Department of Computer Science

Digital Image Processing

CS-371

Assignment 2 - Point-wise Intensity Transformations

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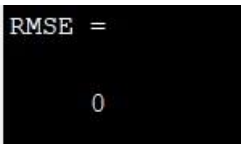
Comparison between my implementation and Matlab's built-in function *imhist()*:

In order to compare those 2 implementations we used Root Mean Square Error (RMSE). As we can understand from the above result, the implementation of our function is quite good and close to the built-in Matlab function.

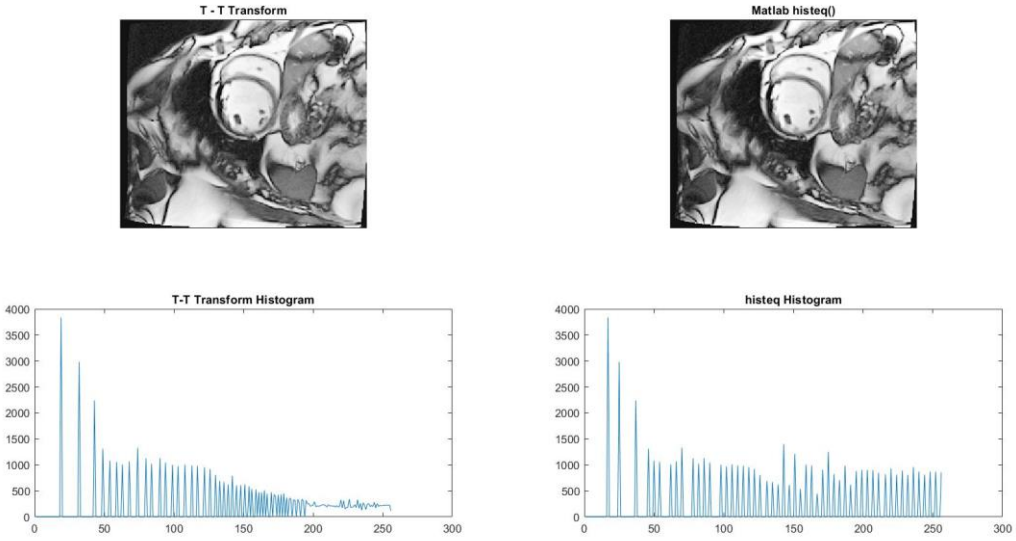


RMSE result in our .m file

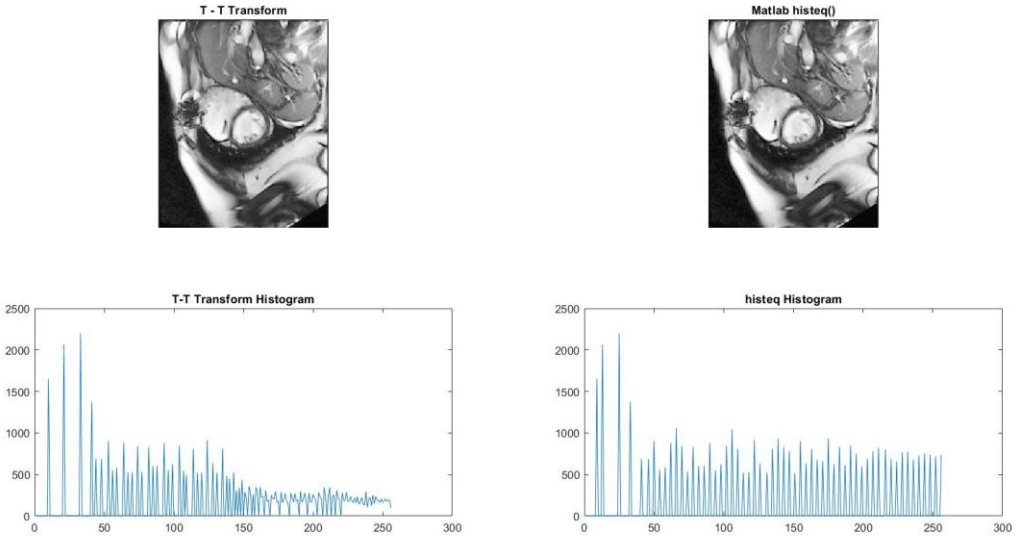
Comparison between my implementation of T and Matlab's built-in function *histeq()*:

In this part we are going to qualitatively compare the output of my implementation T for histogram equalization transform with the output of the build-in Matlab function *histeq()*, which also provides histogram equalization.

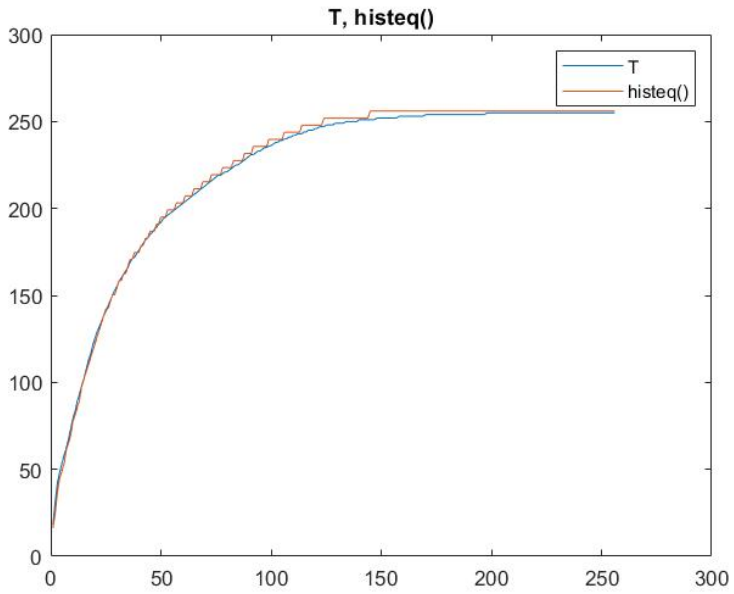
As we can see in the pictures below (2.1, 2.2), there isn't a big difference in the quality of the 2 pictures. But we can understand that in our implementation there is a little bit more noise in some parts compared to the *histeq()* Matlab's function. Besides that T-transform output image is slightly brighter than the *histeq()* output image. As we can observe also from the picture 2.3, the T transformation is smoother than the *histeq()* and there are not so many gaps between the difference of the intensities.



