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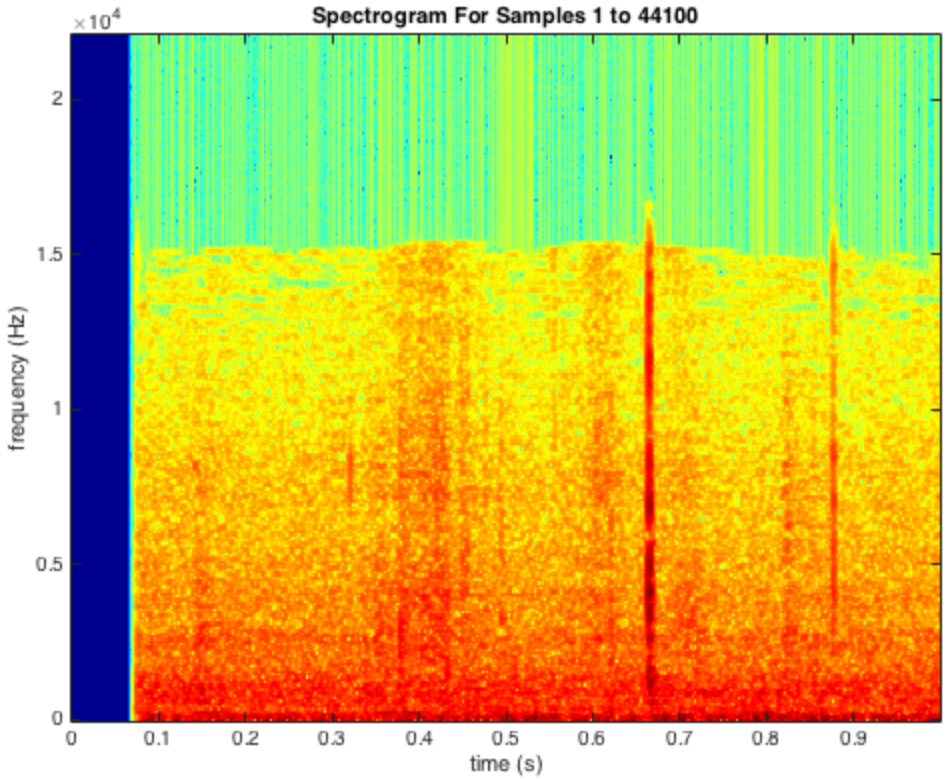
Import data

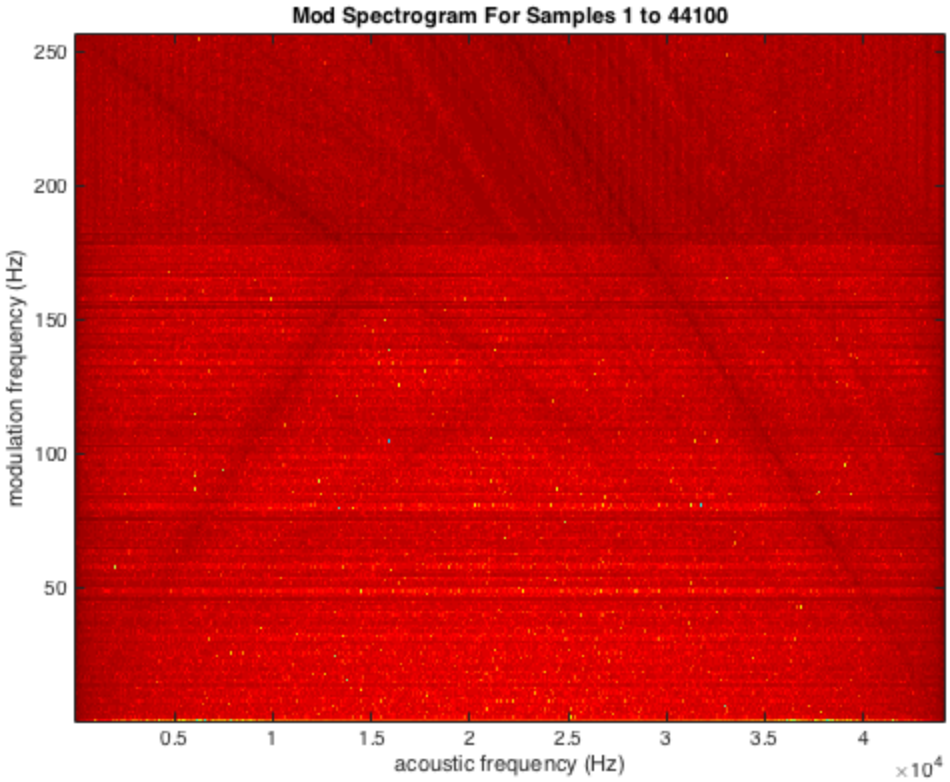
```
[x, fs] = audioread('resources/Cessna.wav');
x = mean(x,2);
x = x.';
```

