2018111040

QUESTION 1A : Installed ANT, and ITK .

- Running on the images BF20 and BF40.
- The results had to be seen on the ITKSnap Tool. It had to be downloaded separately using the sudo apt-get install command.
- Matlab could have been used to show them as a gif, but that would have taken unnecessarily long to capture and display here. Hence, used the tool to take a quick screenshot.
- As for the parameters used to work with the N3 and N4 Bias Correction functions, I really did not see much of a difference visually. But to work away from that, we had code in Matlab which will find out the RMSE difference between them. There are other ways too, for doing the same , and we can explore them, but for now, we shall stick to these to keep things simple.
- That could be a proper portrayal of the actual difference between the two routes.

QUESTION 1B : Differences found between the clean_image.nii and the one with rf_20A, rf_20B, rf_30C can be portrayed as follows :

V_rf20_A_n3 - V_clean_image : 4.0099e+06
V_rf20_B_n3 - V_clean_image : 3884950
V_rf20_C_n3 - V_clean_image : 4910453

V_rf20_A_n4 - V_clean_image : 4.2664e+06
V_rf20_B_n4 - V_clean_image : 4190398
V_rf20_C_n4 - V_clean_image : 5184665

Conclusions

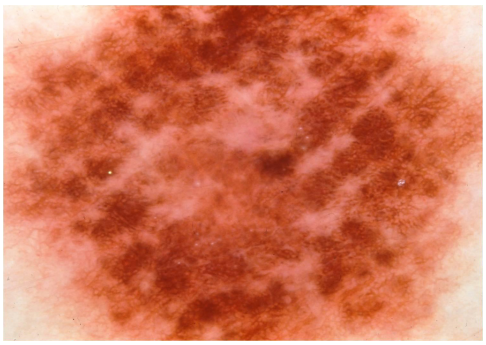
- From these magnitudes, we see that the differences are pretty sizeable. Even though , however, visually , the images look the same to a commoner's naked eye.
- This makes us notice a very important thing which we often are prone to ignoring when dealing with matters in Medical imaging. Even though, visually, things may look very similar to the naked eye , images can be very different, and to a trained eye, these differences in clarity can end up being a crucial difference between a correct diagnosis and an incorrect prediction.

QUESTION 2A : Reinhard Transformation

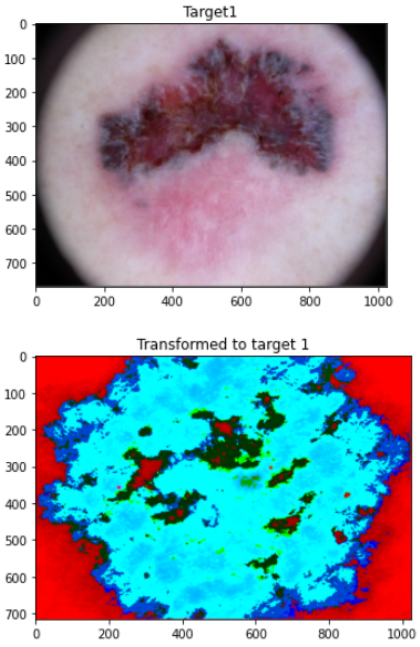
- Reinhard transformation is a fairly easy one to understand and run. We have a source image , and a target image. We run the algorithm in LAB space and then convert our image back to RGB space.

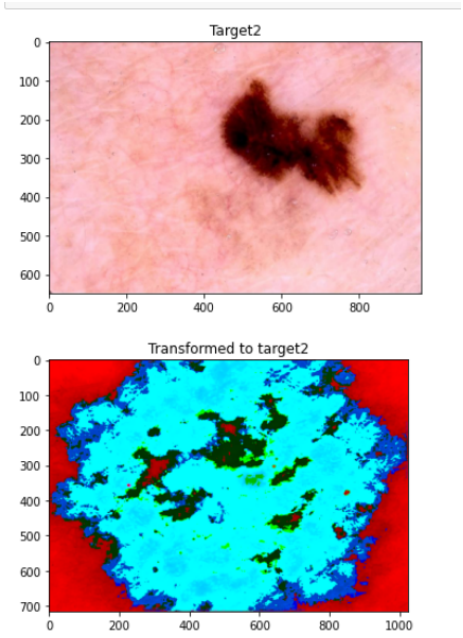
  For sake of comfort, and since, in this question, we just had to display how things work, I have let the images remain in the usual BGR format of CV2 images. It was felt that, since both the source and the target images are going to be in BGR space, the color change perception will be the same only, and we can have our display as usual.

