Plotting 2D Data - Bird Chirp Example

Explores the spectral properties of a 2D matrix making use of several commands from the plotting package. The philosophy of this package is rapid prototyping and exploration - most of the plots you see below can be produced with one or two commands.

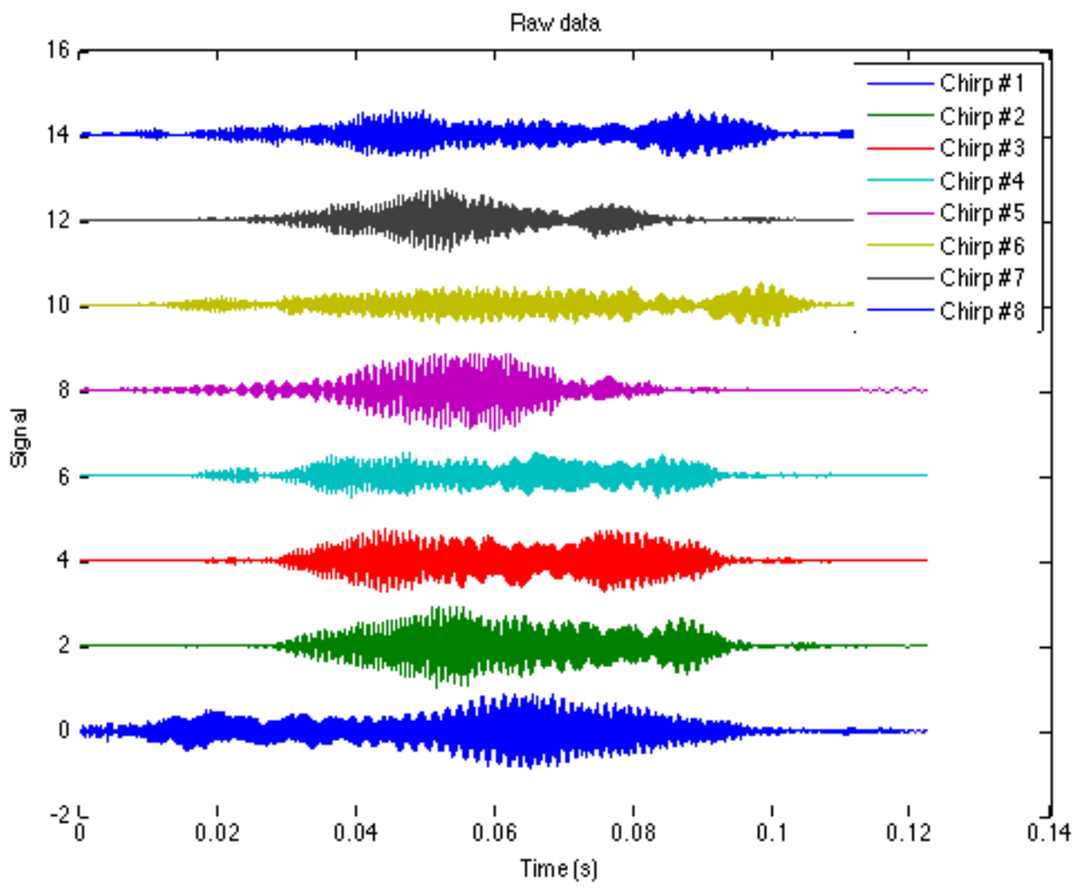
Contents

Load a bunch of signals (bird chirps)

```
set(0, 'DefaultFigureColor', 'White');
load chirp
Ndata = 1000;
Nchirps = 8;
chirp_midpoints = [620, 2200, 3800, 5200, 6800, 8300, 10100, 11900];
chirp_midpoints = chirp_midpoints(1:Nchirps);
chirp_coords = repmat(chirp_midpoints,Ndata,1) + repmat([1:Ndata]' - floor(Ndata/2) - 1,1,Nchirps);
X = y(chirp_coords);
chirpnames = arrayfun(@(x) ['Chirp #' num2str(x)],1:Nchirps,'UniformOutput',0);
```