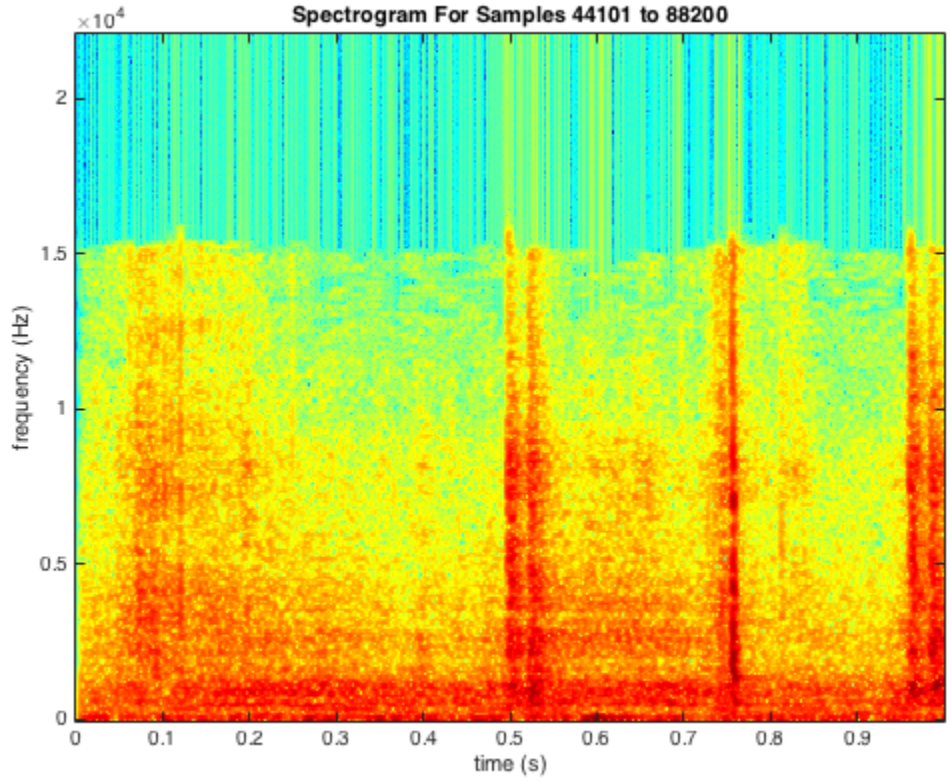
FBSmodspec

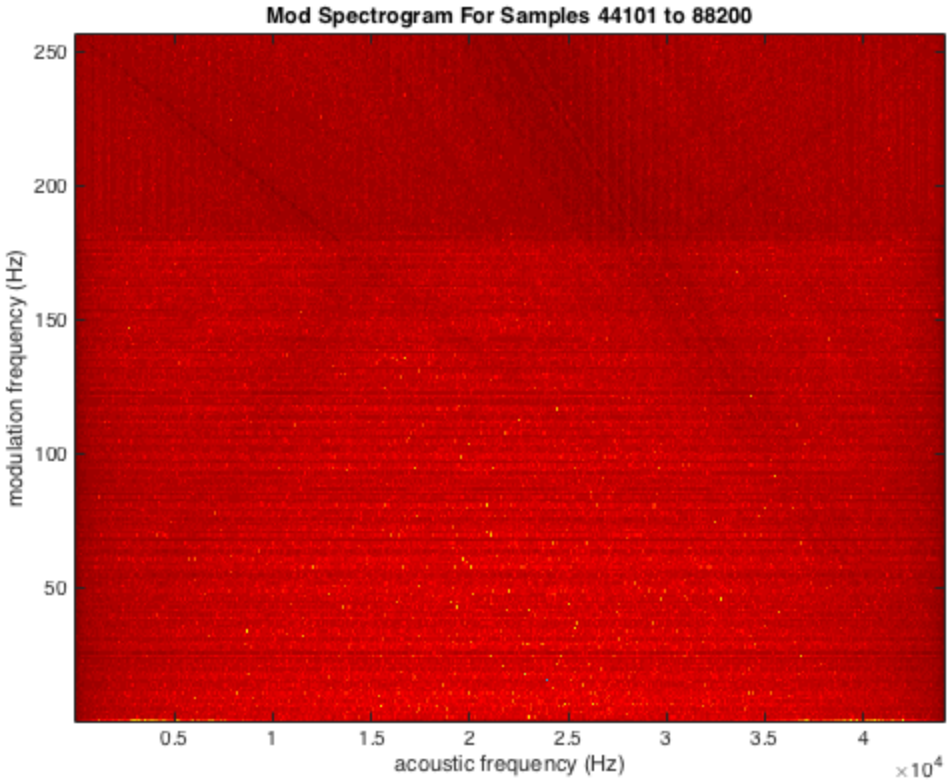
```
nsegments_in = 10; % select number of segments to process
Nw = 512;
segmentlen = fs;
xlen = length(x);
nsegments_total = floor(xlen/segmentlen);

nsegments = min(nsegments_in,nsegments_total);

start_pos = 1;

for segmentind = 1:nsegments
    end_pos = start_pos + segmentlen - 1;

    x_segment = x(start_pos:end_pos);
    fbsmodspec(x_segment, Nw, fs, start_pos,end_pos);
    start_pos = start_pos + segmentlen;
end


% %% In loop
% nsegments_in = 10; % select number of segments to process
% Nw = 512;
% segmentlen = fs;
% xlen = length(x);
% nsegments_total = floor(xlen/segmentlen);
%
% nsegments = min(nsegments_in,nsegments_total);
%
% start_pos = 1;
%
% for segmentind = 1:nsegments
%     end_pos = start_pos + segmentlen - 1;
%
%     x_segment = x(start_pos:end_pos);
%     modspec(x_segment, Nw, fs, start_pos,end_pos);
```

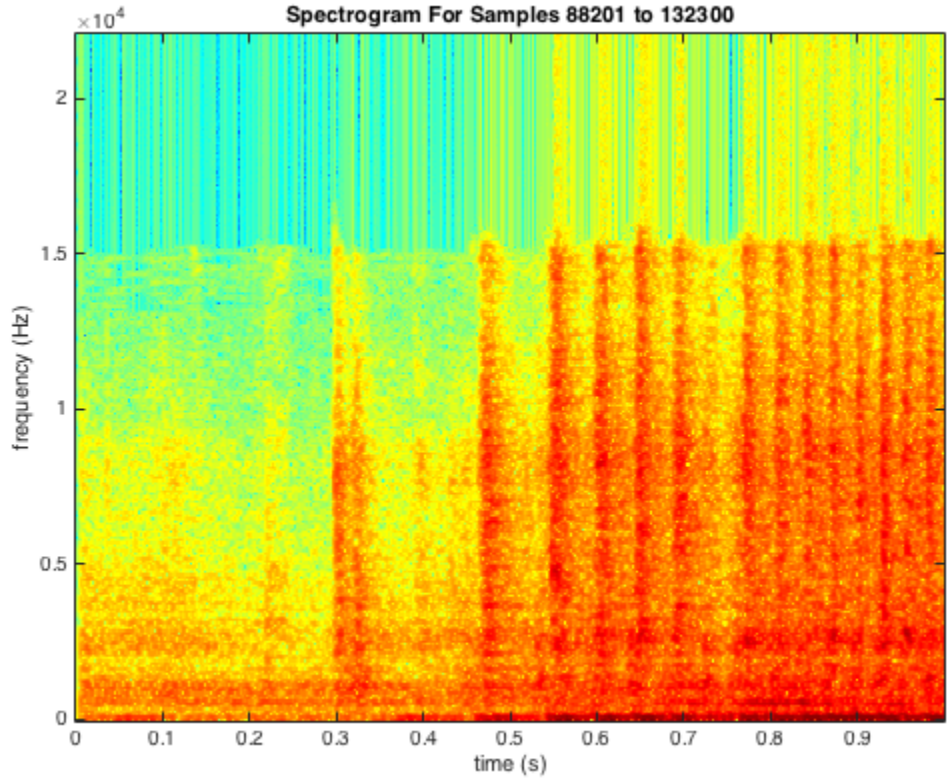
```
%     start_pos = start_pos + segmentlen;
% end

% %% Perform filter bank analysis and plots modulation spectrum
% start_pos = 800000;
% count_frames = 80000;
% x = x(start_pos:start_pos+count_frames);
% x_len = length(x);
% n = (0:x_len-1);
%
% Nw = 512; %2048 with overlap of 1/4
% N = Nw;
% spectrumFBS = FBS_Analysis(x,fs,Nw, 0, 0);
%
% modspecgram = fft(spectrumFBS,size(spectrumFBS,2),2);
% msg_half = modspecgram(1:ceil(size(spectrumFBS,1)/2) + 1,:); %0 to
 256
% figure;
% imagesc(20*log10(abs(msg_half)));
```

