

## QUESTION2 a

Gradient Descent is run on the channels separately but with the same set of parameters (alpha and gamma). Criteria for selecting parameters is the combined RMSE of all the three channels. The cost function is thus the sum of the cost of the three channels.

This method takes into account the mutual dependence of channels on each other which is somewhat expected. Taking the same alpha and gamma also models the extent of the dependence of the pixel intensity values on those of neighbouring pixels, which can be thought of as a property of the image and should be similar across the three channels.

Also as an advantage of this method, we can easily shift to different parameters for different channels.

Different parameters were not chosen for the three channels as it may lead to correction of different channels by different magnitudes and may lead to different colours than the original image i.e. completely changing the original image.

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*Denoising Using Quadratic Prior*

*Optimal Alpha = 0.737500*

*RRMSE(alpha) = 0.053513*

*RRMSE(alpha\*0.8) = 0.057739*

*RRMSE(alpha\*1.2) = 0.063145*

*Denoising High noise Using Huber Prior*

*Optimal Alpha = 0.840000*

*Optimal Gamma = 0.072000*

*RRMSE(alpha,gamma) = 0.052993*

*RRMSE(alpha\*0.8,gamma) = 0.097378*

*RRMSE(alpha\*1.2,gamma) = 0.086151*

*RRMSE(alpha,gamma\*0.8) = 0.063631*

*RRMSE(alpha,gamma\*1.2) = 0.053336*

*Denoising High noise Using Discontinuity-adaptive-log Prior*

*Optimal Alpha = 0.830000*

*Optimal Gamma = 19.000000*

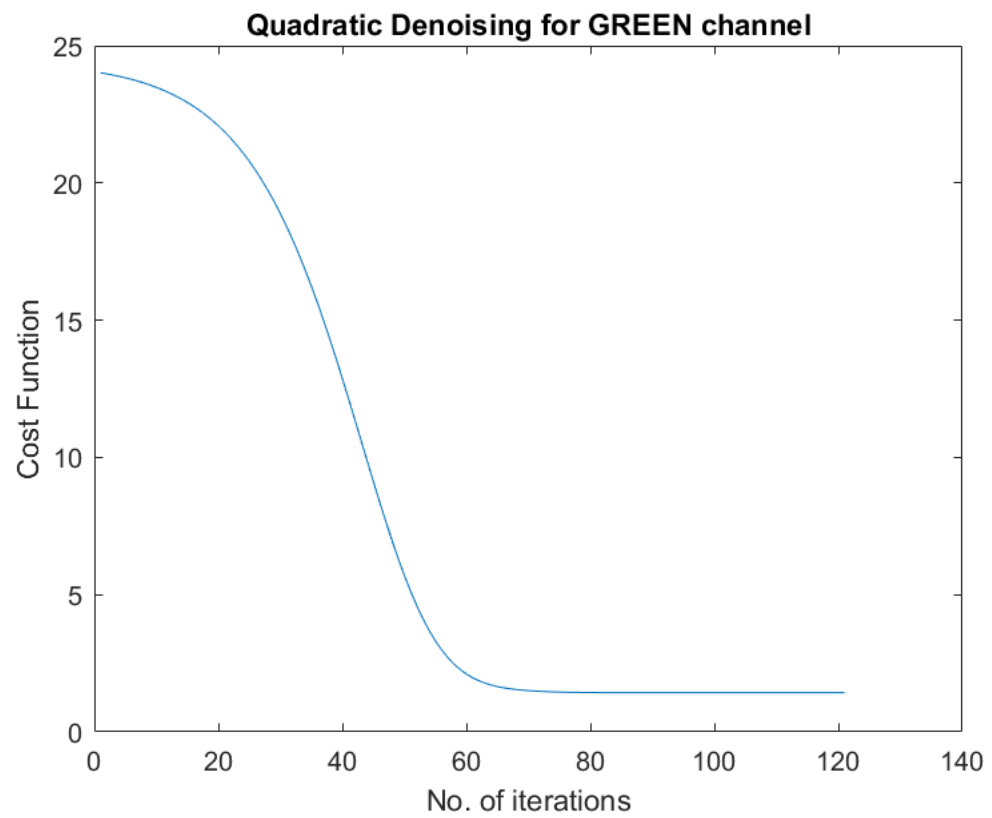
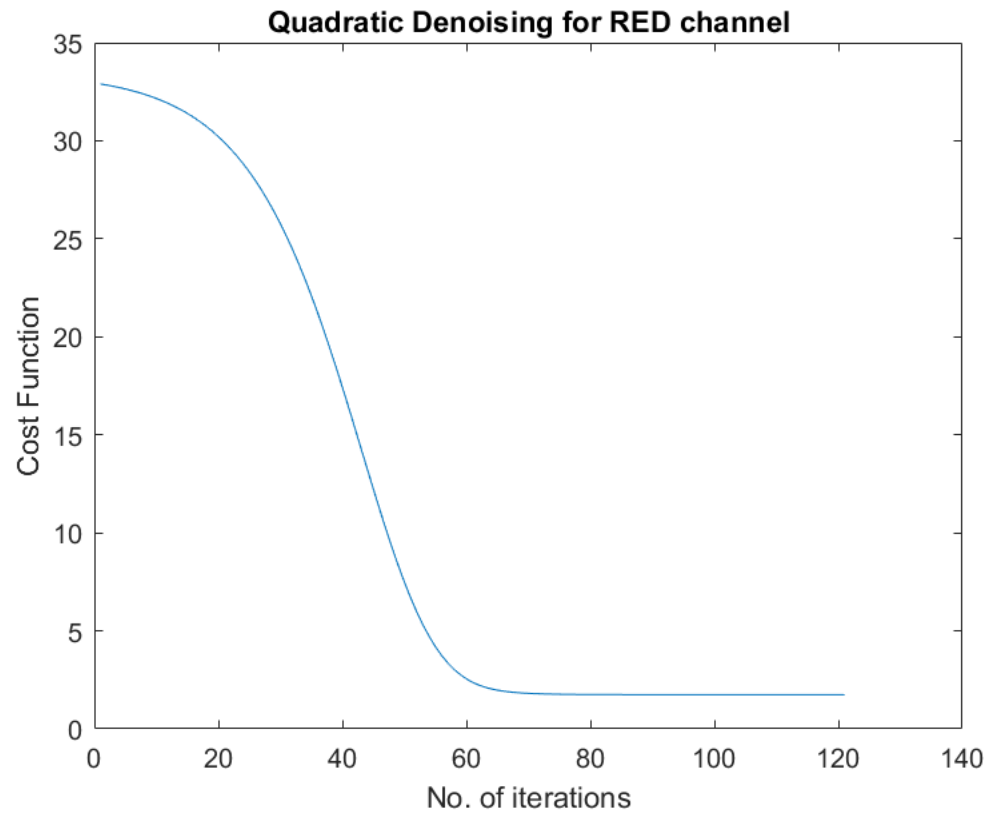
*RRMSE(alpha,gamma) = 0.053524*