(2.1).1st picture of Image Dataset (A0S9V9) T-histeq() comparison



(2.2).9th picture of Image Dataset (B0I2Z0) T-histeq() comparison

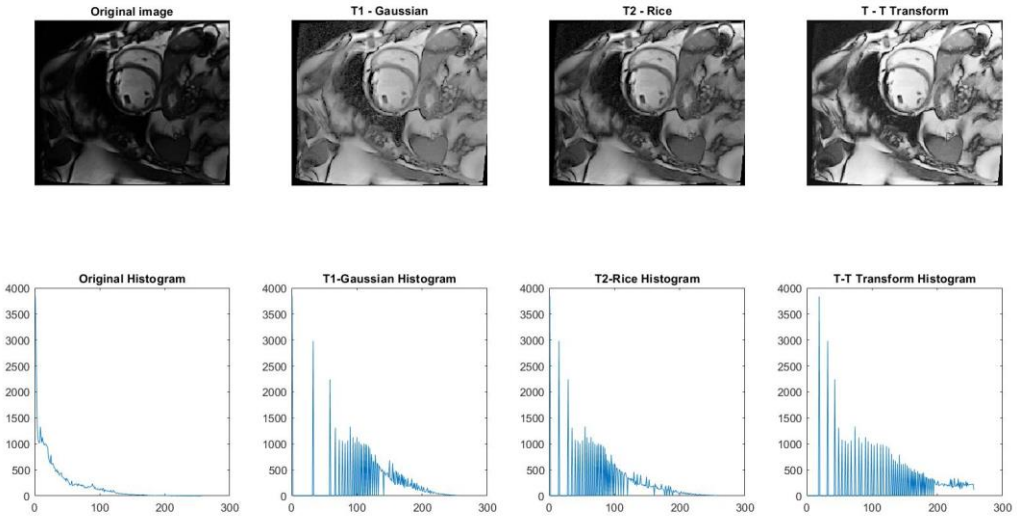


(2.3). Histogram Matching : Correspondence

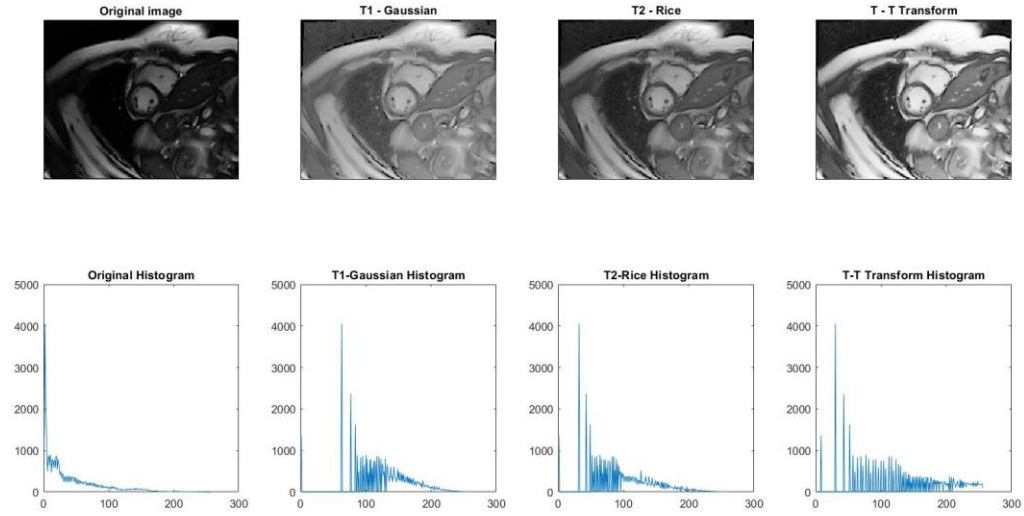
Brief comments on results

The models that we applied to transform the cardiac magnetic resonance images (MRI) had as a result an image with a less Dynamic Range. All methods final images included some noise, but we can see that in the Gaussian one (T1) the noise is more noticeable compared to the other 2 methods that we used (T2,T). Rice model output is seem to be a little bit darker than the Gaussian, however we can observe that it contains slightly more details. The reason that we lose some details is that in some parts of the image there are some dark pieces that are surrounded by some big light parts and that causes the "Blow out"/"Burn out" in those parts. We observe that the output image of the transform T has more contrast compared to the other images and so the "Blow out"/"Burn out" is happens more in this model of transformation (we can definitely see this effect in the picture (2.5) below).

We can observe from the histograms that, in the histogram of Gauss and Rice, the Rice histogram is slightly shifted to the left, which describes the "darker" output. We can see of course from the histogram of the T transform that it is not so compressed as the other 2 and that's why the image has more contrast in T.



(2.4). Original image and all the transformations we applied in this image. 1st picture of Image Dataset (A0S9V9)



(2.5). Original image and all the transformations we applied in this image. 3rd picture of Image Dataset (A2N8V0)