Standard deviation of Gaussian noise model=1 (as anyways, it gets subsumed within weights given to prior and likelihood (effectively log of posterior is c*log likelihood+log prior)).

Gradient Descent plots : Of (-log of Posterior) with number of iterations
Image not scaled to [0,1] for gradient descent, kept as it is . Just for displaying , scaled to [0,1].

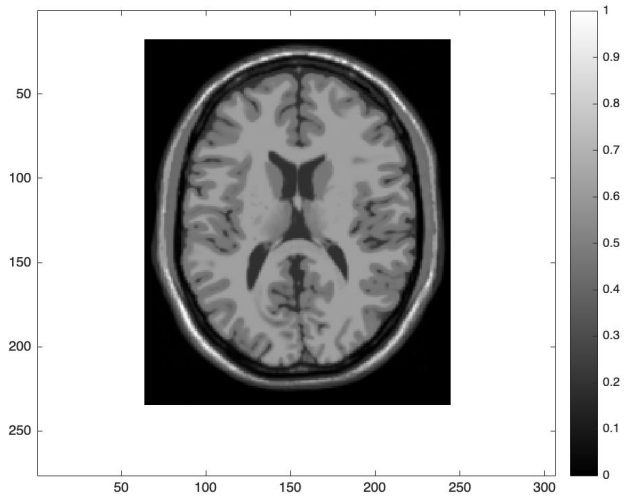
Low noise
RMSE between noisy and noiseless image 0.0519

Prior 1.
Parameters : alpha = 0.0763
RMSE = 0.0455
RMSE at 1.2 *alpha = 0.0478
RMSE at 0.8*alpha = 0.0460

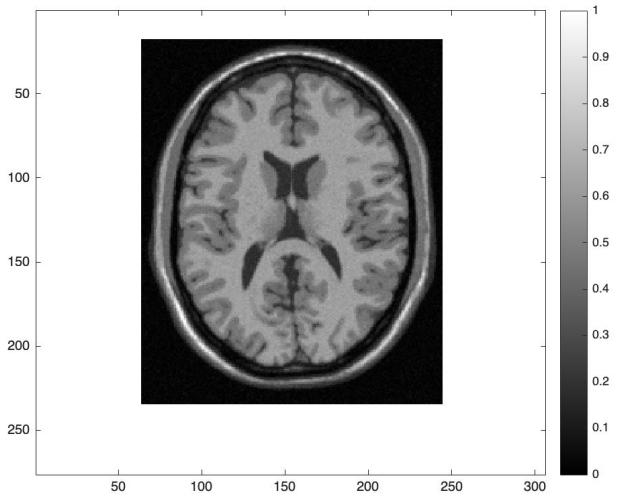
Prior 2.
Parameters : alpha = 0.7024 , gamma=1.5306
RMSE = 0.0430
RMSE at 1.2 *alpha = 0.0468
RMSE at 0.8*alpha = 0.0445
RMSE at 1.2 *gamma = 0.0431
RMSE at 0.8*gamma = 0.0433

Prior 3.
Parameters : alpha = 0.8696 , gamma=0.6
RMSE = 0.0430
RMSE at 1.2 *alpha =0.0527
RMSE at 0.8*alpha =0.0463
RMSE at 1.2 *gamma =0.0431
RMSE at 0.8*gamma = 0.0432