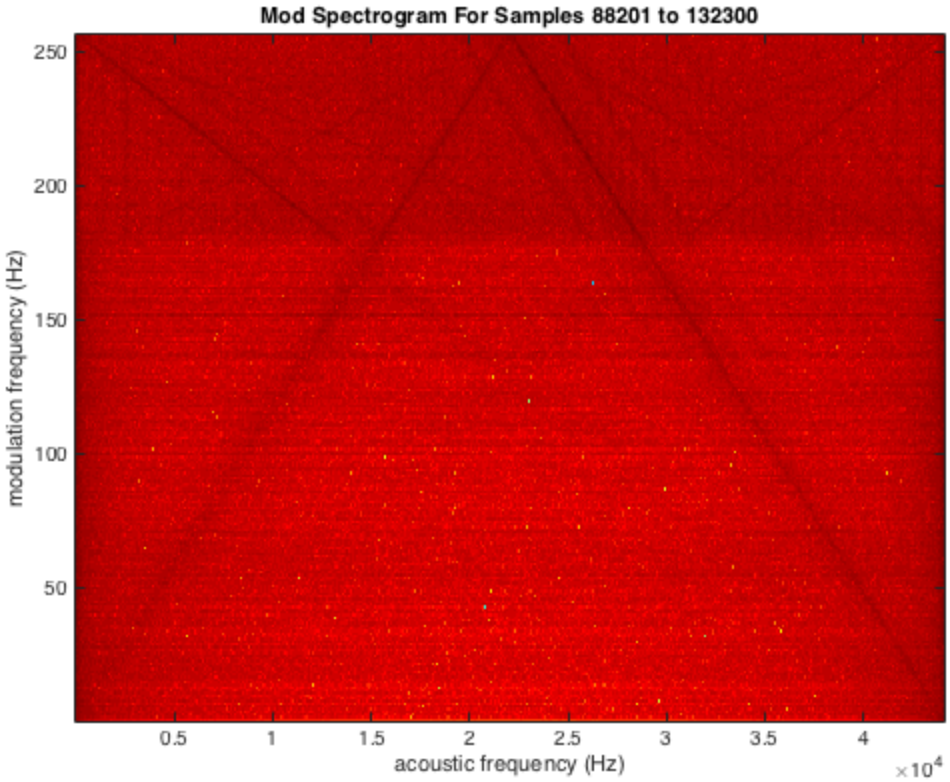


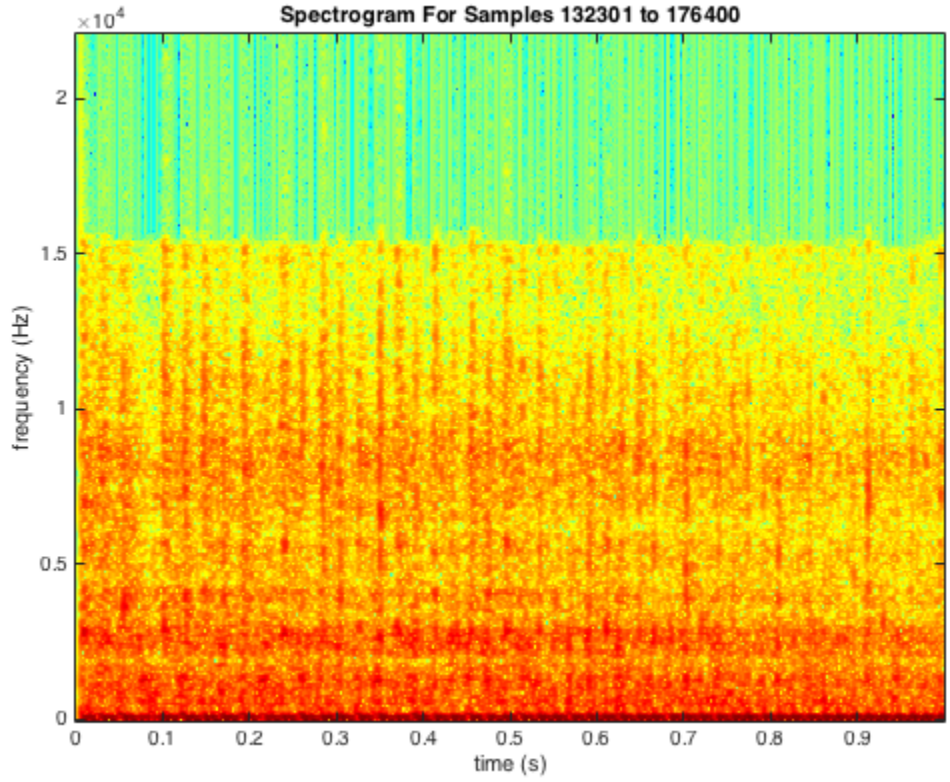

Mod Spectrogram For Samples 1 to 44100
modulation frequency (Hz)
250
200
150
100
50
0.5
1
1.5
2
2.5
3
3.5
4
acoustic frequency (Hz)
×10^4

