

ECE 5256

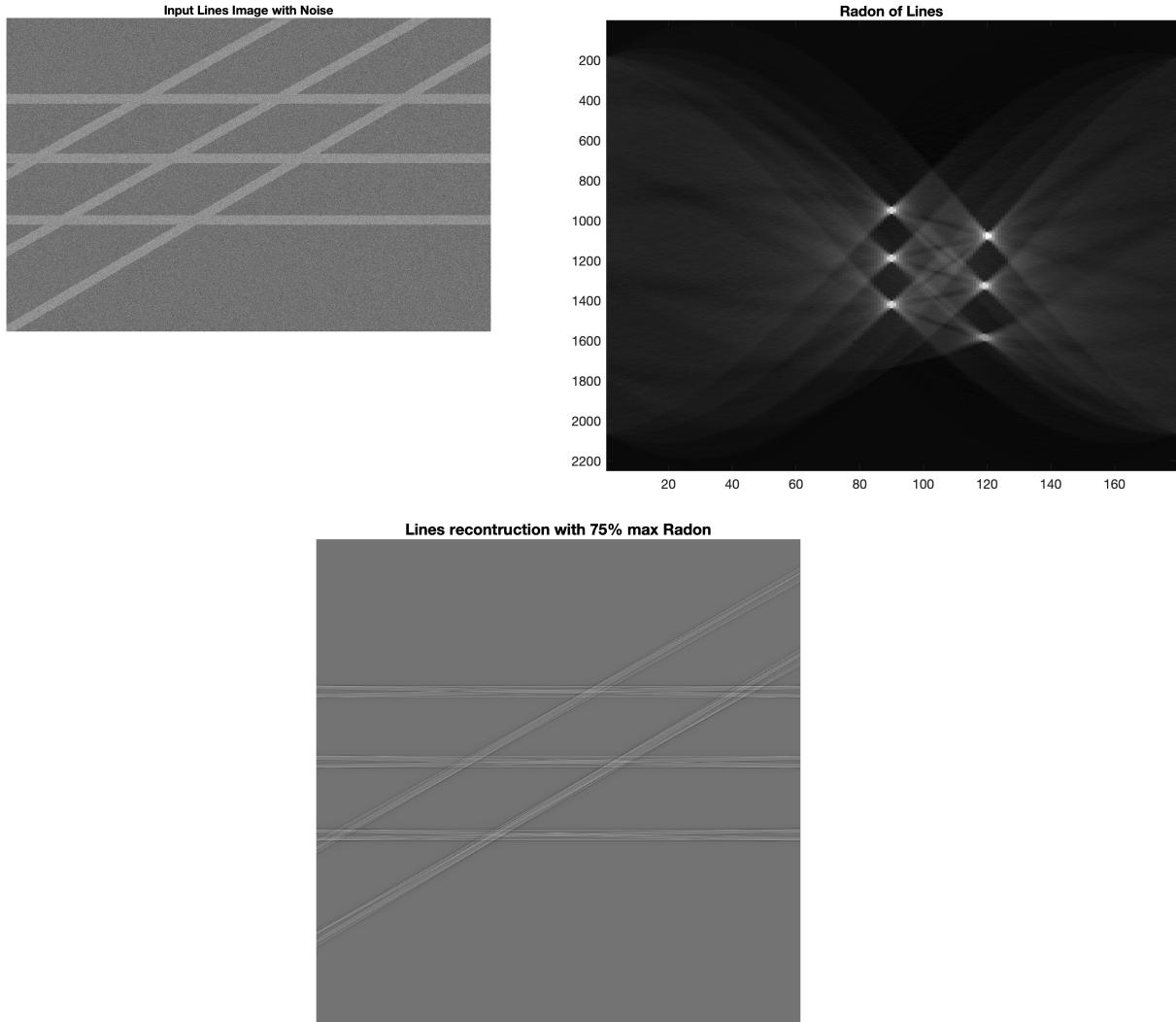
Project 6: Forward Radon Transform

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## 1 Part 1

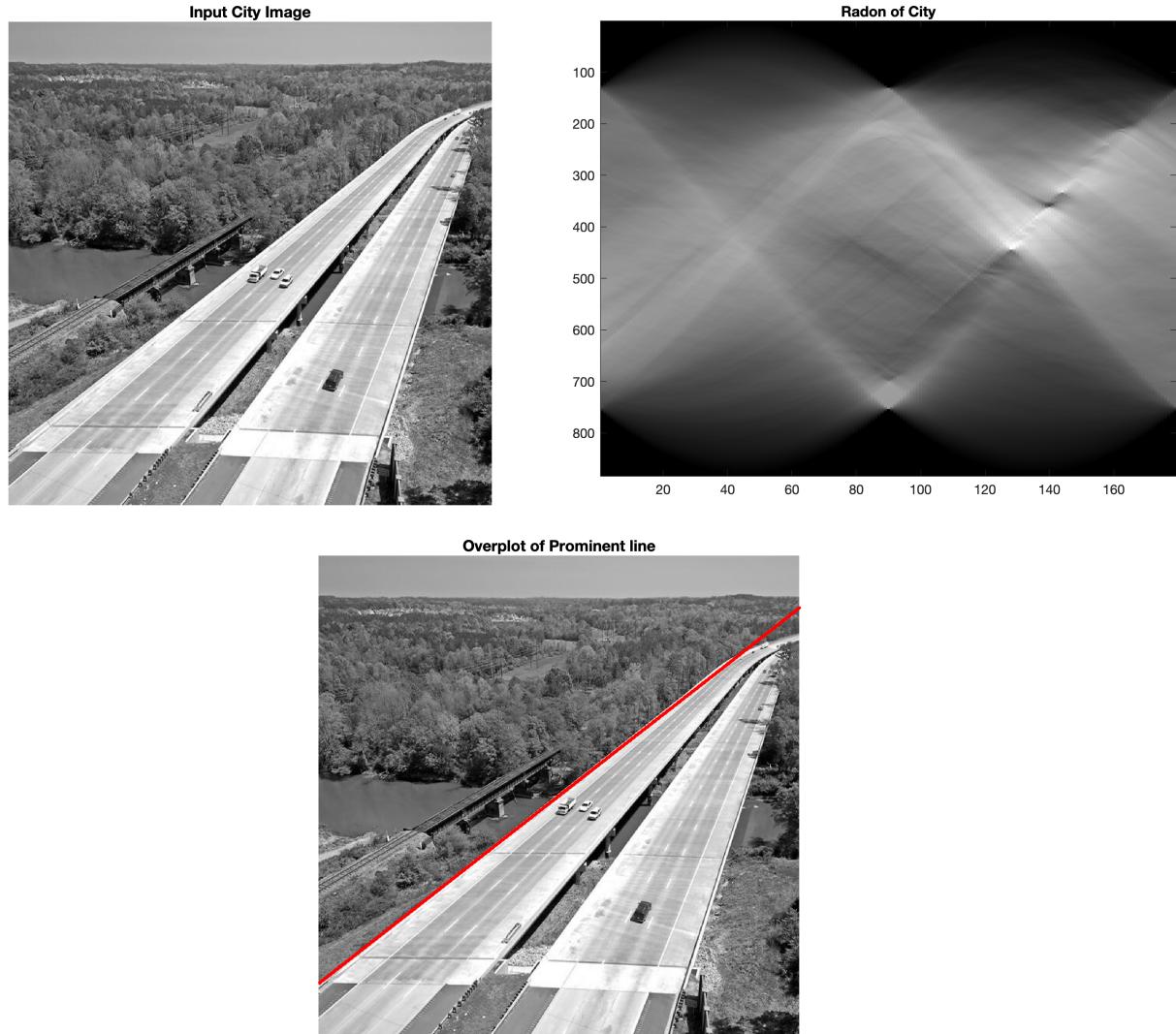
For the first part of this project I constructed an image of 6 lines. 3 horizontal and 3 at an angle. I then added Gaussian noise to the image. This result is seen in below. The radon transform of this image was then taken. This is seen blow. From this transform I found the spots brighter than 75% of the maximum values. This were then used in the inverse radon transform to reconstruct the lines. This did a pretty good job compared to the original noisy image. This result is seen below. However one of the diagonal lines was not found.



## 2 Part 2

For part 2 of this project I investigated on how the radon transformation can be used to identify dominate lines in an image. For this the input image of a roadway was used, seen below. From this the radon transform was taken the same was as in part 1, also seen below. Looking at the radon transform there is really only

one right spot so there is only one dominate line. To select this I picked the brightest point in the radon transform and reconstructed it from this. I then over plotted the line in red over the original image seen in the lower picture below.



## A MATLAB Code

This is the code used for the coding portions of this project.

```
%Housekeeping commands
clear all
close all

lines=imread('Lines.png'); %Reading in input
lines=cast(im2gray(lines), 'double'); %converting to grayscale
noise=cast(floor(randn(size(lines)).*200), 'double'); %creating noise
Nlines=lines+noise; %adding noise
%displaying noisy image