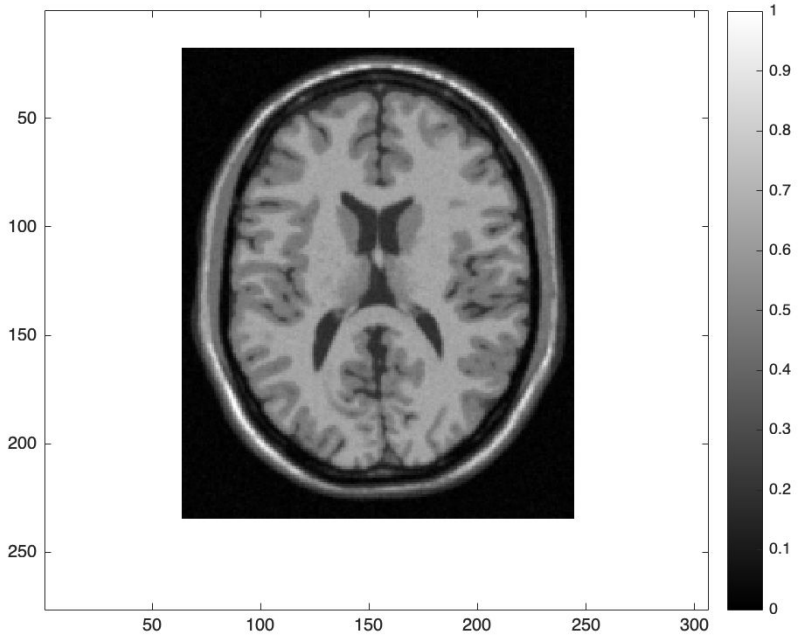
Noiseless image



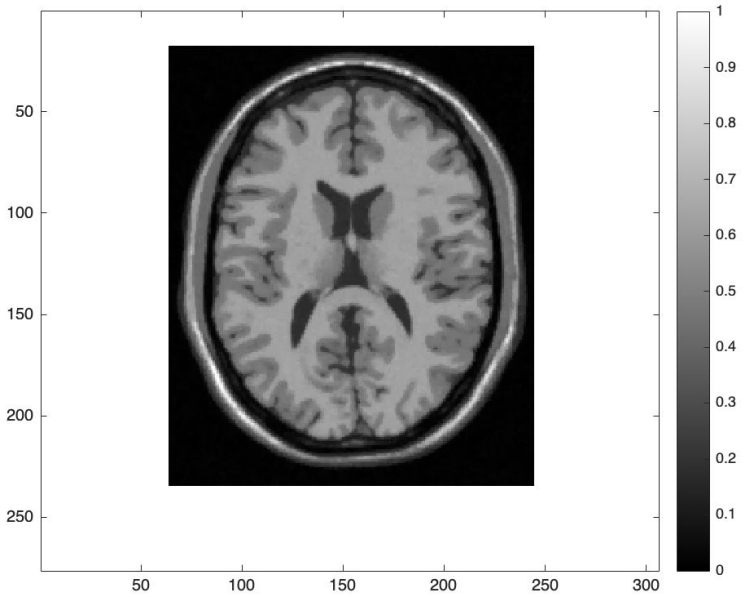
Noisy Image



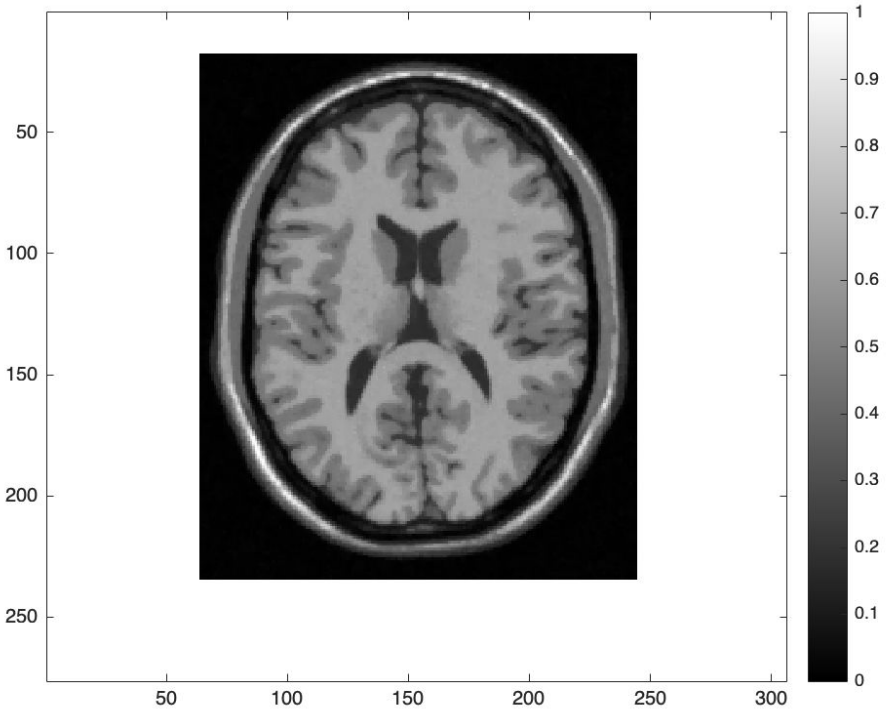
Denoised using prior1



Denoised using prior2

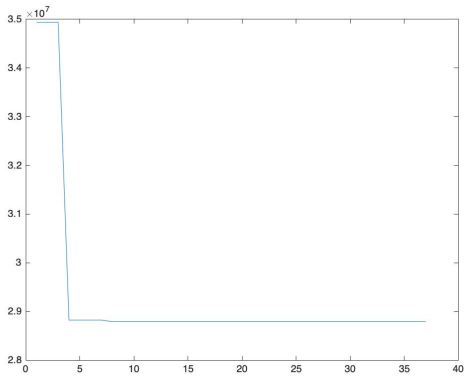


Denoised using prior3

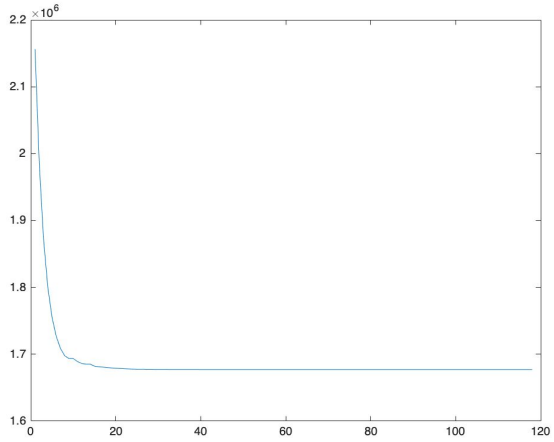


Gradient Descent plot (-log of Posterior vs number of iterations)