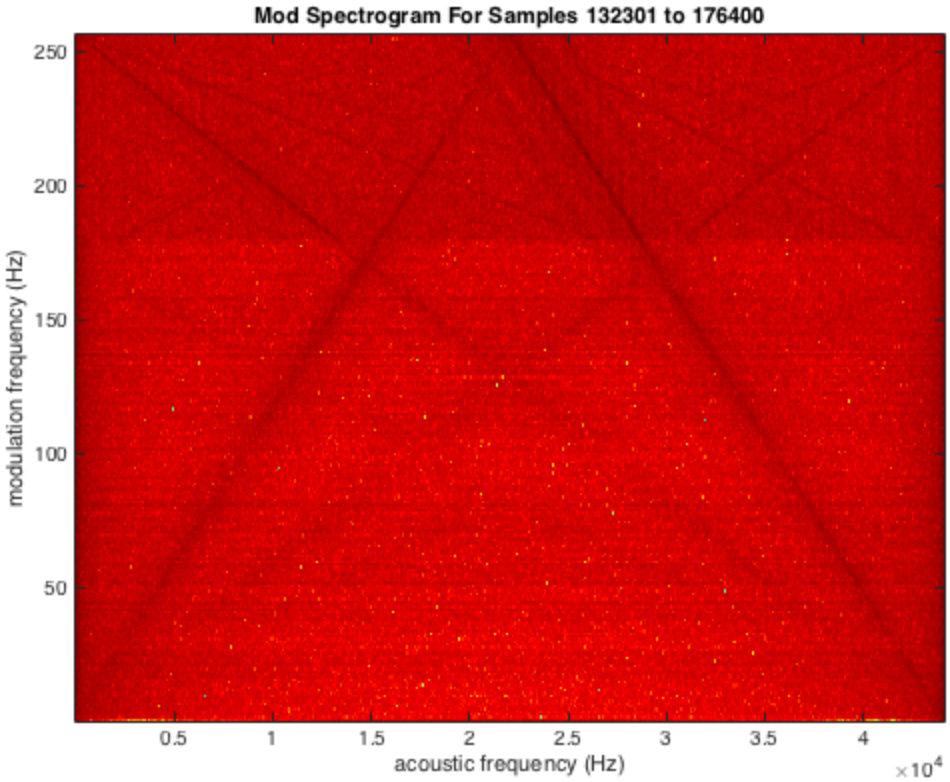

Spectrogram For Samples 44101 to 88200
×10^4
frequency (Hz)
2
1.5
1
0.5
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
time (s)

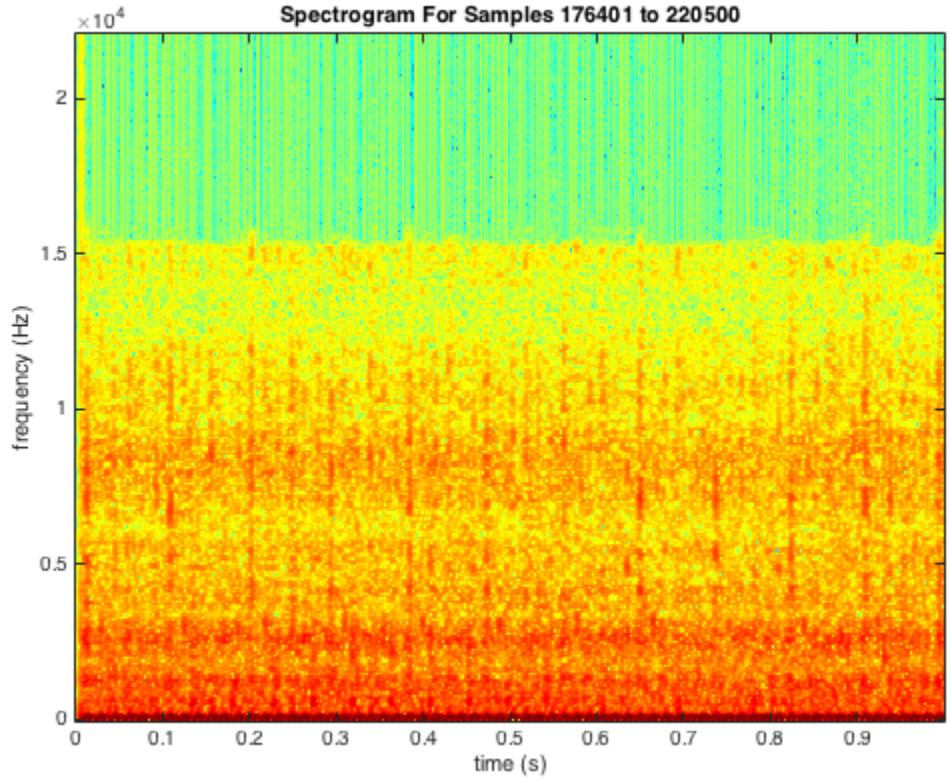

Mod Spectrogram For Samples 44101 to 88200
modulation frequency (Hz)
250
200
150
100
50
0.5
1
1.5
2
2.5
3
3.5
4
acoustic frequency (Hz)
×10^4

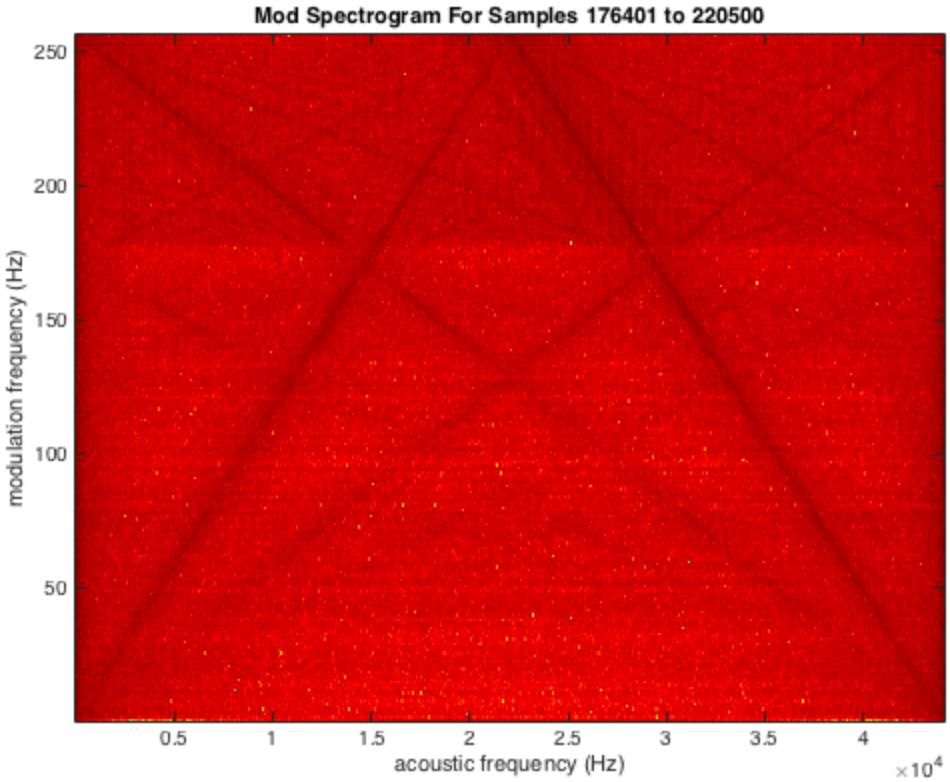

Spectrogram For Samples 88201 to 132300
×10^4
frequency (Hz)
2
1.5
1
0.5
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
time (s)