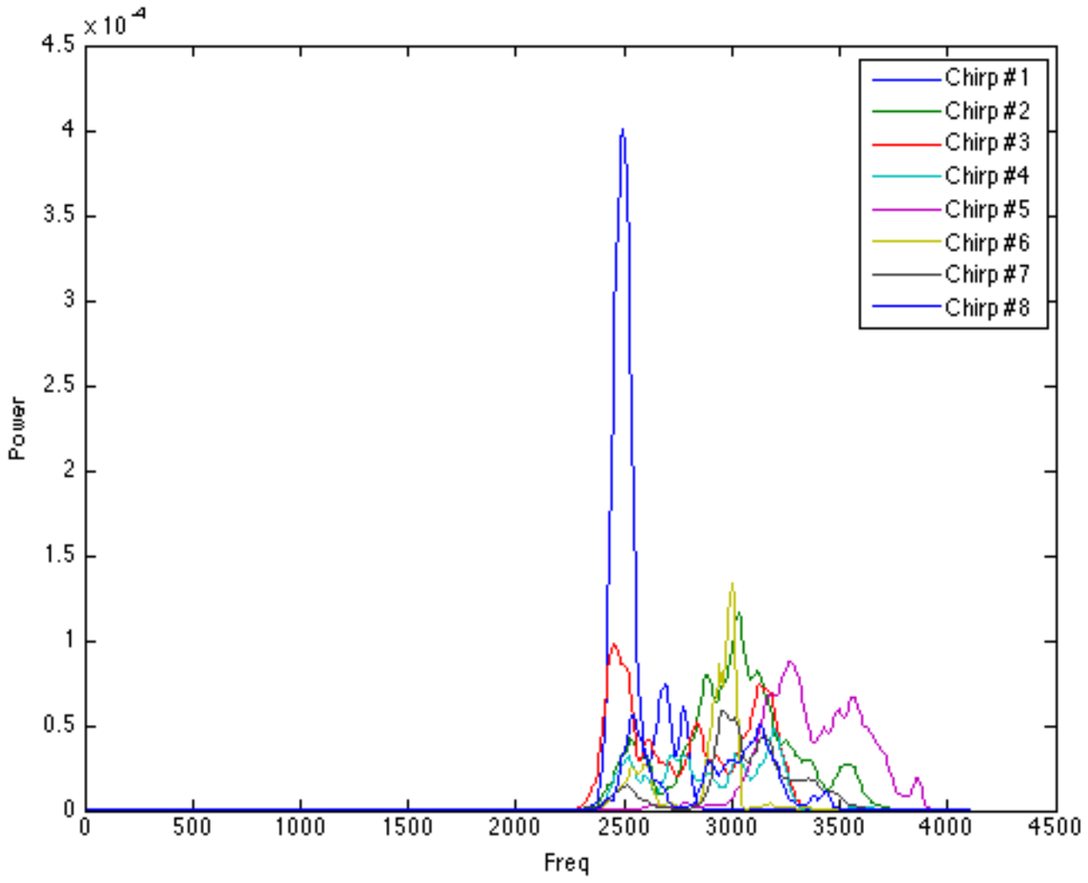
plot_matrix3D: Plot the stacked raw data

```
figure; hl= plot_matrix3D(X,'fs',Fs,'do_mean',1,'showErrorbars',1,'do_shift',2,'active_dim',3); title('Raw data');
legend(hl,chirpnames); xlabel('Time (s)'); ylabel('Signal');
```