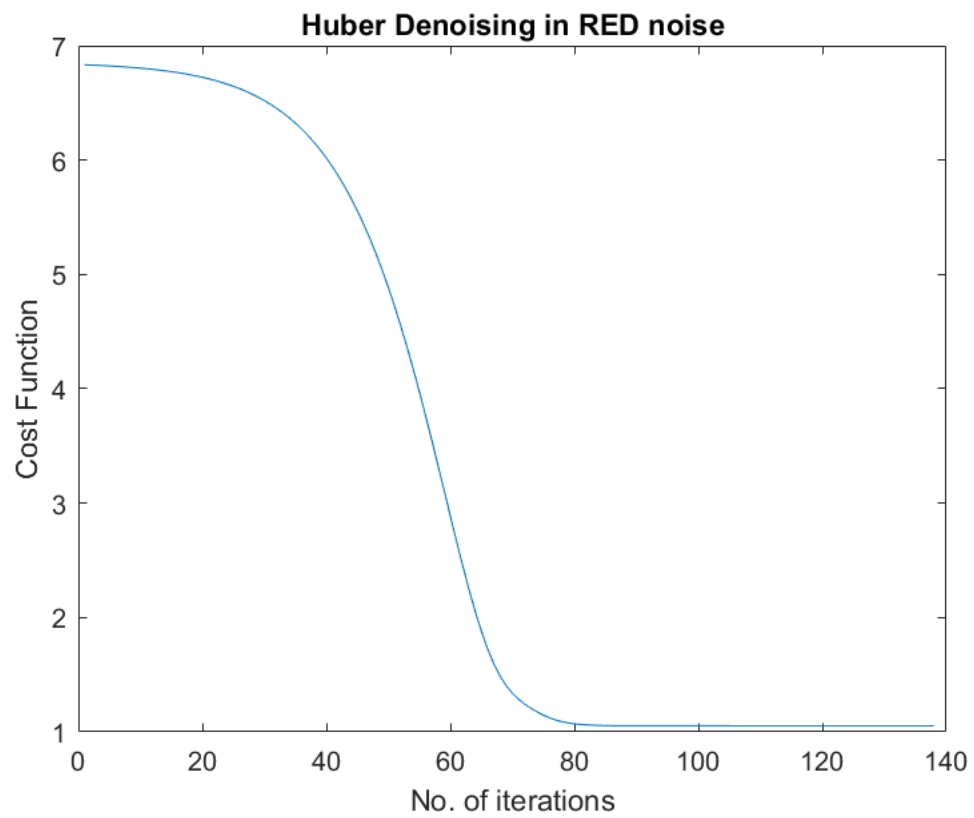
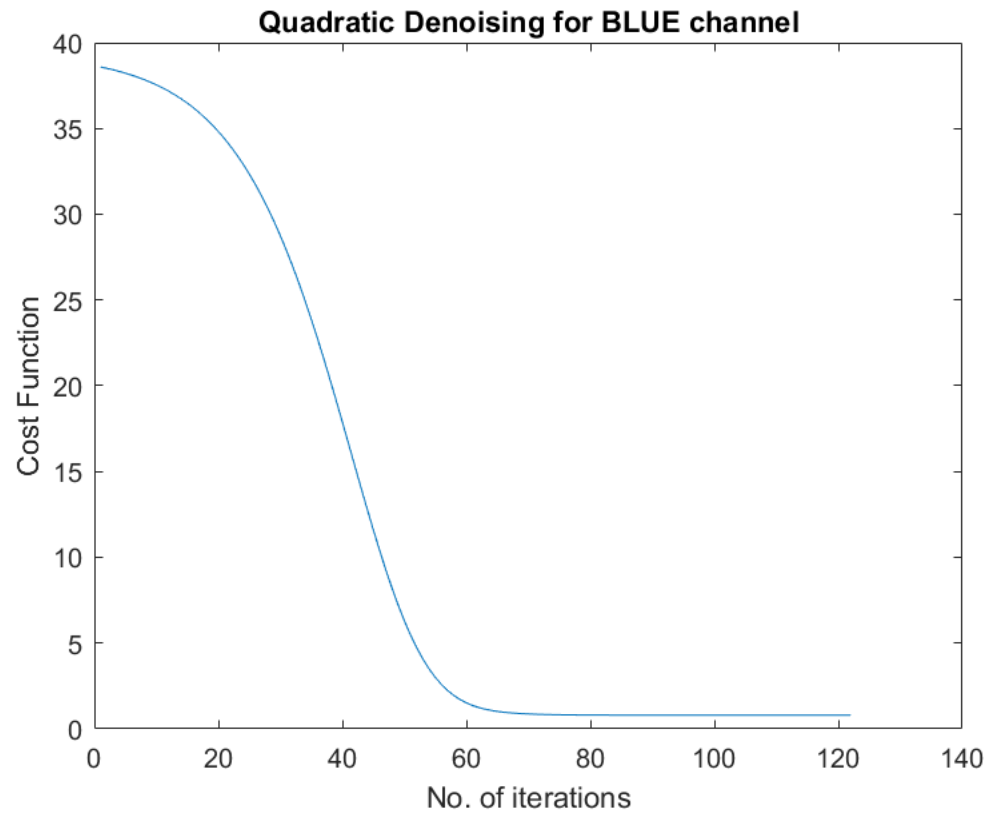
*RRMSE(alpha\*0.8,gamma) = 0.064901*