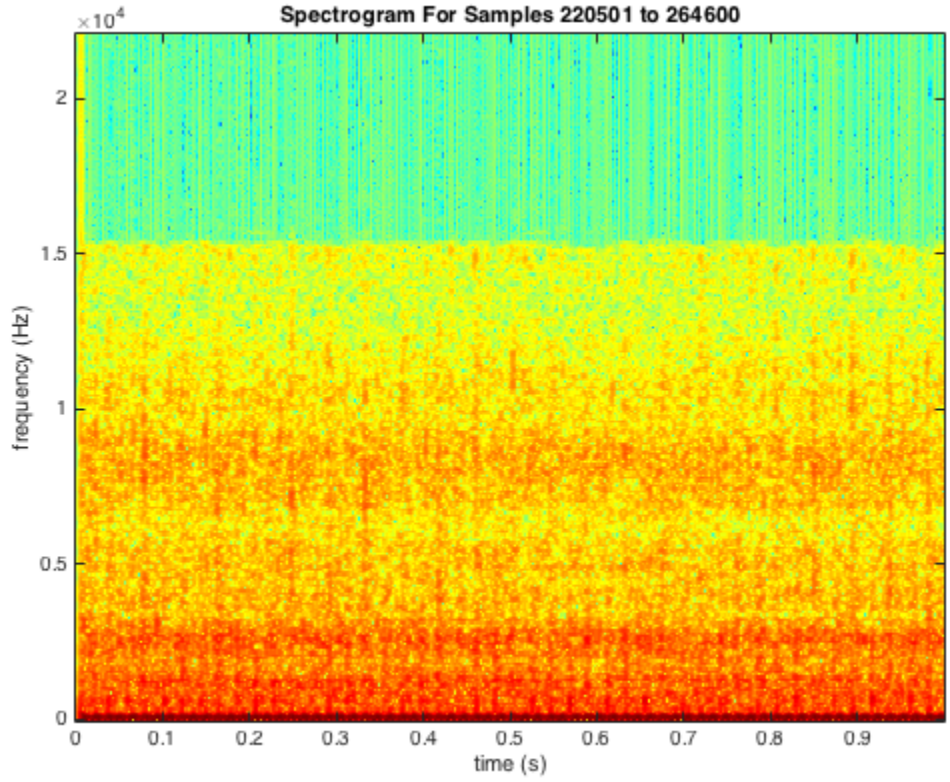

Mod Spectrogram For Samples 88201 to 132300
modulation frequency (Hz)
250
200
150
100
50
0.5
1
1.5
2
2.5
3
3.5
4
acoustic frequency (Hz)
×10^4

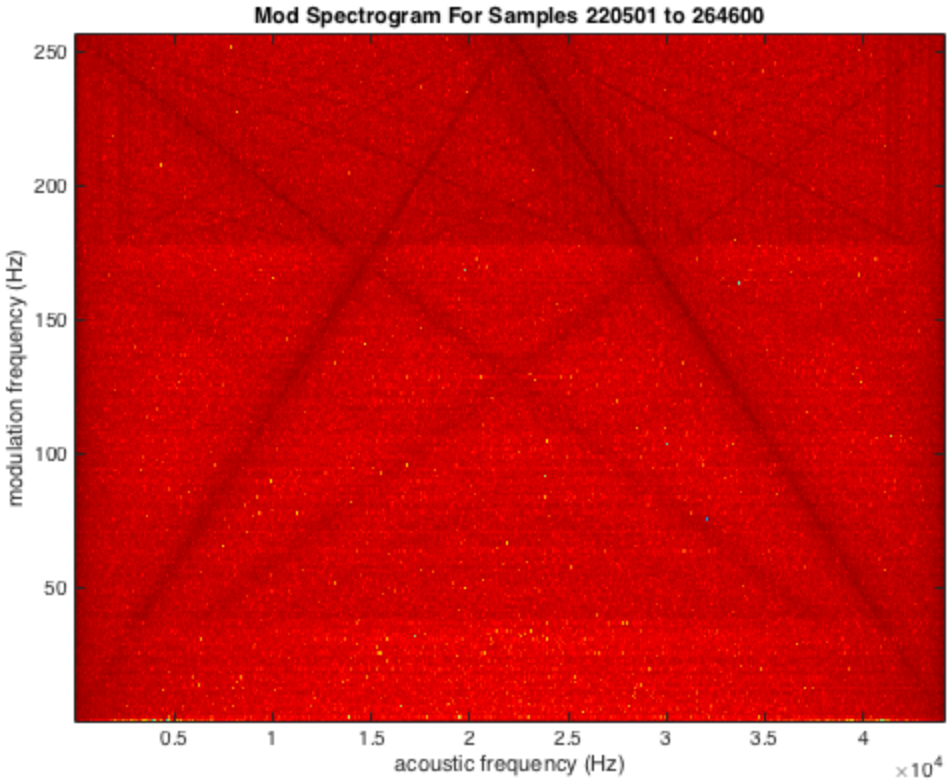

Spectrogram For Samples 132301 to 176400
×10^4
frequency (Hz)
2
1.5
1
0.5
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
time (s)

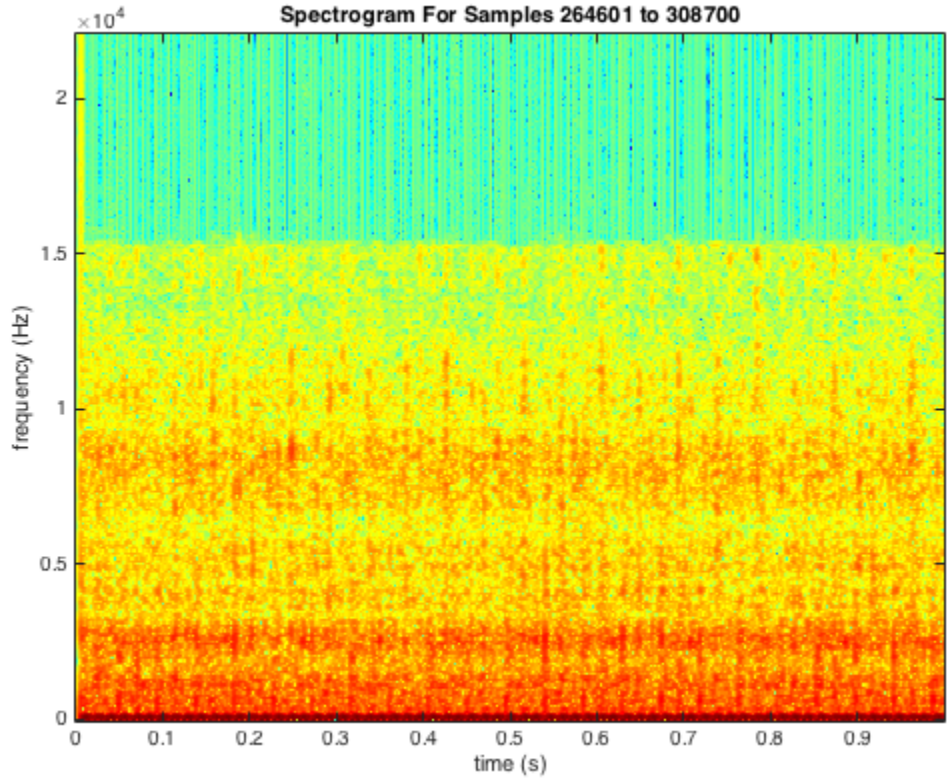

Mod Spectrogram For Samples 132301 to 176400
modulation frequency (Hz)
250
200
150
100
50
0.5
1
1.5
2
2.5
3
3.5
4
acoustic frequency (Hz)
×10^4

