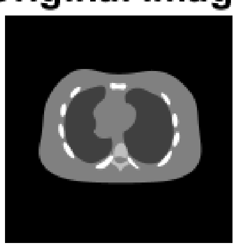
Say the vectorized image is x and A is the Radon matrix. Then Ax gives the vectorized radon transform of x. Writing the column vector x as $\Sigma x_i I_i$, where Ii is a column vector of size same as that of x containing all zeros except at ith row, where it has 1.
Now,
$Radon(x)=\Sigma x_i Radon(I_i)$ ………………………………(Linearity of Radon).

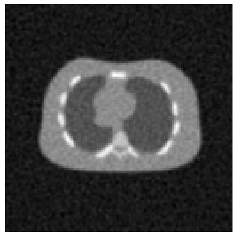
So, in the matrix form, we construct a matrix m, of all zeros except at that location that corresponds to i in the vectorized form of m. Compute its radon transform using the inbuilt matlab function. This gives us the matrix version of $Radon(I_i)$. This matrix, in its vectorized form gives us the ith column of A.

```
RRMSE for backprojected image is 0.201421 (Cosine filter)
Tikhonov parameters(alpha = 0.250)
RRMSE(alpha) = 0.143226
RRMSE(1.2*alpha) = 0.163592
RRMSE(0.8*alpha) = 0.146125

QUADRATIC PRIOR PARAMETERS
alpha = 0.500
RRMSE(alpha) = 0.142417
RRMSE(1.2*alpha) = 0.144553
RRMSE(0.8*alpha) = 0.142017

HUBER PRIOR PARAMETERS
alpha = 1.000
gamma = 9.000
RRMSE(alpha,gamma) = 0.142417
RRMSE(1.2*alpha,gamma) = 0.142017
RRMSE(0.8*alpha,gamma) = 0.144553
RRMSE(alpha,0.8*gamma) = 0.142417
RRMSE(alpha,1.2*gamma) = 0.142417

DISCONTINUITY PRIOR PARAMETERS
alpha = 0.800
gamma = 4.800
RRMSE(alpha,gamma) = 0.142059
RRMSE(1.2*alpha,gamma) = 0.142028
RRMSE(0.8*alpha,gamma) = 0.144191
RRMSE(alpha,0.8*gamma) = 0.142058
RRMSE(alpha,1.2*gamma) = 0.142037
```

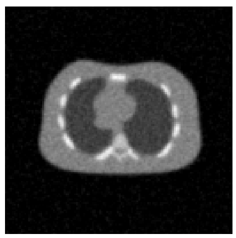
Original Image



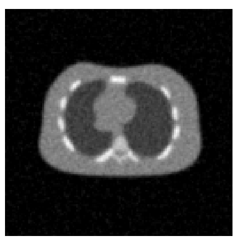
myFilter Reconstructed (Cosine filter)



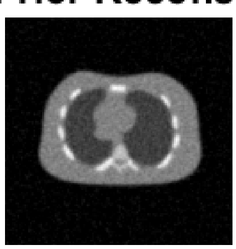
Tikhonov Reconstructed

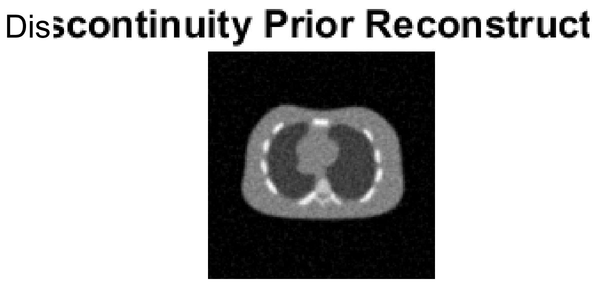


uadratic Prior Reconstructe



Huber Prior Reconstructed





Published with MATLAB® R2015b