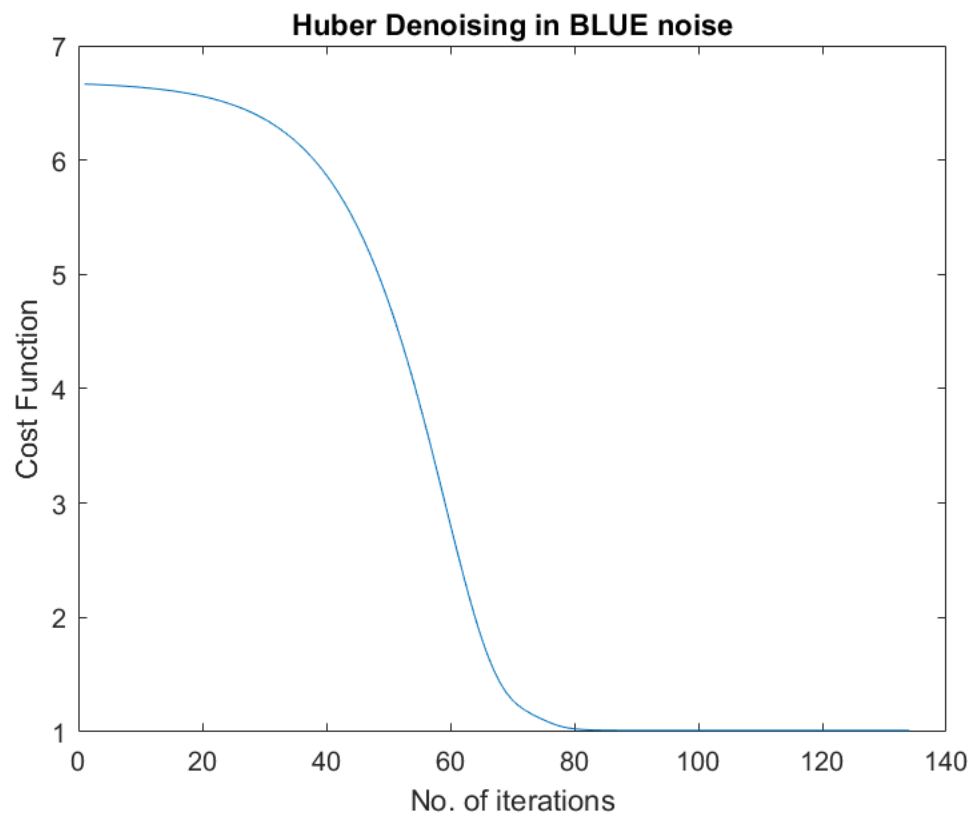
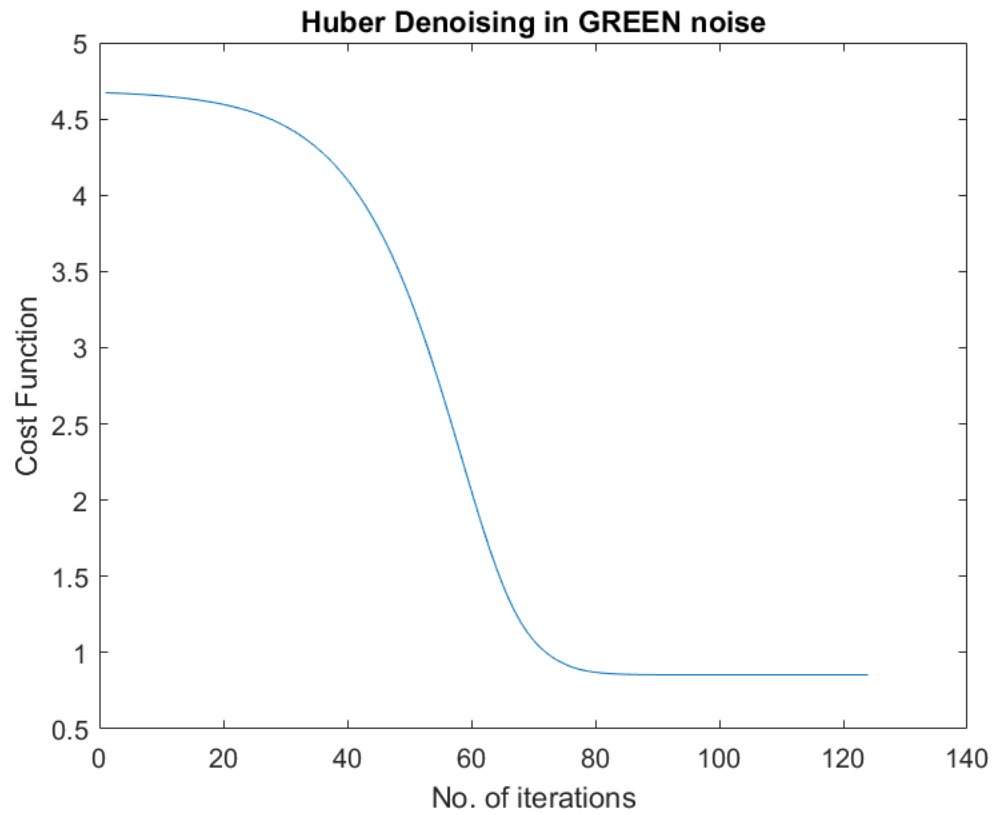
*RRMSE(alpha\*1.2,gamma) = 0.120974*