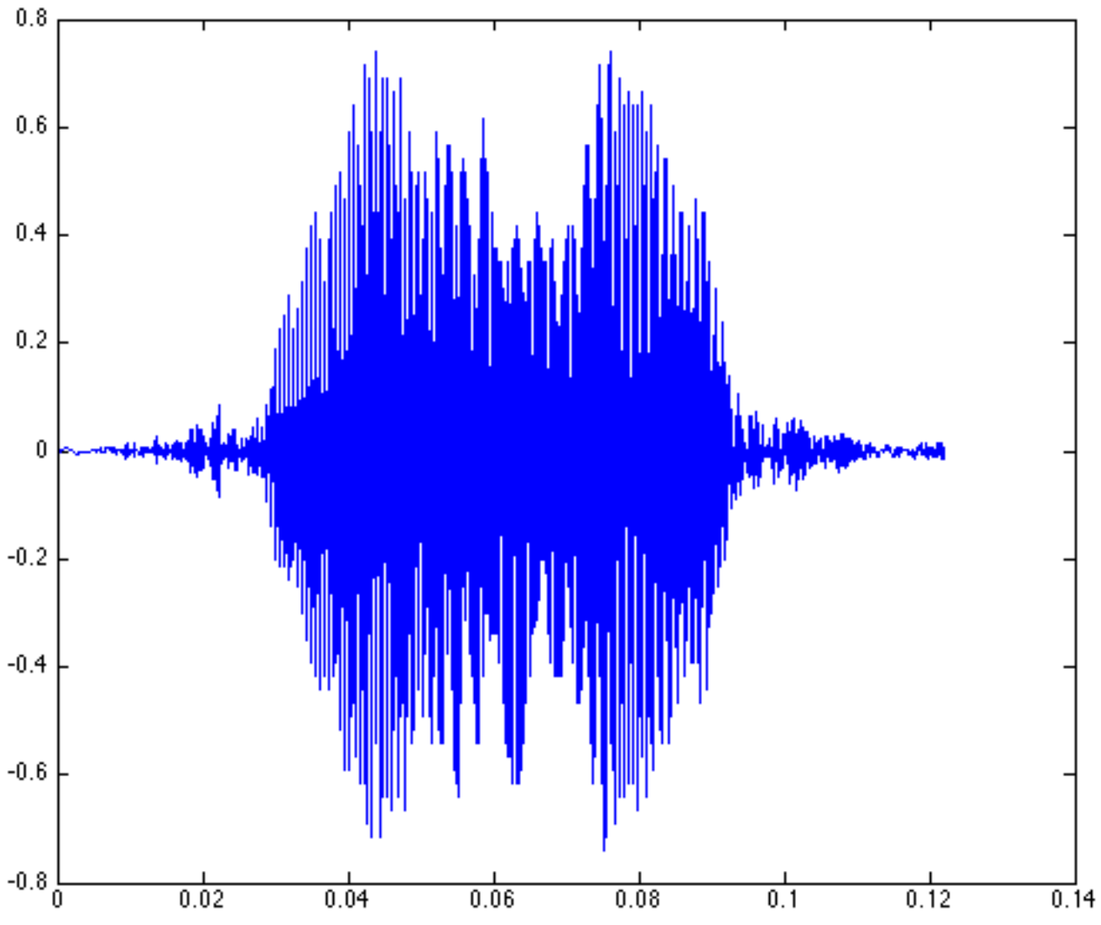
plot_psd: Plot all powerspectra

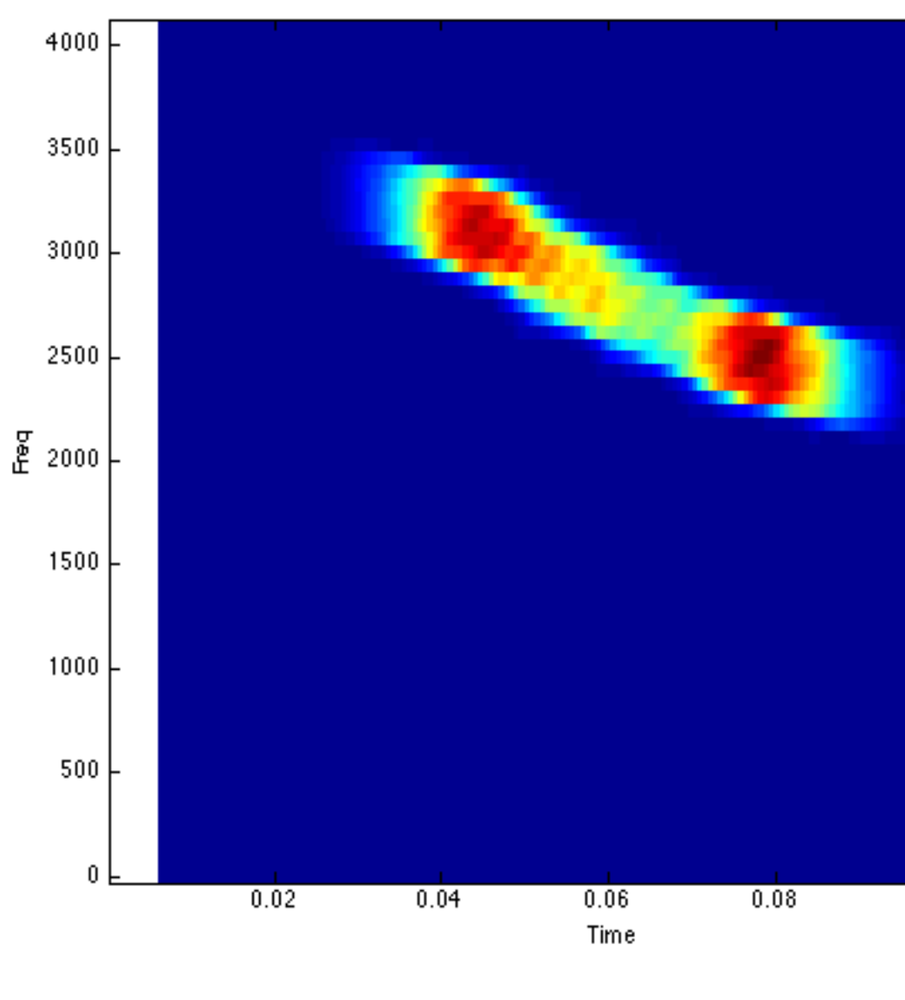
```
figure; hl= plot_psd(X,'fs',Fs); ylabel('Power');
legend(hl,chirpnames);
```



