Testing data from laboratory's FMCW radar

Loading .wav file and radar parameters

```
[file,path] = uigetfile('*.wav');
if isequal(file,0)
   disp('User selected Cancel');
   return
else
   disp(['User selected ', file]);
end
```

```
User selected Corsa2_corner.wav
```

```
load radarParameters
```

Rearranging the data and calculating the RD map axes

```
dataMatrix = radarLabDataLoader(fullfile(path,file), 'trunc');
[N,M] = size(dataMatrix);
zpFactor = 4;

TimePeriod = M/samplerate;
maxR = fSamp*c*TimePeriod/(2*BW);
maxV = 0.5*lambda/(4*TimePeriod);

r = linspace(0, maxR, zpFactor*M);
v = linspace(-maxV, maxV, zpFactor*N);
```

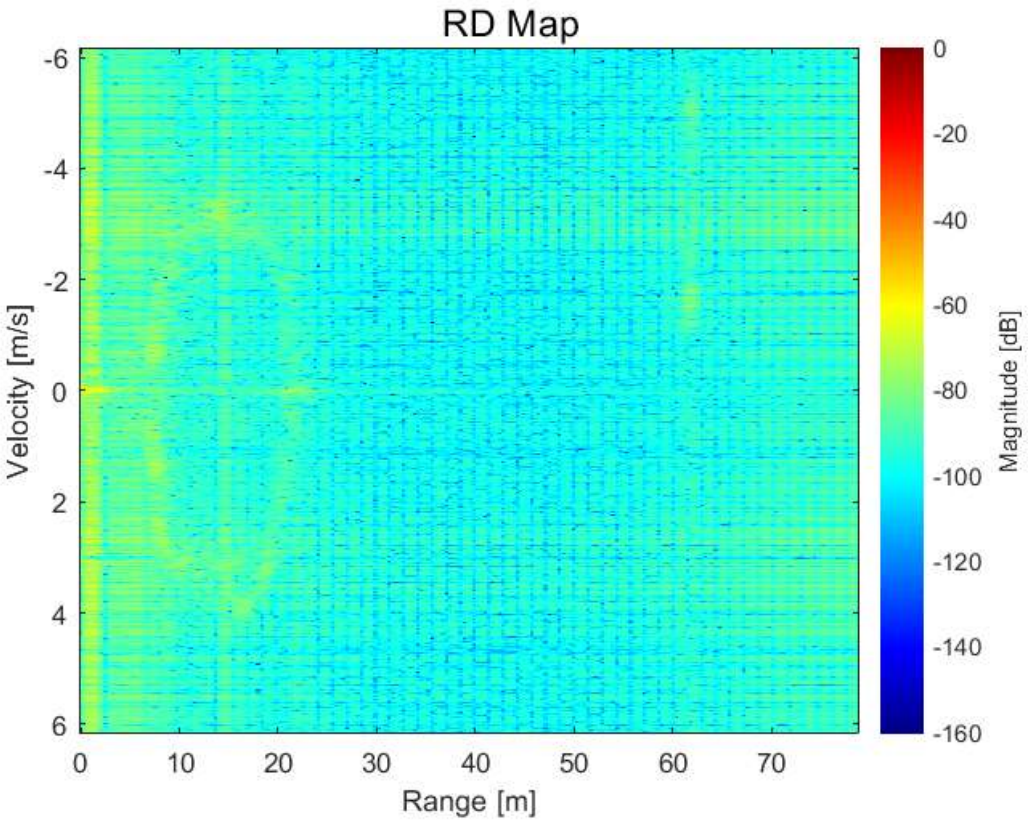
RD map evaluation

```
compressoTemp = ifft(dataMatrix, zpFactor*M, 2);
RDmap = fftshift(fft(compressoTemp, zpFactor*N), 1);
```

Plot results

```
imageToPlot = 20*log10(abs(RDmap(:,1:end/2))/max(max(abs(RDmap(:,1:end/2)))));
maxDyn = max(max(imageToPlot));
minDyn = min(min(imageToPlot));

figure(2)
imagesc(r,v,imageToPlot)
c = colorbar;
c.Label.String = 'Magnitude [dB]';
colormap jet
caxis([minDyn maxDyn])
sgtitle('RD Map')
xlabel('Range [m]')
ylabel('Velocity [m/s]')
```