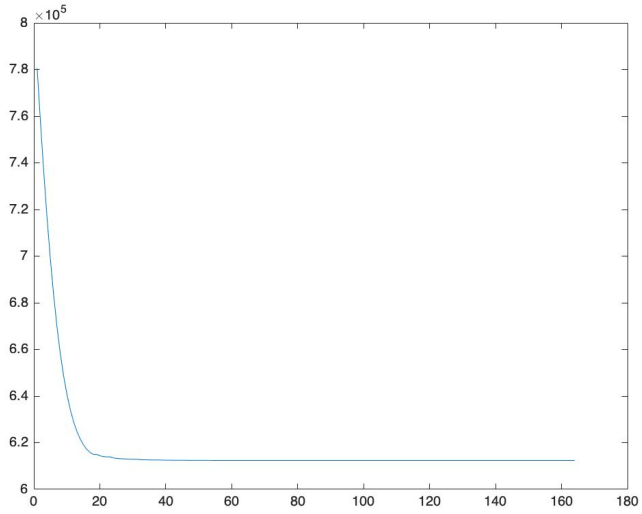
Prior1



Prior2



Prior3



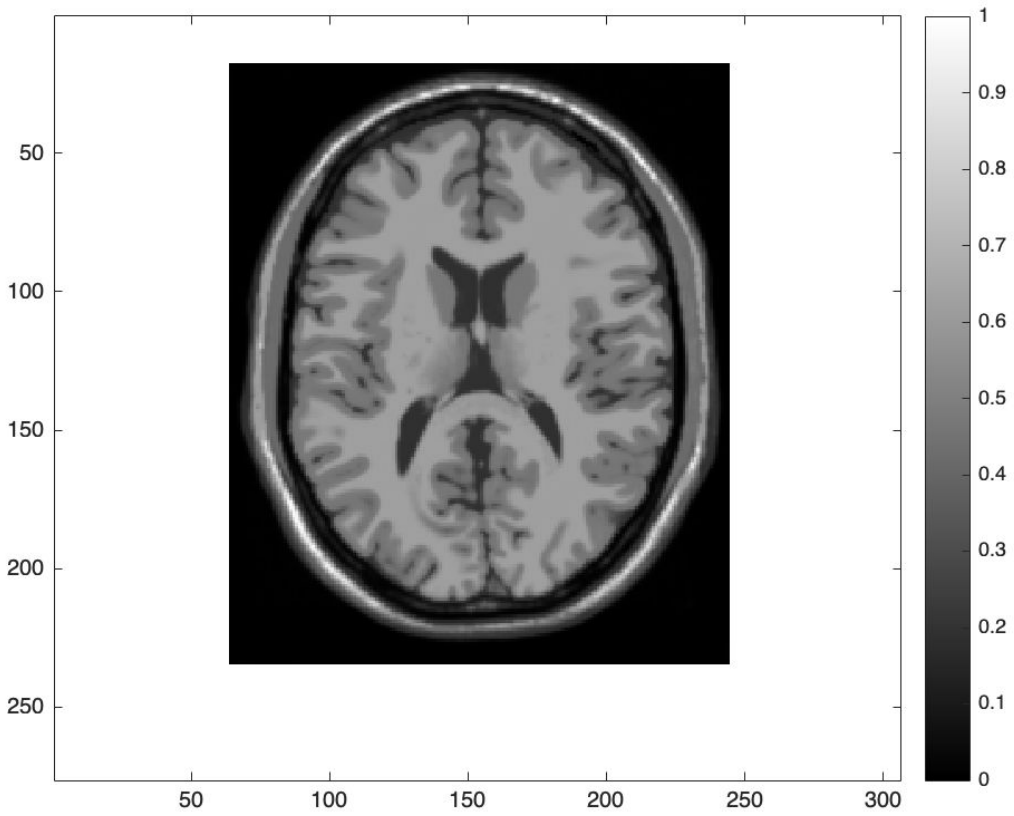
Medium noise
RMSE between noisy and noiseless image 0.1312

Prior 1.
Parameters : alpha = 0.1163
RMSE = 0.1141
RMSE at 1.2 *alpha = 0.1156
RMSE at 0.8*alpha = 0.1162

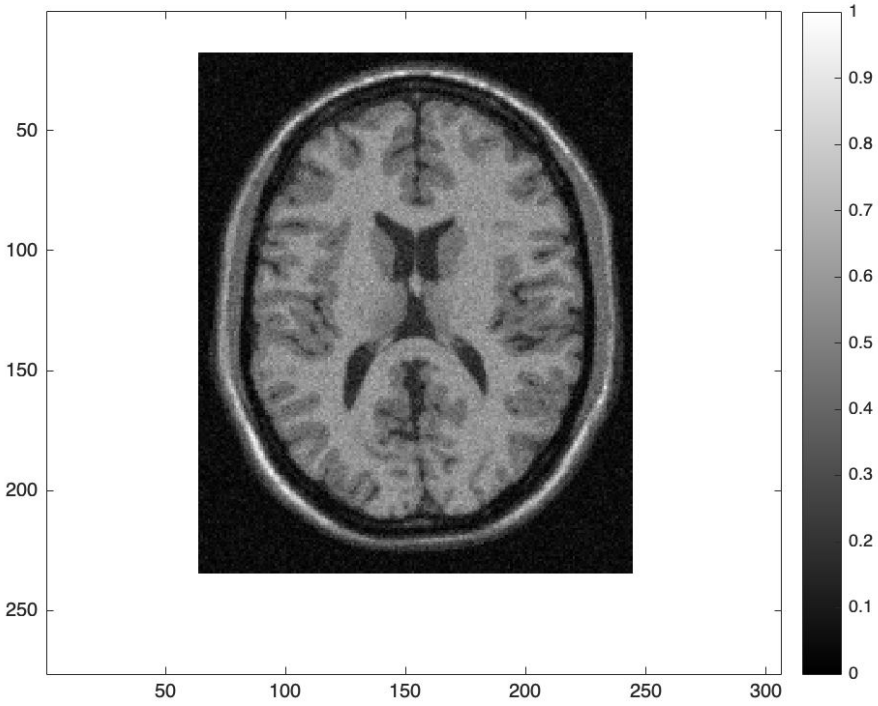
Prior 2.
Parameters : alpha = 0.7143 , gamma=3.2
RMSE = 0.1119
RMSE at 1.2 *alpha = 0.1198
RMSE at 0.8*alpha =0.1152
RMSE at 1.2 *gamma =0.1122
RMSE at 0.8*gamma = 0.1125