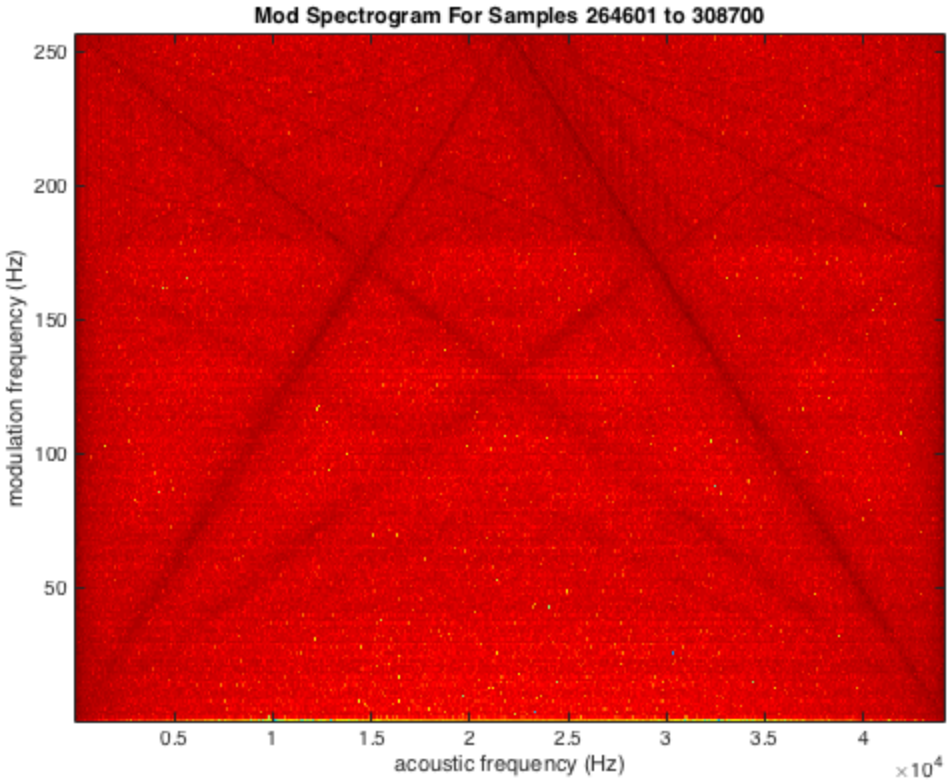

Spectrogram For Samples 176401 to 220500
×10^4
frequency (Hz)
2
1.5
1
0.5
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
time (s)

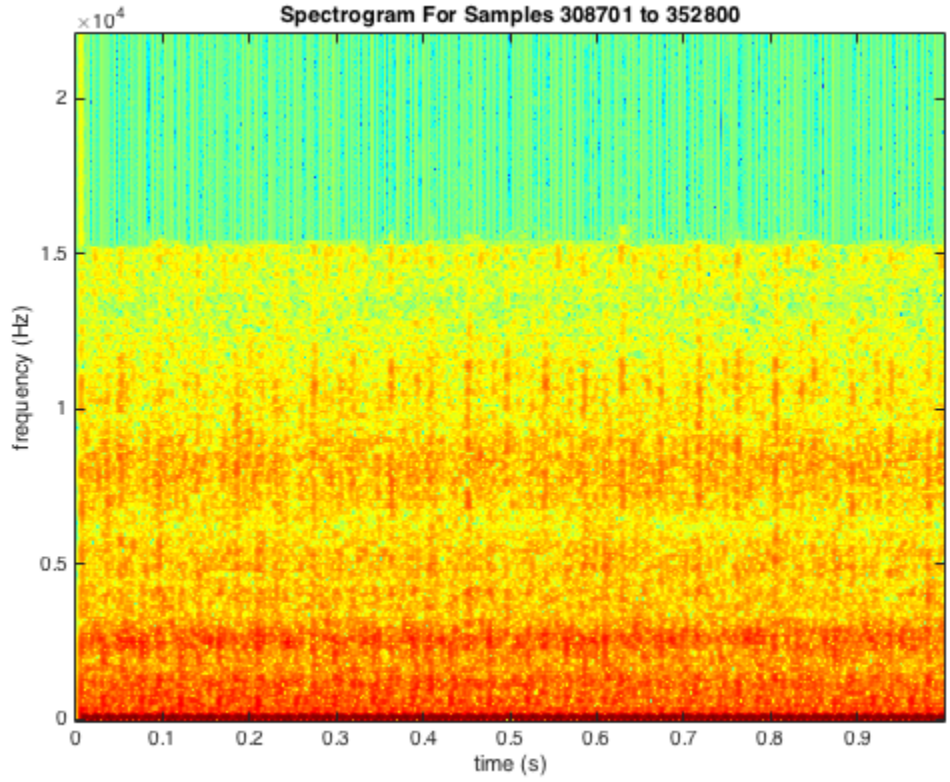

Mod Spectrogram For Samples 176401 to 220500
modulation frequency (Hz)
250
200
150
100
50
0.5
1
1.5
2
2.5
3
3.5
4
acoustic frequency (Hz)
×10^4