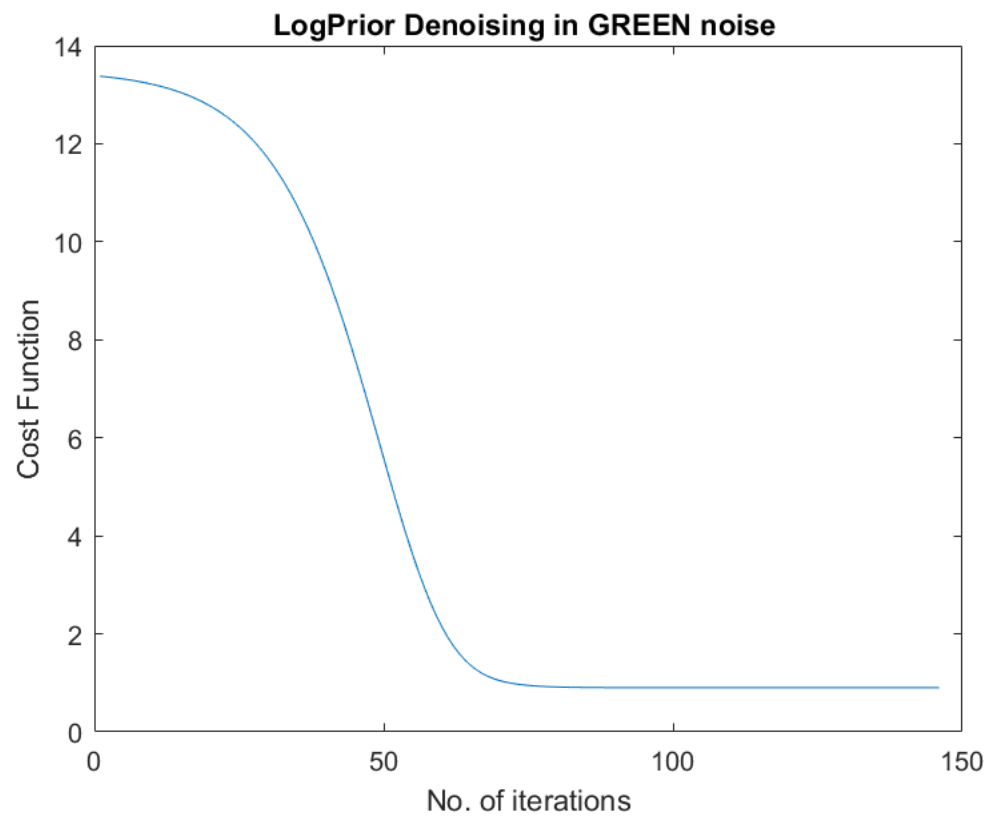
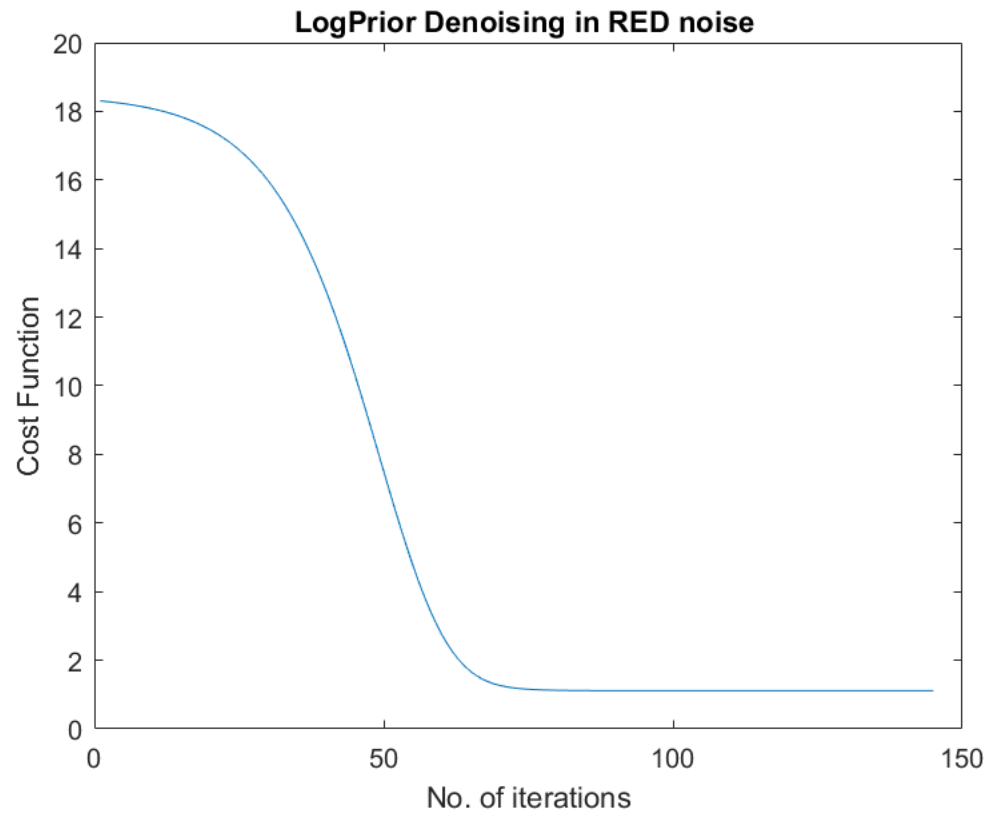
*RRMSE(alpha,gamma\*0.8) = 0.053523*