figure
imagesc(Nlines)
colormap('gray')
axis off image
title('Input Lines Image with Noise')
exportgraphics(gcf, 'NoisyLines.png', 'Resolution', 300)

Rlines=radon(Nlines, 1:179); %taking radon transform for all 180 degrees
figure
imagesc(Rlines)
colormap('gray')
title('Radon of Lines')
exportgraphics(gcf, 'RadonLines.png', 'Resolution', 300)

Recon=max(Rlines, [], 'all')*0.75 < Rlines; % taking 75% of max radon
BRLines=Rlines.*Recon; %masking radon transfrom
LinesRecon=iradon(BRLines, 1:179); %taking inverse radon transfrom
%dipsaying reconstruction
figure
imagesc(LinesRecon)
colormap('gray')
axis off image
title('Lines reconstruction with 75% max Radon')
exportgraphics(gcf, 'ReconLines.png', 'Resolution', 300)
```

```

%Part 2

city=imread("RoadwaySQ.jpg");%reading input
city=im2gray(city); %converting to grayscale
s=size(city);
%displaying and saving input image
figure
imagesc(city)
colormap('gray')
axis off image
title('Input City Image')
exportgraphics(gcf,'Input.png','Resolution',300)

Rcity=radon(city,1:179);%radon transfrom
%displaiying radon transfrom
figure
imagesc(Rcity)
colormap('gray')
title('Radon of City')
exportgraphics(gcf,'RadonRoad.png','Resolution',300)

figure
hold on
imagesc(city)%displaying roadway
set(gca,'YDir','reverse') %needed to do this for overplotting
colormap('gray')
axis off image
CityMax=max(Rcity,[],'all')==Rcity;%finding bightest point in radon trans
BRcity=CityMax;
CityRecon=iradon(BRcity,1:179);% inverser radon transfrom of bright point
%overplotting dominate line
[X,Y,~]=find(CityRecon>0);
plot(Y,X,LineWidth=2,color='red')
title('Overplot of Prominent line')
exportgraphics(gcf,'LineOverplot.png','Resolution',300)

```