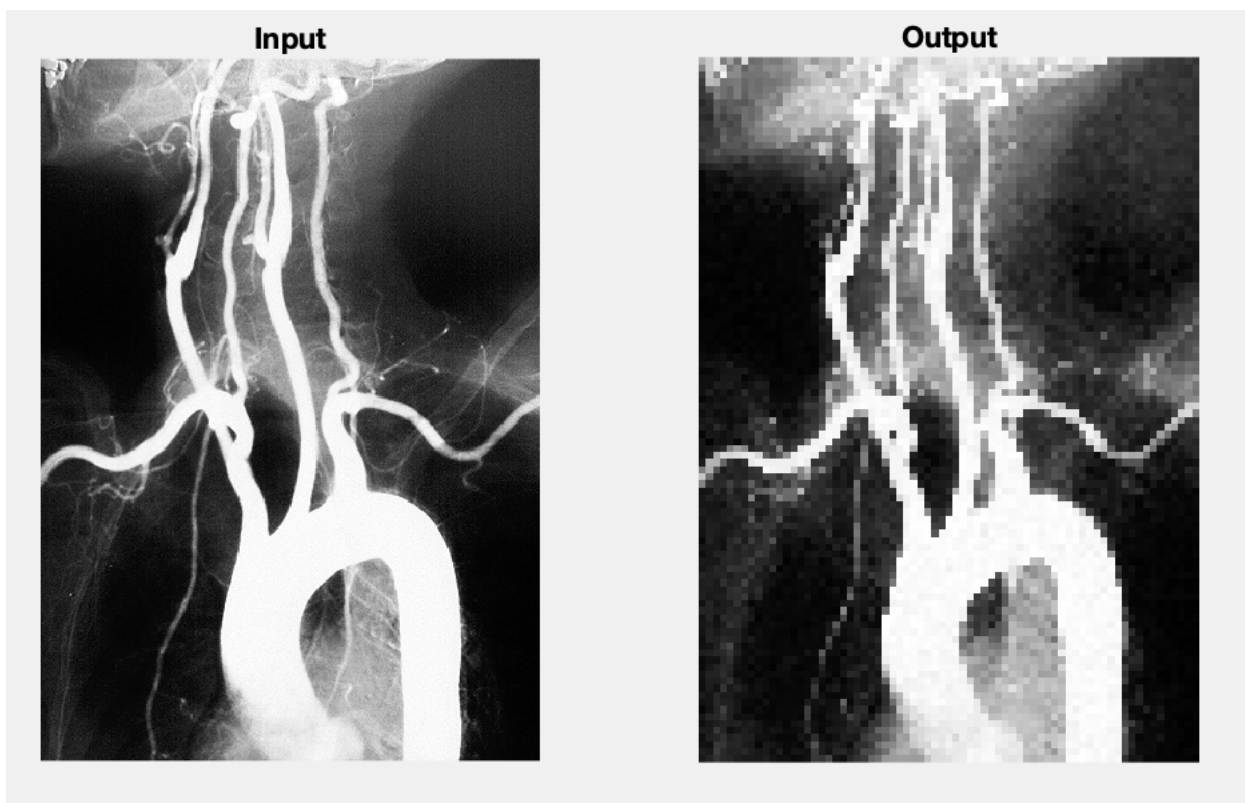
1 Downsampling

Xray.tif with $N = 2$ Result



Xray.tif with $N = 5$ Result

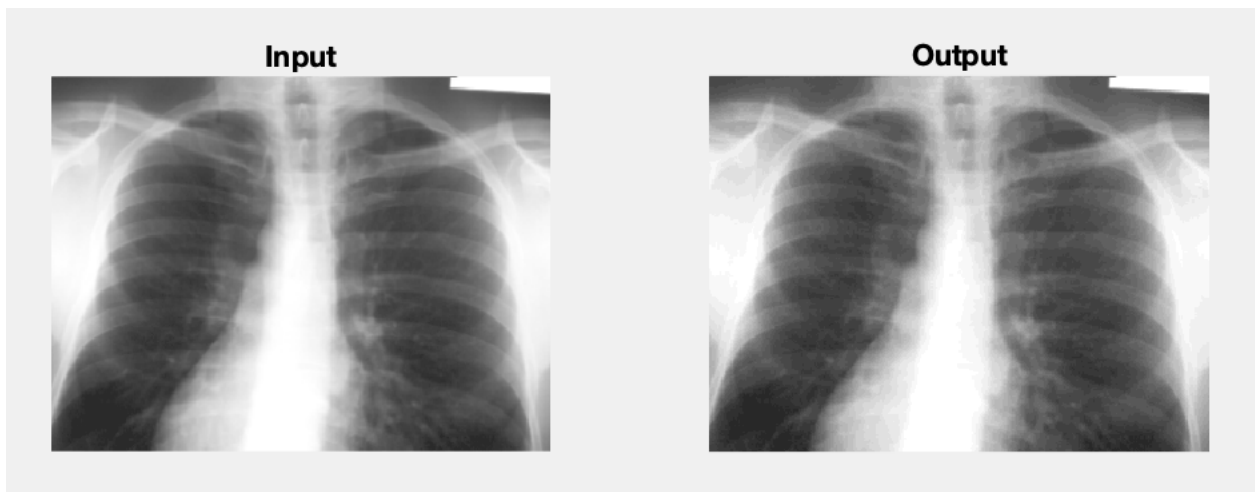


arteriogram.tif with $N = 2$ Resultarteriogram.tif with $N = 5$ Result

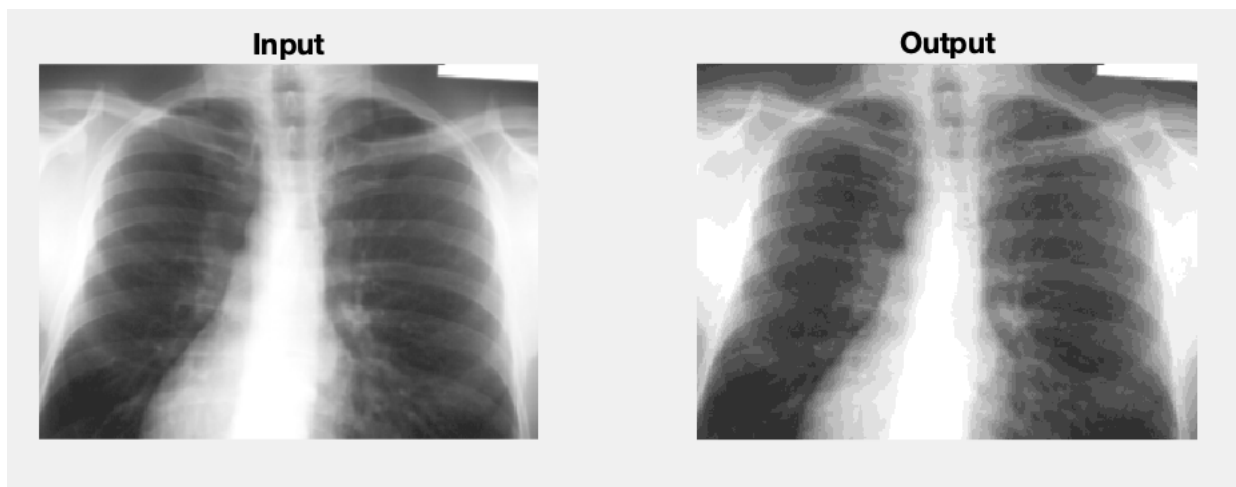
Discussion For starter, we are dealing with raster images, which is simply a 2D array that stores the pixel value for each pixel. By decreasing the spatial resolution, or more specifically, decreasing the pixel number by deleting rows and columns, this results in a visible quality loss. For Xray.tif, it is notable that the output image becomes blocky when downsampling in rate $N = 2$, although the details and boundaries are still clear. When downsampling in rate $N = 5$, the rectangle in output image becomes larger, and some details are lost such as spine is difficult to observe and the boundaries become jaggy and indifferentiable. For arteriogram.tif, we also observe the output image starts to be blocky when downsampling in rate $N = 2$, as above, details and boundaries are still clear. When downsampling in rate $N = 5$, the blood vessels start to blur, the background is undifferentiated. In a nutshell, as the downsampling rate increase, the images become blocky, details or boundaries are hard to differentiate and information are permanently lost.