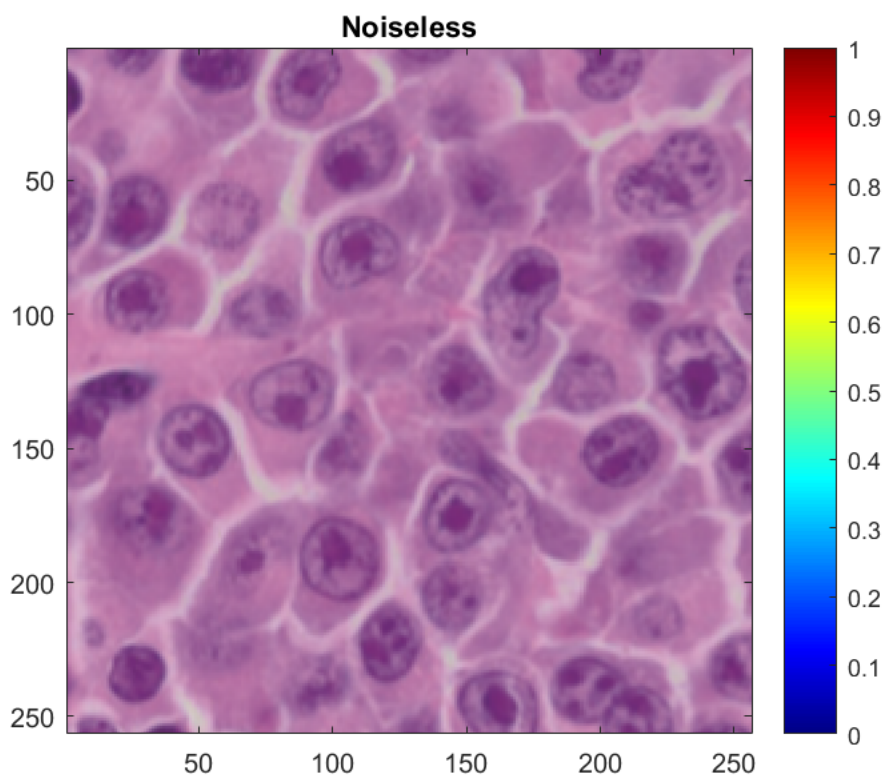
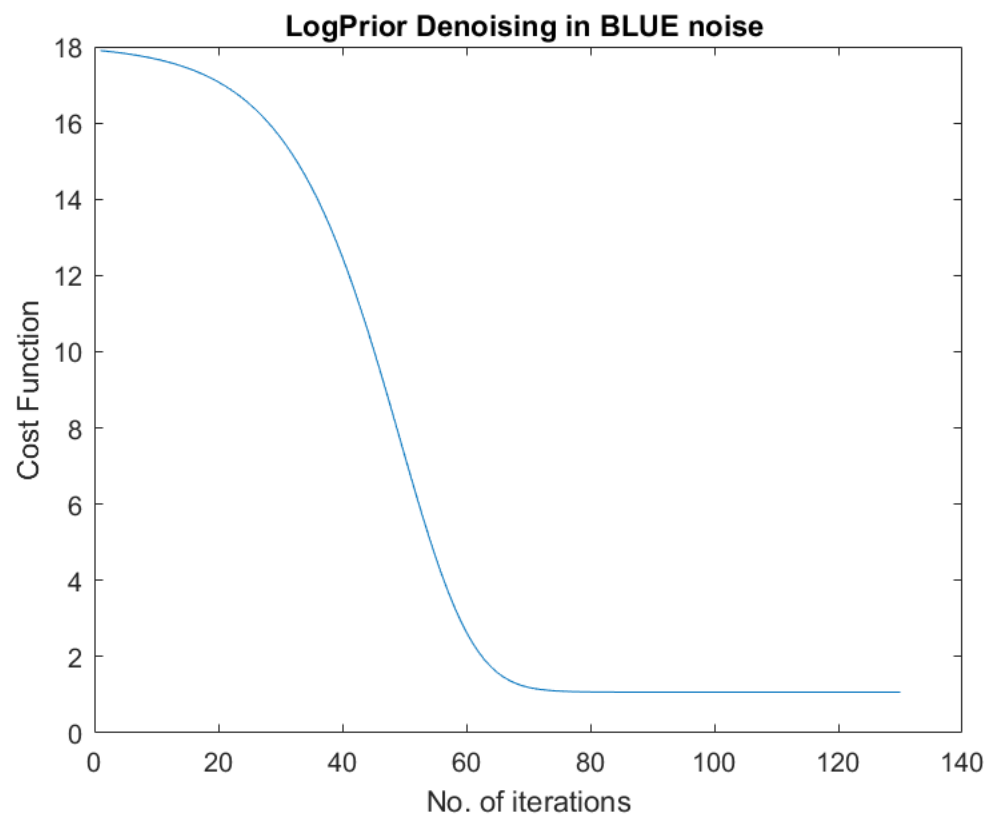
*RRMSE(alpha,gamma\*1.2) = 0.053524*