Prior 3.
Parameters : alpha = 0.833 , gamma=2
RMSE =0.1121
RMSE at 1.2 *alpha =0.1192
RMSE at 0.8*alpha = 0.1171
RMSE at 1.2 *gamma =0.1125
RMSE at 0.8*gamma = 0.1123

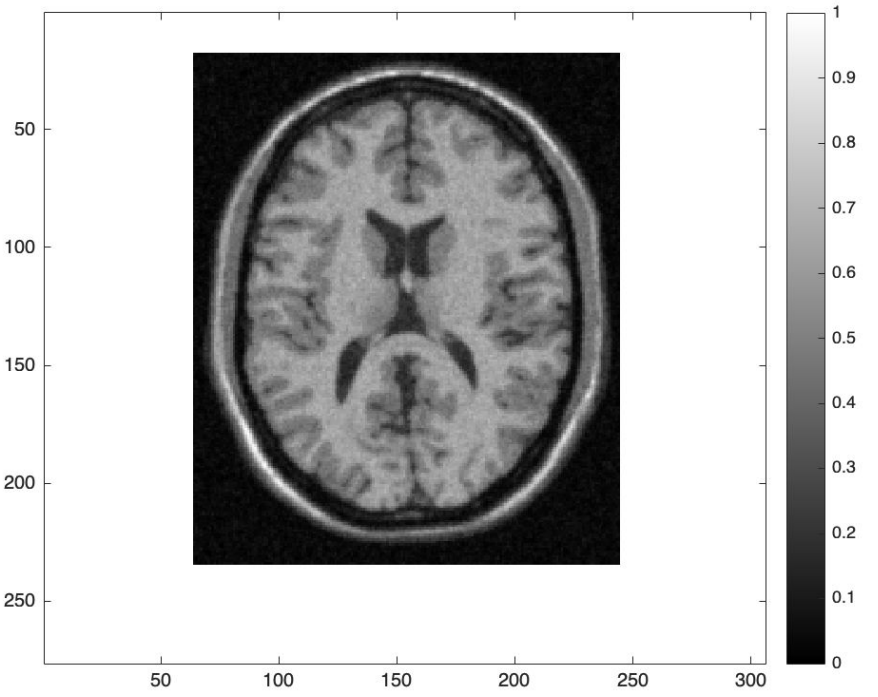
Noiseless



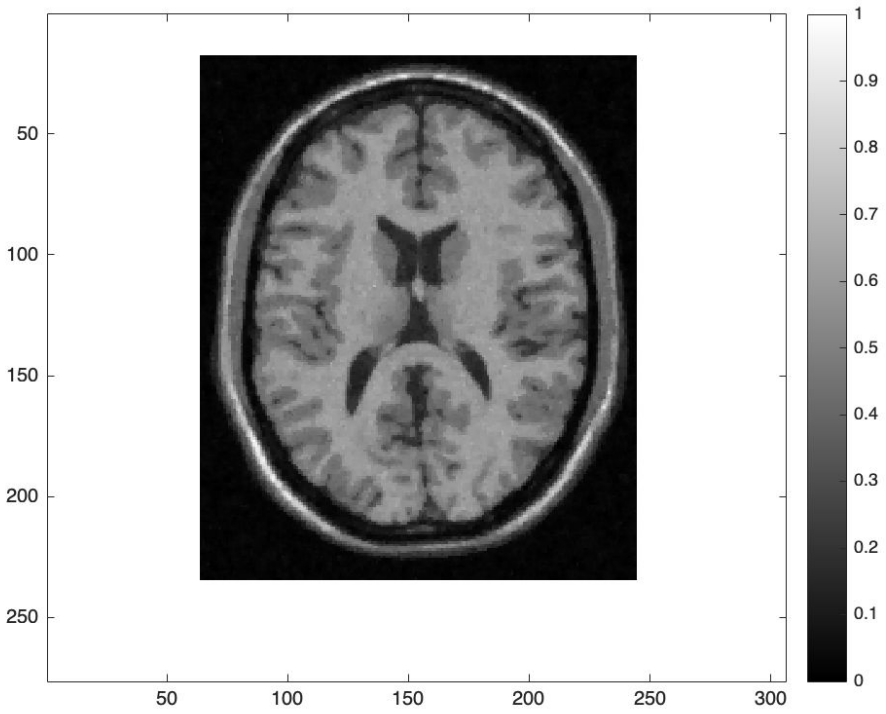
Noisy