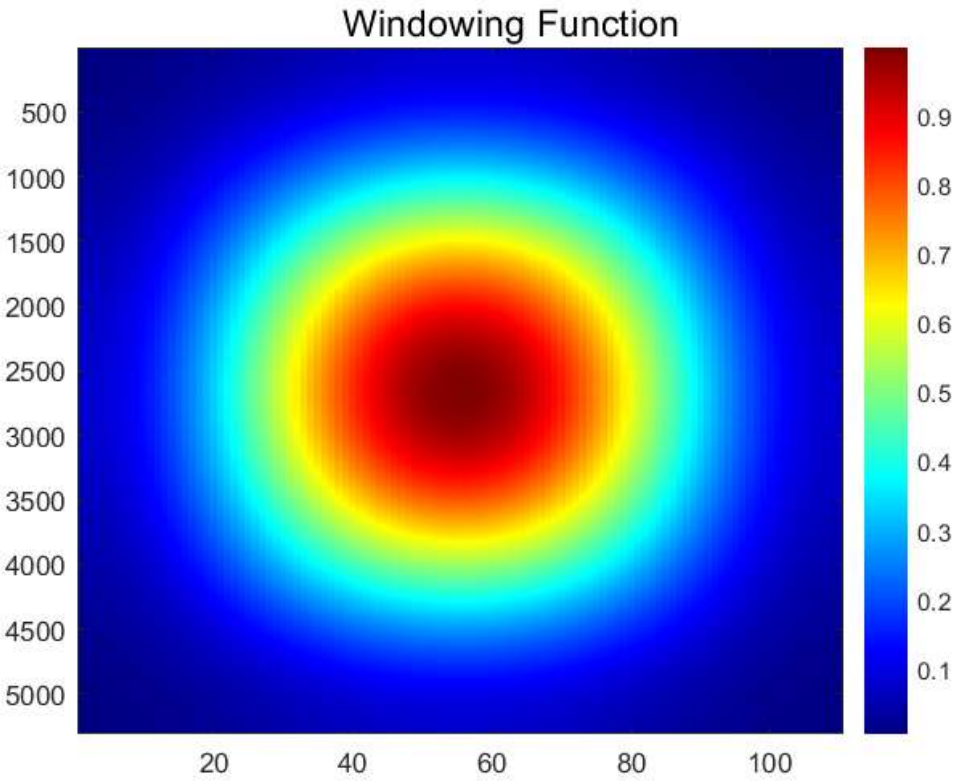
Windowing Function definition

```
window = true;

if window
    Hn = hamming(N);
    Hm = hamming(M);
else
    Hn = ones(N,1);
    Hm = ones(M,1);
end

ham2D = repmat(Hn, 1, M).*repmat(Hm.', N, 1);
dataMatrix = dataMatrix.*ham2D;

figure(1)
imagesc(ham2D)
colormap jet
colorbar
sgtitle('Windowing Function')
```



RD map evaluation

```
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RDmap = fftshift(fft(compressoTemp, zpFactor*N), 1);
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Plot results