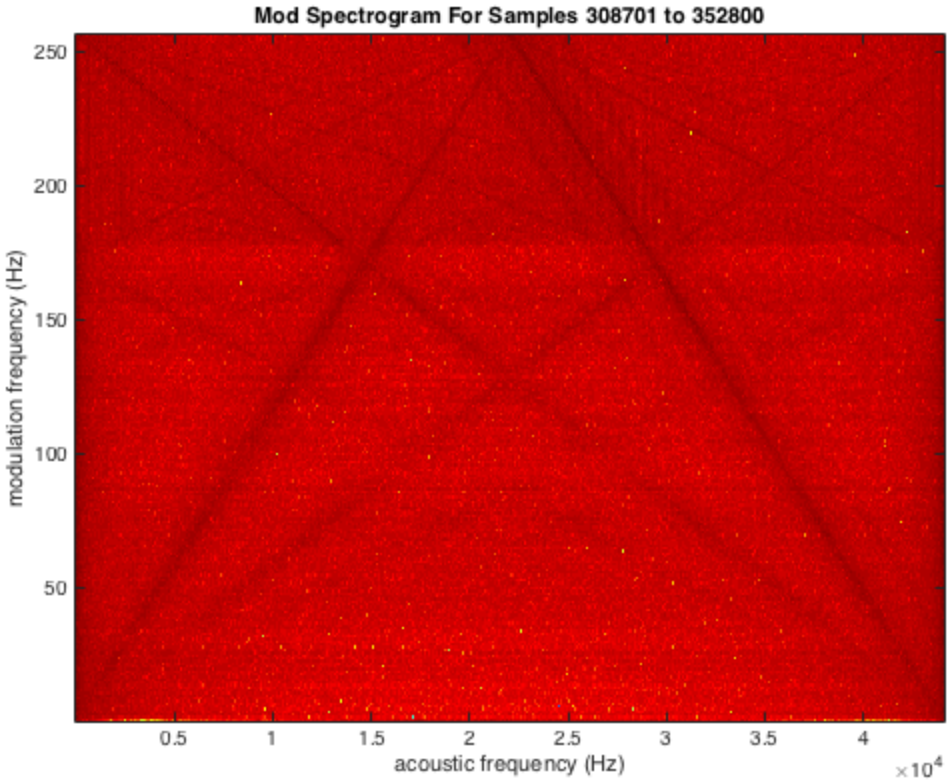

Spectrogram For Samples 220501 to 264600
×10^4
frequency (Hz)
2
1.5
1
0.5
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
time (s)

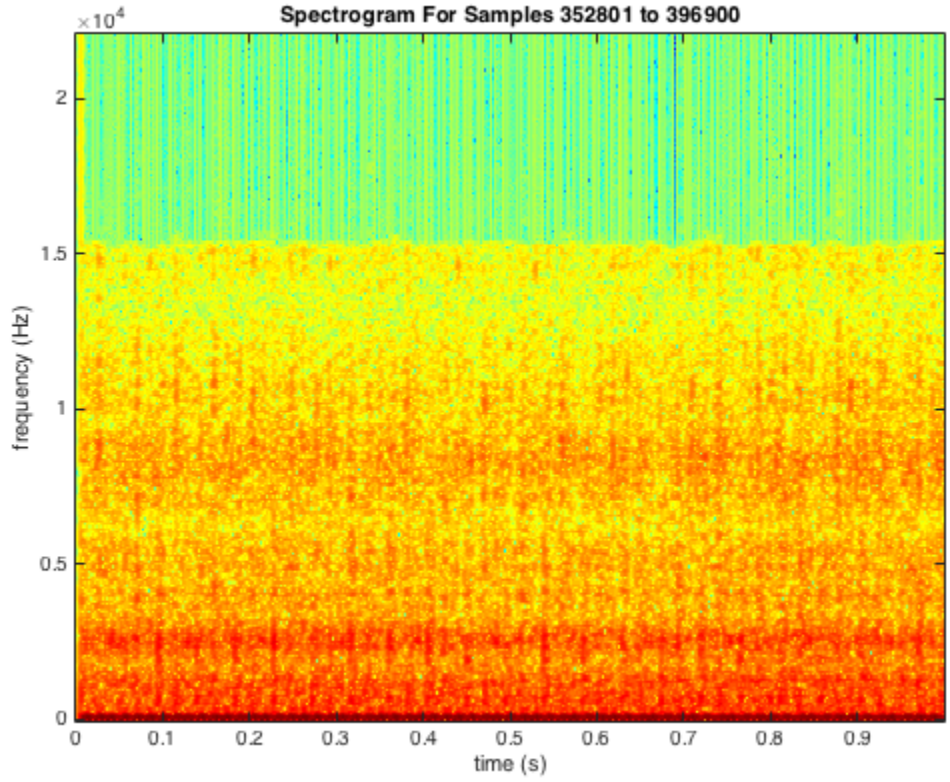

Mod Spectrogram For Samples 220501 to 264600
modulation frequency (Hz)
250
200
150
100
50
0.5
1
1.5
2
2.5
3
3.5
4
acoustic frequency (Hz)
×10^4

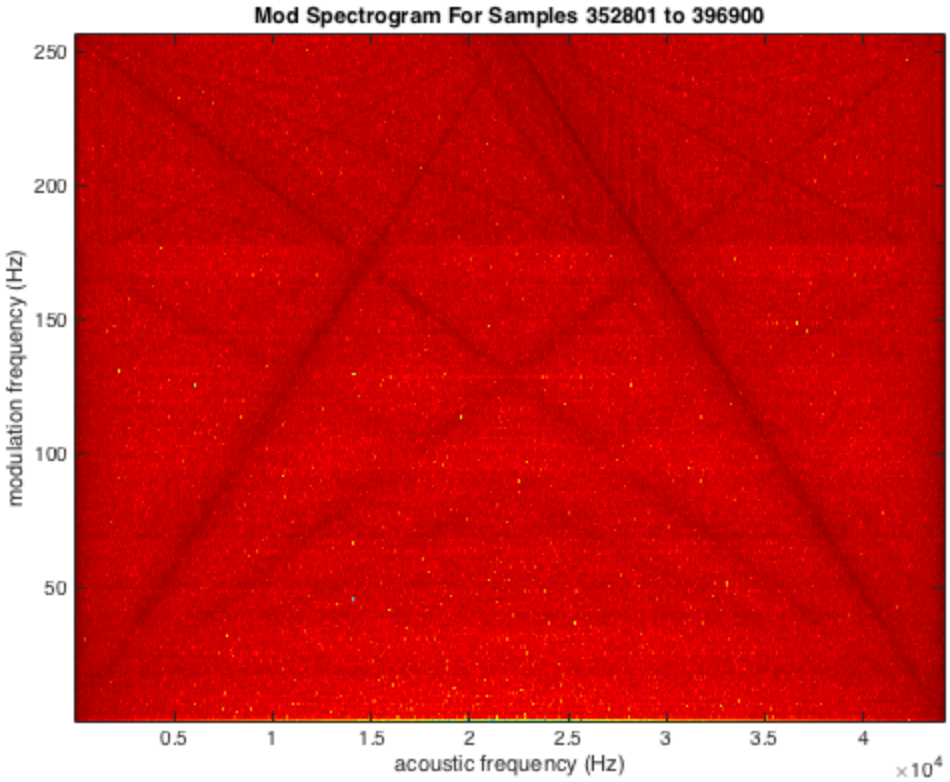

Spectrogram For Samples 264601 to 308700
×10^4
frequency (Hz)
2
1.5
1
0.5
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
time (s)