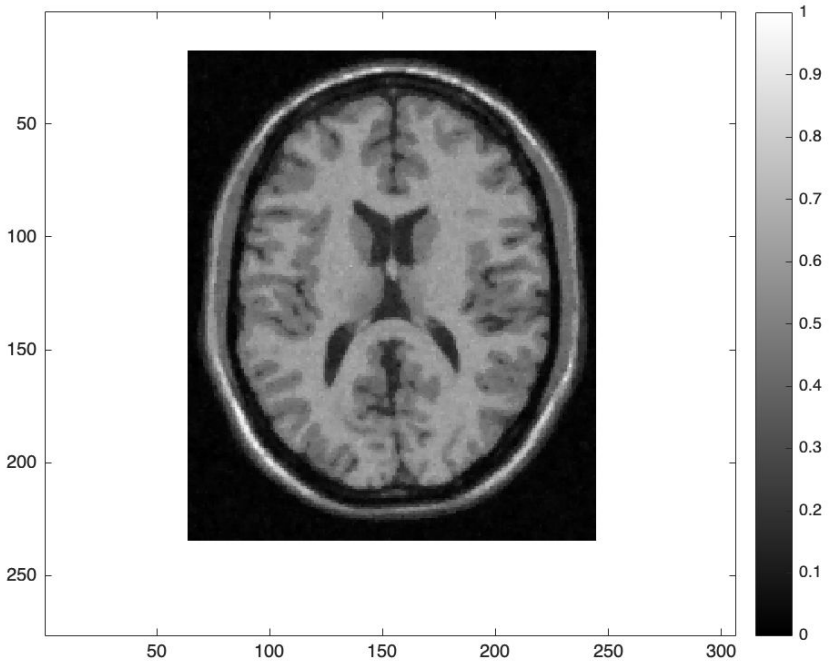
Denoised using prior1



Denoised using prior2

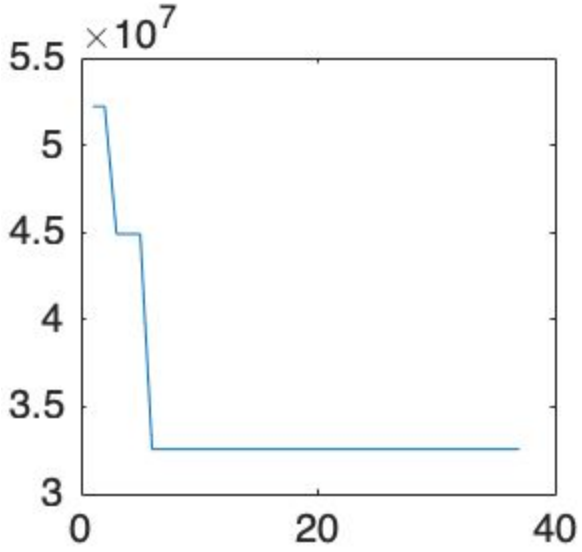


Denoised using prior3

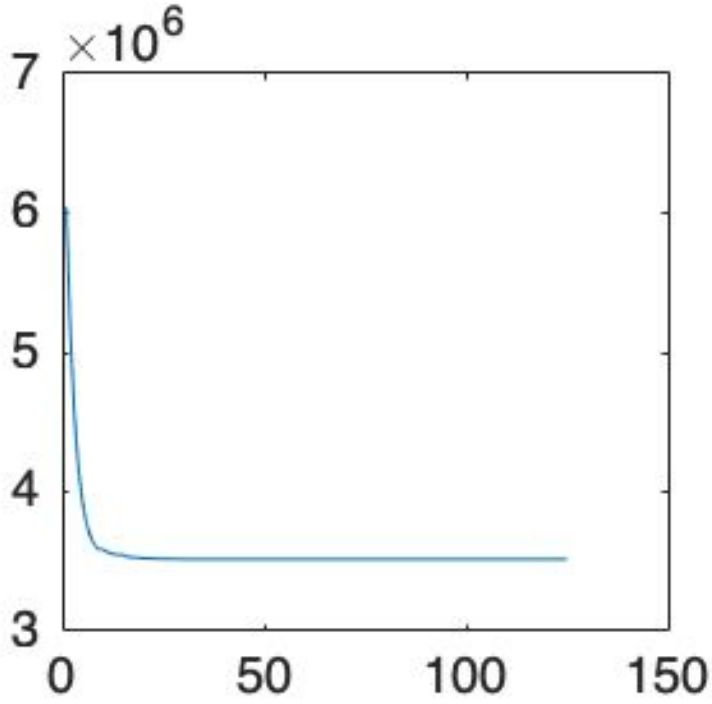


Gradient Descent plots(-log of Posterior vs number of iterations)