```
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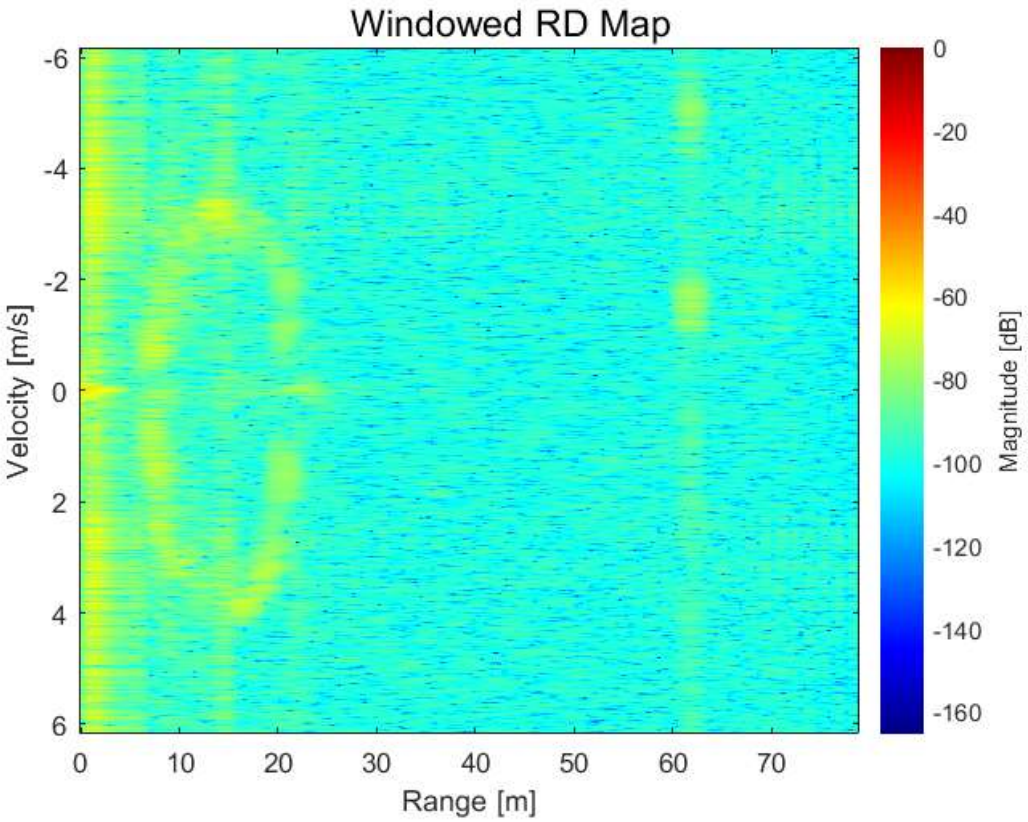
maxDyn = max(max(imageToPlot));
minDyn = min(min(imageToPlot));

figure(2)
imagesc(r,v,imageToPlot)
c = colorbar;
c.Label.String = 'Magnitude [dB]';
colormap jet
caxis([minDyn maxDyn])
sgtitle('Windowed RD Map')
xlabel('Range [m]')
ylabel('Velocity [m/s]')
```

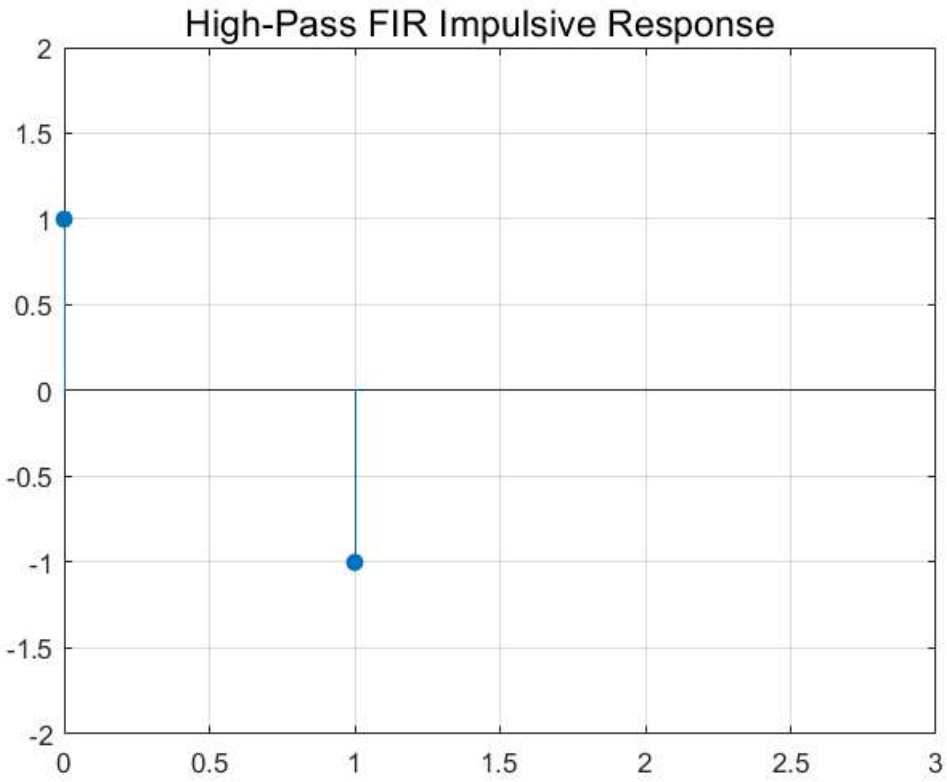


High-Pass Filtering and RD map evaluation