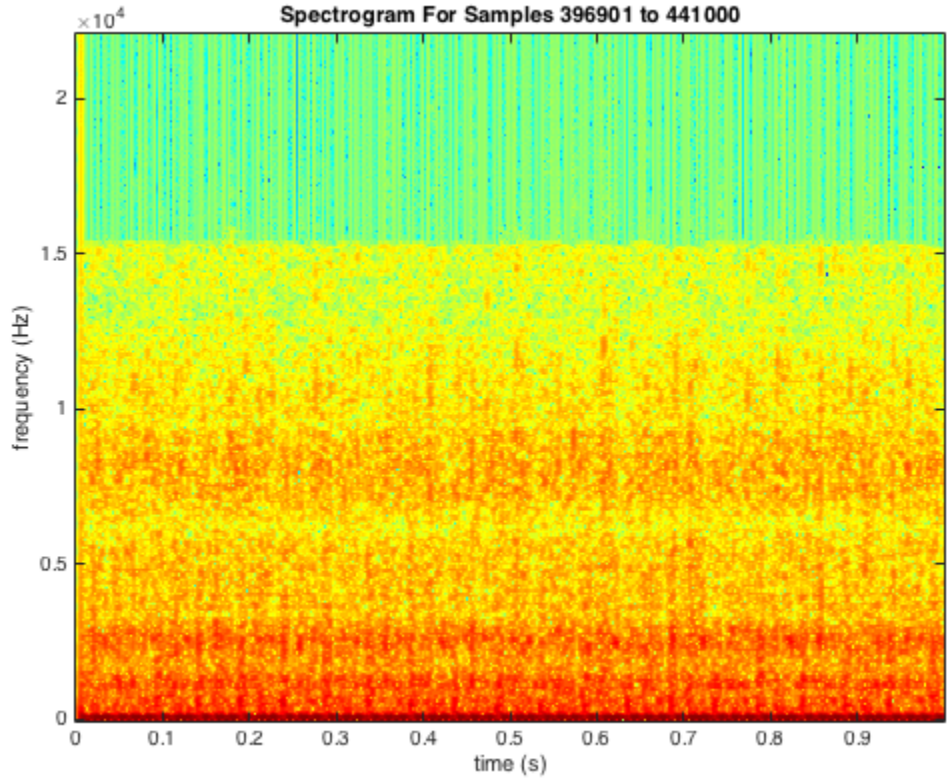

Mod Spectrogram For Samples 264601 to 308700
modulation frequency (Hz)
250
200
150
100
50
0.5
1
1.5
2
2.5
3
3.5
4
acoustic frequency (Hz)
×10^4

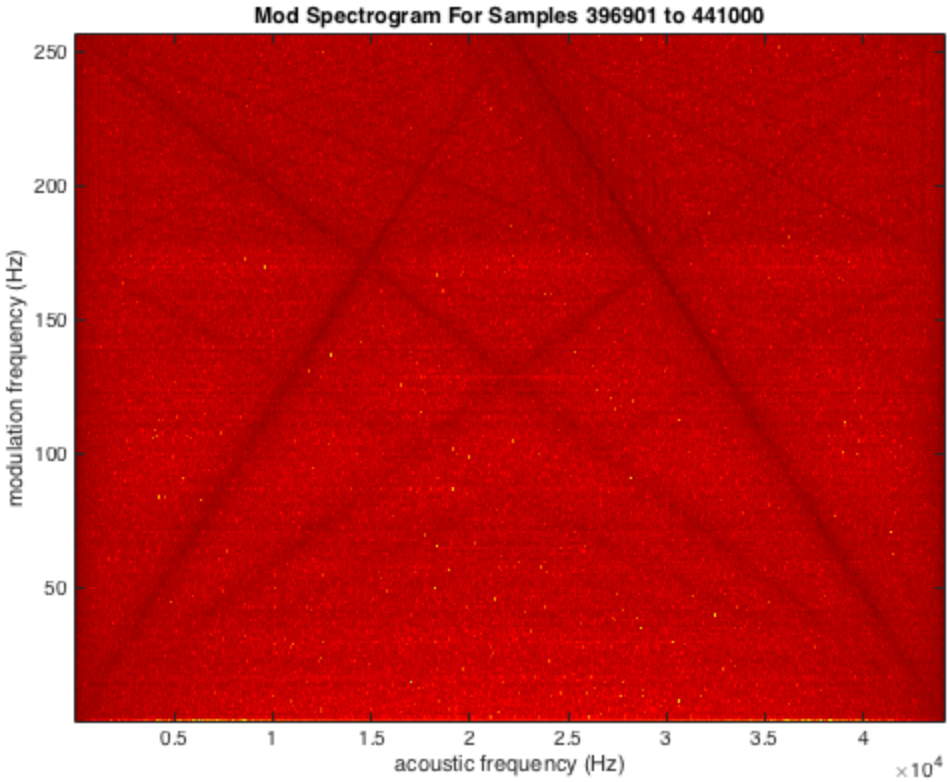

Spectrogram For Samples 308701 to 352800
×10^4
frequency (Hz)
2
1.5
1
0.5
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
time (s)


Mod Spectrogram For Samples 308701 to 352800
modulation frequency (Hz)
250
200
150
100
50
0.5
1
1.5
2
2.5
3
3.5
4
acoustic frequency (Hz)
×10^4


Spectrogram For Samples 352801 to 396900
×10^4
frequency (Hz)
2
1.5
1
0.5
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
time (s)


Mod Spectrogram For Samples 352801 to 396900
modulation frequency (Hz)
250
200
150
100
50
0.5
1
1.5
2
2.5
3
3.5
4
acoustic frequency (Hz)
×10^4


Spectrogram For Samples 396901 to 441000
×10^4
frequency (Hz)
2
1.5
1
0.5
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
time (s)



This part does OLA, which doesn't work?

% Perform STFT hop_size = Nw/2; %spectrum = stft(x,2048,256,0,hann(2048)); spectrum = stft(x,Nw,hop_size,0,hamming(Nw)); music = abs(spectrum); sphase = spectrum./(abs(spectrum)+eps); % Finally, plot the positive half of the result figure; f = linspace(0,1,N)*(fs/2); % actual frequency axis in Hz t = n / fs; % actual time axis in seconds imagesc(t,f,20*log(music)); axis xy; colormap(jet); xlabel('time (s)', 'FontName', 'Arial', 'FontSize', 15); ylabel('frequency (Hz)', 'FontName', 'Arial', 'FontSize', 15); title('STFT', 'FontName', 'Arial', 'FontSize', 15);

%% Perform mod specgram modspecgram = fft(spectrum,size(spectrum,2),2); figure; imagesc(20*log10(abs(modspecgram)));

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