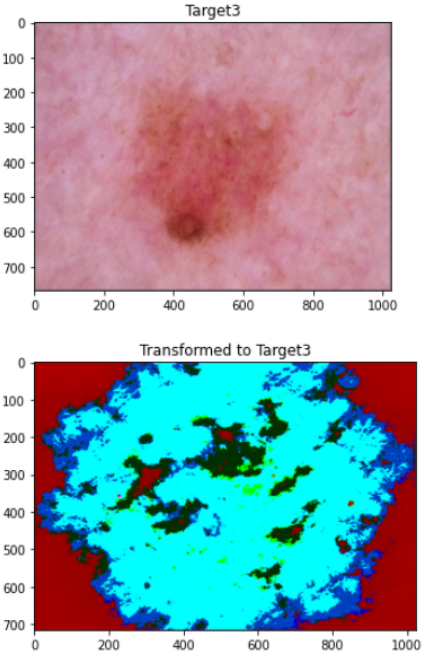
  Following was the original image that we dealt with:

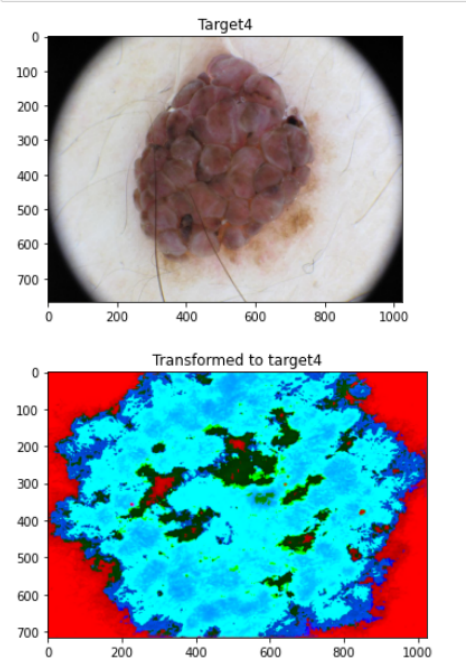


- Here are the various transforms that we had with different target images




Target2
Transformed to target2


Target3
Transformed to Target3

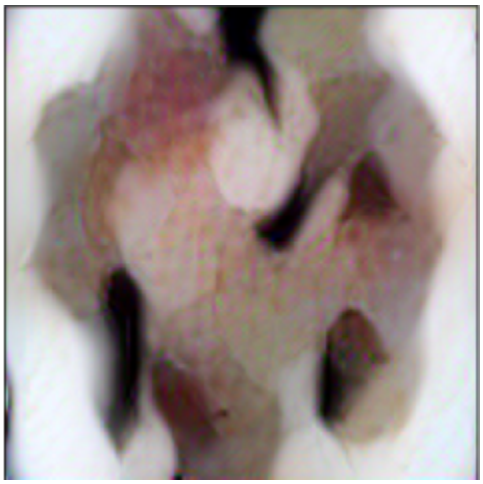


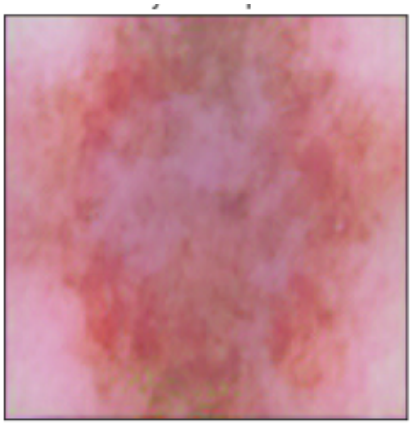
CONCLUSIONS ::

We see that, compared to it's original self , there is lot of changes in the source image, but among the various target, although perceivable, the visual changes very consistently giving clues about the changes that have happened

QUESTION 2 B:

- The Style Transfer notebook was downloaded and run for results. It is to be noted that the outputs are clearly visually more relevant and far more better and correct looking. The images that we got are as follows :





These images have been achieved with the same target images as the previous set, but here undoubtedly, the images look more appealing. Whether they are qualitatively better or not , is left upto the more knowlegeable people.

CONCLUSIONS / SUGGESTIONS :

- The fact that , in the second case, training was used, we can see that images produced seem to better than the one that were received from the usual Reinhard Transform.
- To compare them, since they already look so visually different, is an easy task. But for more quantitative measures, we can use a lot of measures . Even a simplistic one like a RMSE value can be used to see how different these are .
- We could also plot histograms etc to see how the differences are manifesting

QUESTION 3

- { We were not able to implement this due to time contraints }