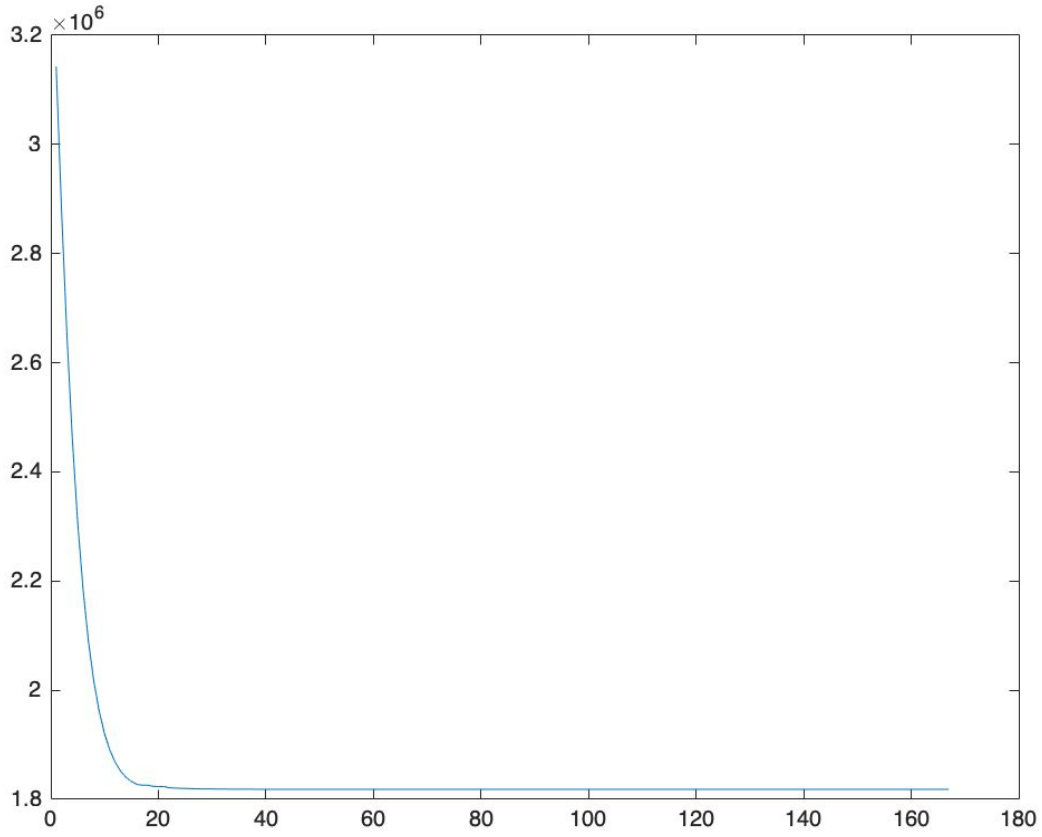
Prior1



Prior2



Prior3



High Noise

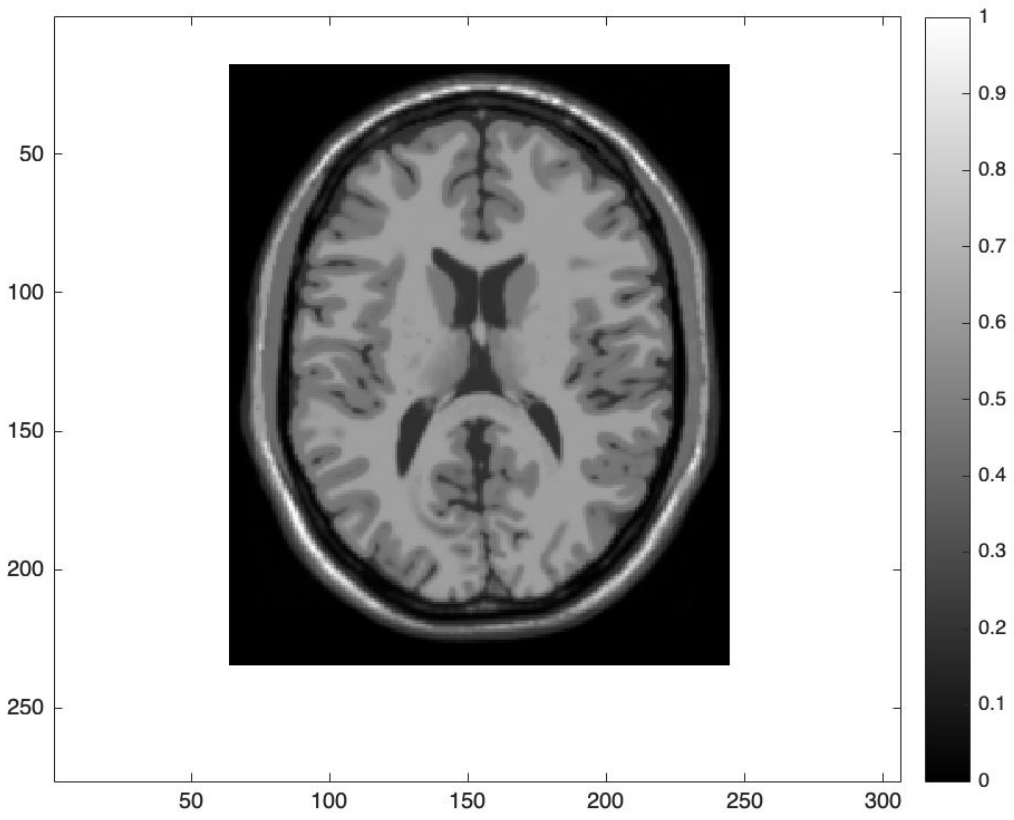
RMSE between noisy and noiseless image 0.1555

Prior 1.
Parameters : alpha = 0.2564
RMSE =0.1258
RMSE at 1.2 *alpha =0.1282
RMSE at 0.8*alpha = 0.1268

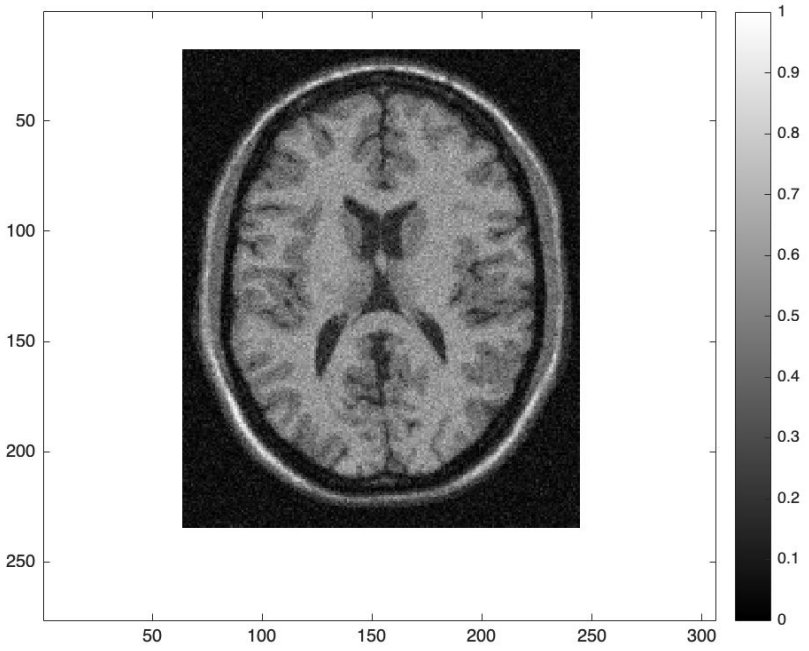
Prior 2.
Parameters : alpha = 0.7692 , gamma=3.52
RMSE = 0.1225
RMSE at 1.2 *alpha = 0.1480
RMSE at 0.8*alpha =0.1292
RMSE at 1.2 *gamma =0.1228
RMSE at 0.8*gamma = 0.1233