```
MTI_Filter = [1 -1];
filteredData = filter(MTI_Filter, 1, dataMatrix, [], 2);

compressoTemp = ifft(filteredData, zpFactor*M, 2);
RDmap = fftshift(fft(compressoTemp, zpFactor*N), 1);

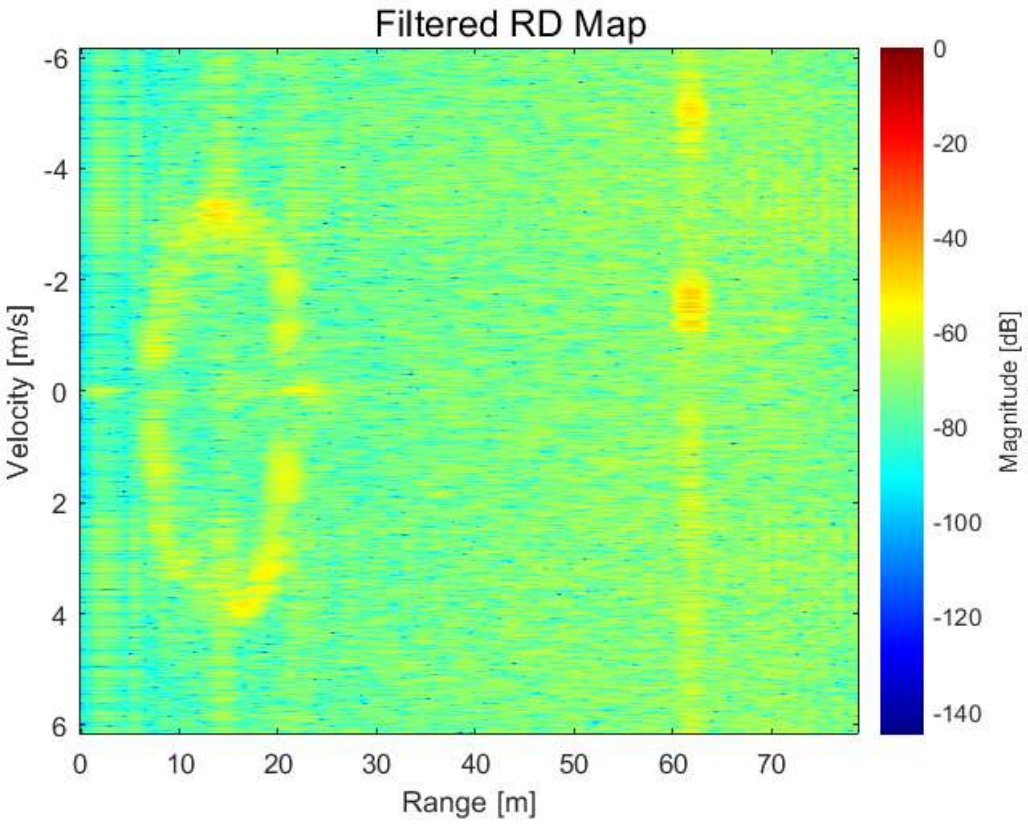
figure(3)
stem([0 1], MTI_Filter,'filled')
grid on
sgtitle('High-Pass FIR Impulsive Response')
xlim([0 3])
ylim([-2 2])
```



Plot results

```
imageToPlot = 20*log10(abs(RDmap(:,1:end/2))/max(max(abs(RDmap(:,1:end/2)))));
maxDyn = max(max(imageToPlot));
minDyn = min(min(imageToPlot));

figure(4)
imagesc(r,v,imageToPlot)
c = colorbar;
c.Label.String = 'Magnitude [dB]';
colormap jet
caxis([minDyn maxDyn])
sgtitle('Filtered RD Map')
xlabel('Range [m]')
ylabel('Velocity [m/s]')
```


Filtered RD Map
Velocity [m/s]
-6
-4
-2
0
2
4
6
0
10
20
30
40
50
60
70
Range [m]
0
-20
-40
-60
-80
-100
-120
-140
Magnitude [dB]