2 Bit resolution

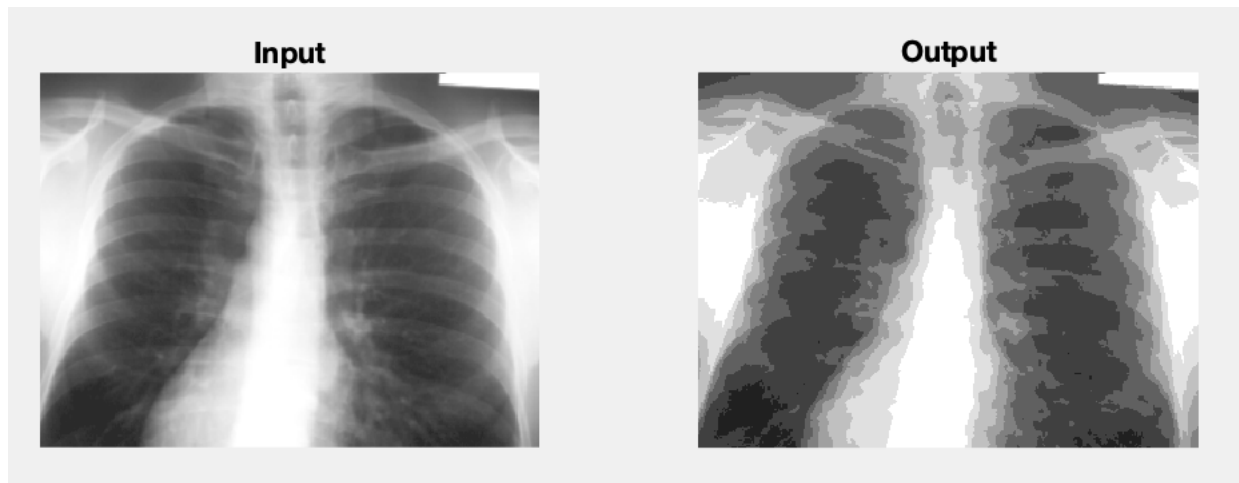
Xray.tif with B = 3 Result



Xray.tif with B = 4 Result



Xray.tif with B = 5 Result



Discussion The input image (Xray.tif) is an 8-bit grey scale image, by lower the intensity resolution 2^B , the image becomes $8 - B$ bit grey scale image, which means the image displays less abundant grey value. When lowering the bit resolution by $B = 3$, the output image is basically the same as the input image. When lowering the bit resolution by $B = 4$, the output image starts to blur and display colour chunk, since grey colour space becomes smaller, so the similar colour in the original image starts to become the same in the output image and result in that colour varies not as smooth as the original image. Also, we can notice the image shows more clear contrast than the original image. When lower the bit resolution by $B = 5$, the output image shows more clear contrast than $B = 4$. However, it starts to lose details such as the bones inside the chest are hard to observe and the details in each part starts to be undifferentiated. In a nutshell, as the bit resolution lowering, the image show more clear contrast and details in image are also hard to discern.