Prior 3.
Parameters : alpha = 0.8696 , gamma=2.1
RMSE =0.1225
RMSE at 1.2 *alpha =0.1447
RMSE at 0.8*alpha = 0.1336
RMSE at 1.2 *gamma =0.1228
RMSE at 0.8*gamma = 0.1231

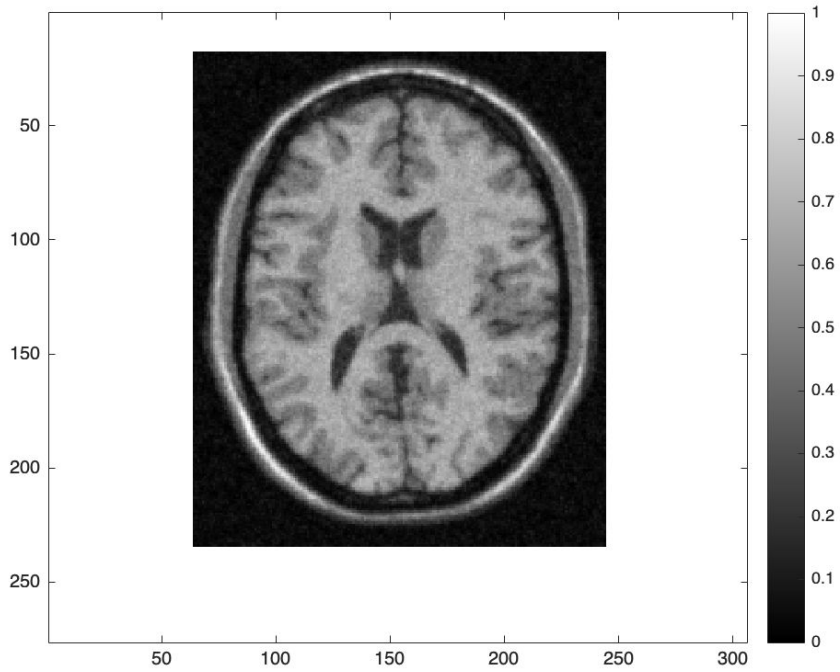
Noiseless



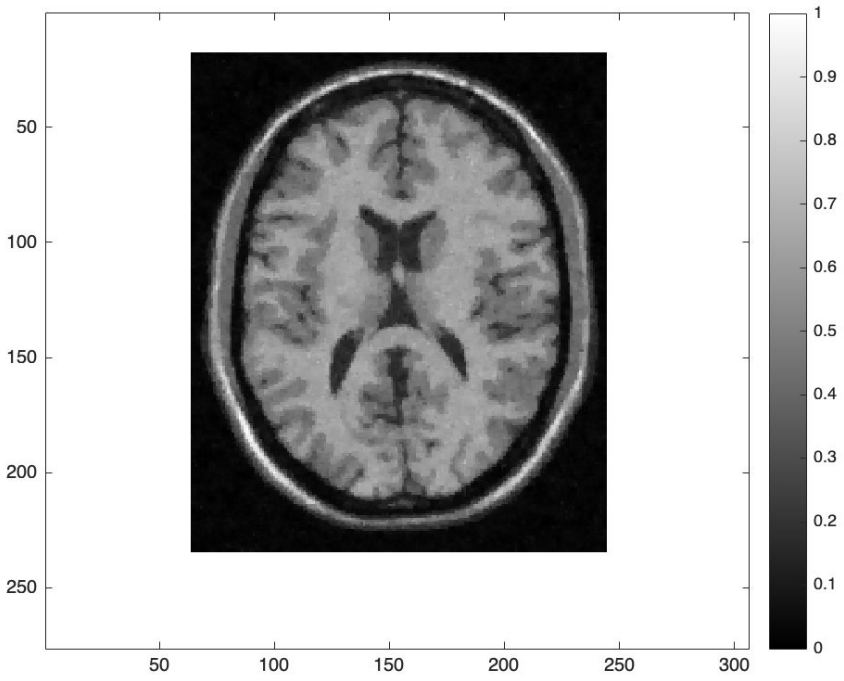
Noisy



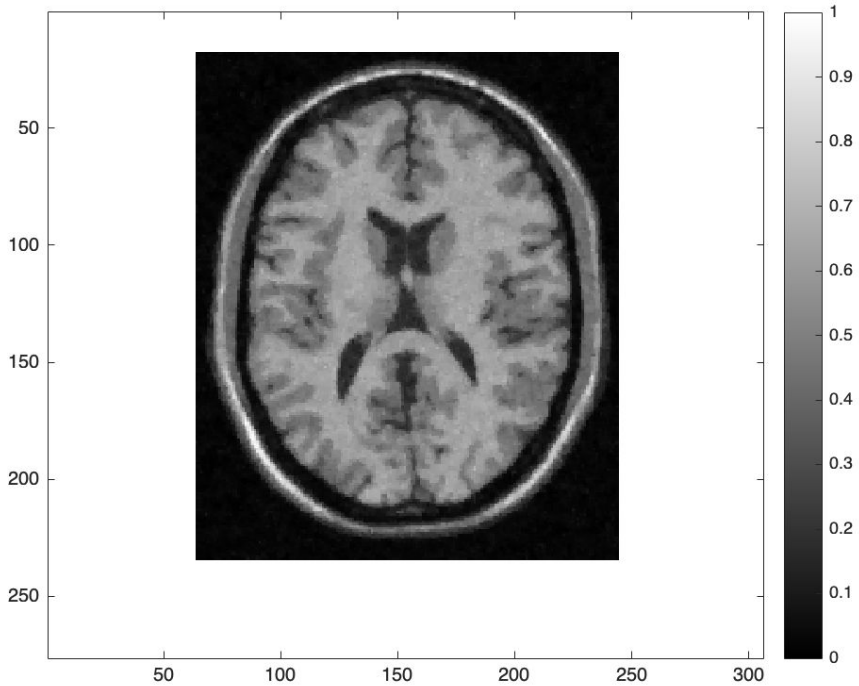
Denoised using prior1



