

```

% Paula Burgi
% HW 4
clear;
img = imread('cheese.jpg');
img = double(img(:,:,3));
img = flipud(img);
pcolor(img); shading flat;

r = 64;
a = 120;
R = [];
iaa = [];
for i = 1:a
    ia = i*(180/a);
    rim = imrotate(img,ia,'bilinear','crop');
    Ri = sum(rim,2);
    samp = floor(linspace(1,size(img,1),r));
    R(:,i) = Ri(samp);
    iaa = [iaa; ia];
end

% failed attempt at back projection...
[xg, yg] = meshgrid(1:r,1:a);
dr = iaa(2) - iaa(1);
Rb = zeros(a,r);
for i = 1:a
    ia = iaa(i);
    Rp = R(:,i);
    ri = xg.*cosd(ia) + yg.*sind(ia);
    ridx = round(ri./ (deg2rad(dr)+a))+2;
    Rpp = zeros(size(ridx));
    for j = 1:length(ridx(:))
        Rpp(j) = Rp(ridx(j));
    end
    Rb = Rb + Rpp;
end
%using matlab function
Rb = iradon(R, iaa, 'linear', 'none');
Rbf = iradon(R, iaa);

% add noise
img2 = img+(randn(size(img)).*.1*max(max(img)));
Rn = [];
iaa = [];
for i = 1:a
    ia = i*(180/a);
    rim = imrotate(img2,ia,'bilinear','crop');
    Ri = sum(rim,2);
    samp = floor(linspace(1,size(img2,1),r));
    Rn(:,i) = Ri(samp);
    iaa = [iaa; ia];
end
% filtered back projection
Rbn = iradon(Rn, iaa, 'linear', 'none');
Rbfn = iradon(Rn, iaa);

close all;
figure; hold on;
set(gcf, 'Position', [100, 100, 800, 400])
subplot(2,4,1);
pcolor(img); shading flat; colormap gray;

```

```

title('original');
subplot(2,4,2);
pcolor(R); shading flat; colormap gray;
title('sinogram');
subplot(2,4,3);
pcolor(Rb'); shading flat; colormap gray;
title('back proj');
subplot(2,4,4);
pcolor(Rbf'); shading flat; colormap gray;
title('fil back proj');

subplot(2,4,5);
pcolor(img2); shading flat; colormap gray;
title('original w noise');
subplot(2,4,6);
pcolor(Rn); shading flat; colormap gray;
title('sinogram w noise');
subplot(2,4,7);
pcolor(Rbn'); shading flat; colormap gray;
title('back proj w noise');
subplot(2,4,8);
pcolor(Rbfn'); shading flat; colormap gray;
title('filt back proj w noise');
% with noise, the filtered back projection does not very different than the
% back projection without noise. This is because the process of integration
% does not amplify noise.

```