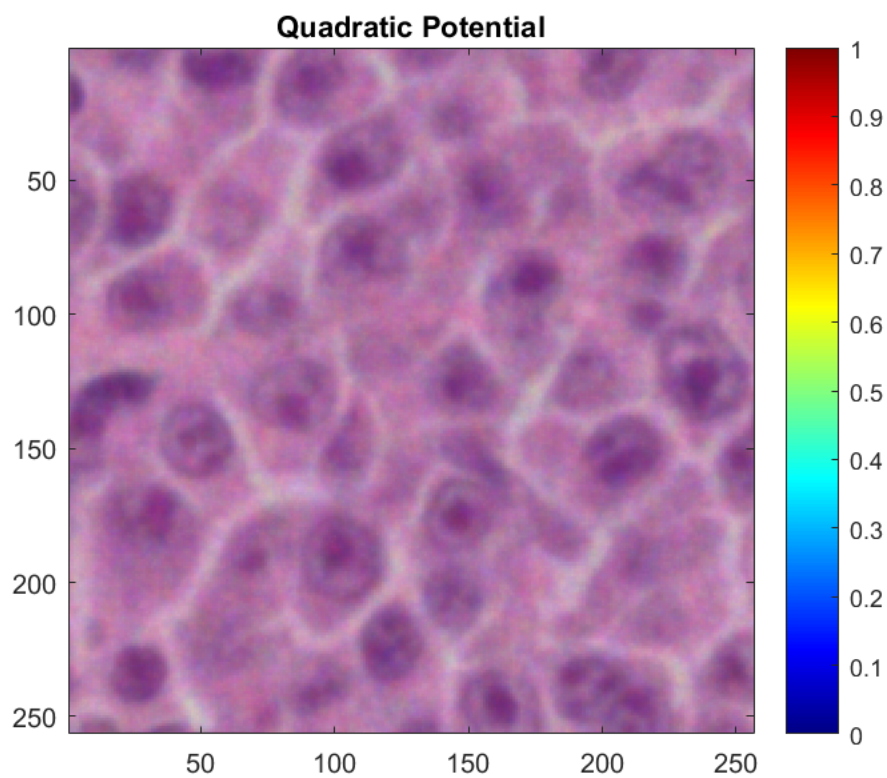
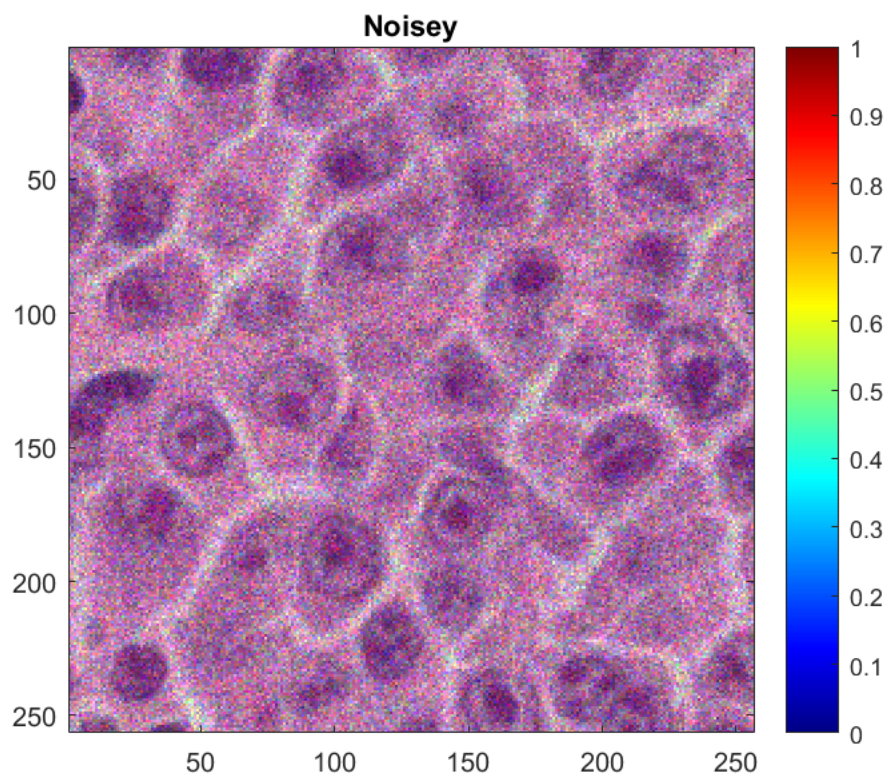