Denoised using prior2

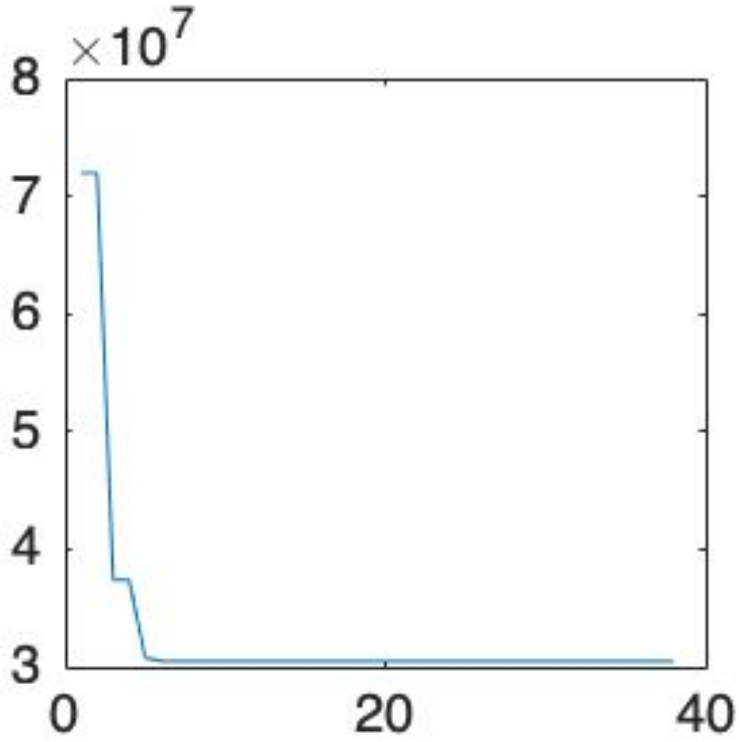


Denoised using prior3

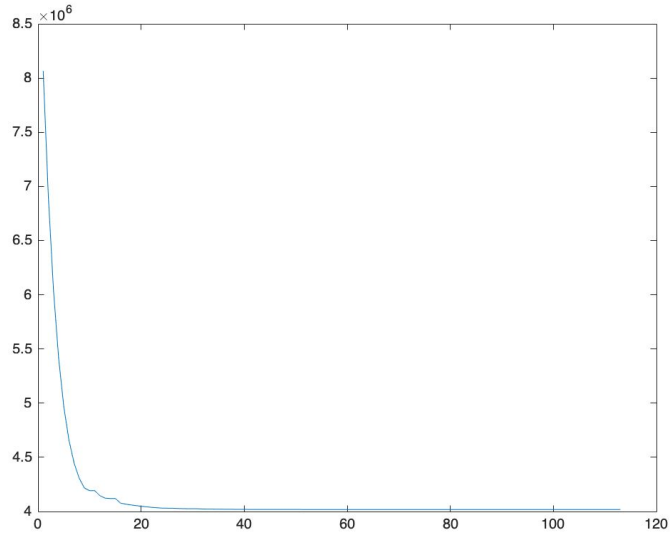


Gradient Descent plots(-log of Posterior vs number of iterations)

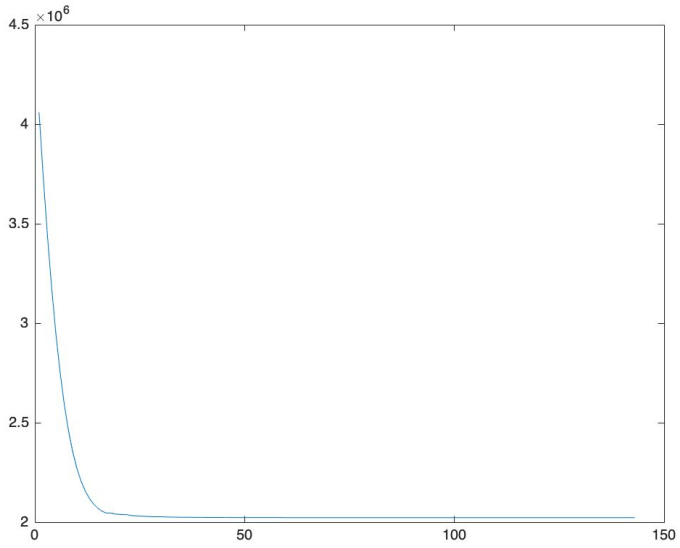
Prior1



Prior2



Prior3



Remark : At some places , if value of 1.2*alpha>1 , then rmse calculated at 1.1*alpha