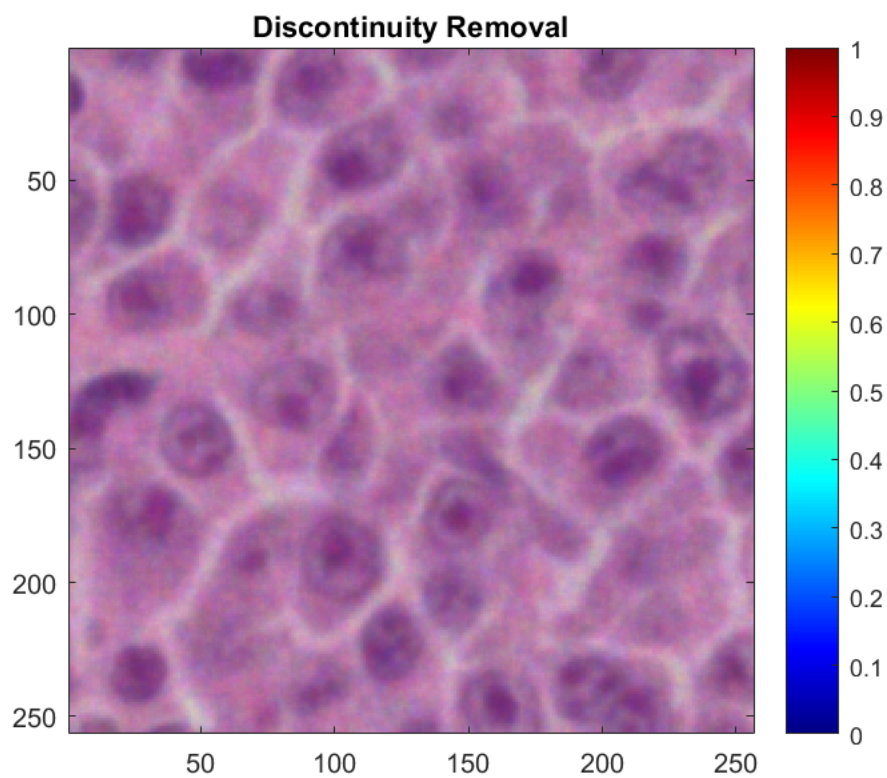
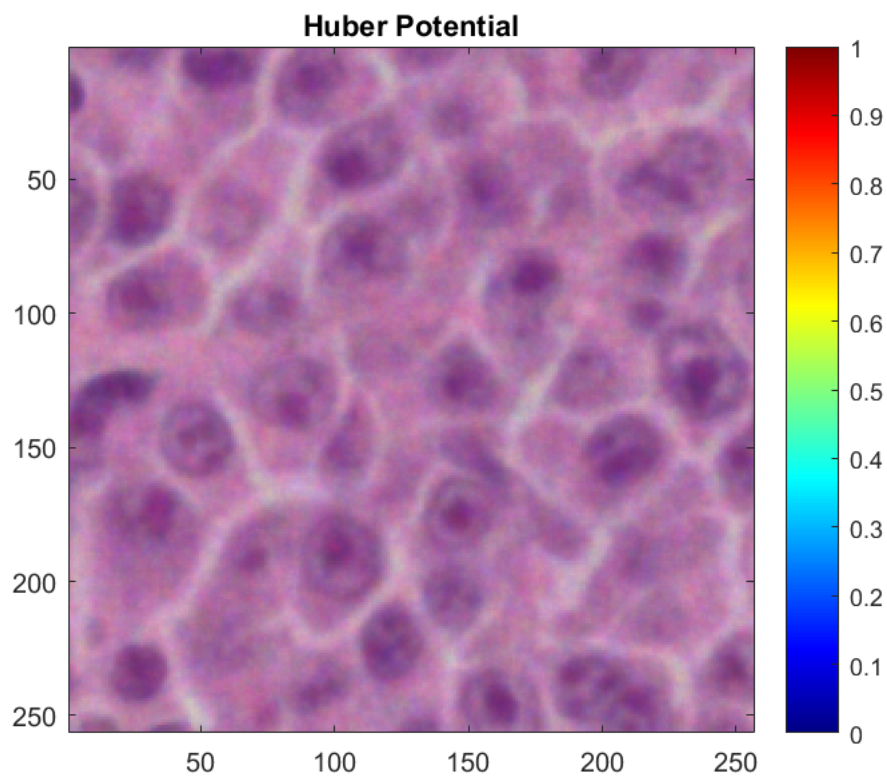












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