plot_ani: Animated plot time series paired with spectrogram for each chirp

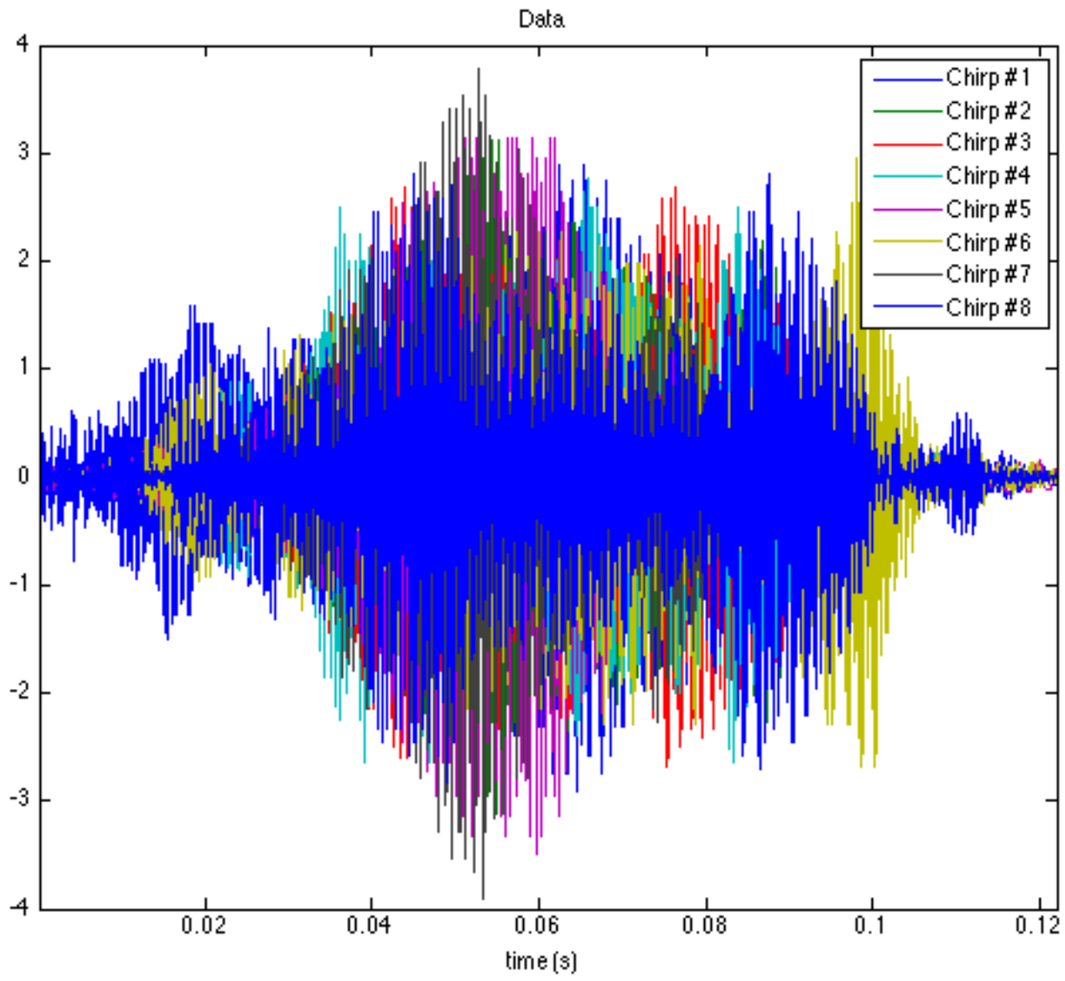
```
figl; plot_ani(X(:,:),'fs',Fs,'fname',{@plot_fs,@plot_spect});
```

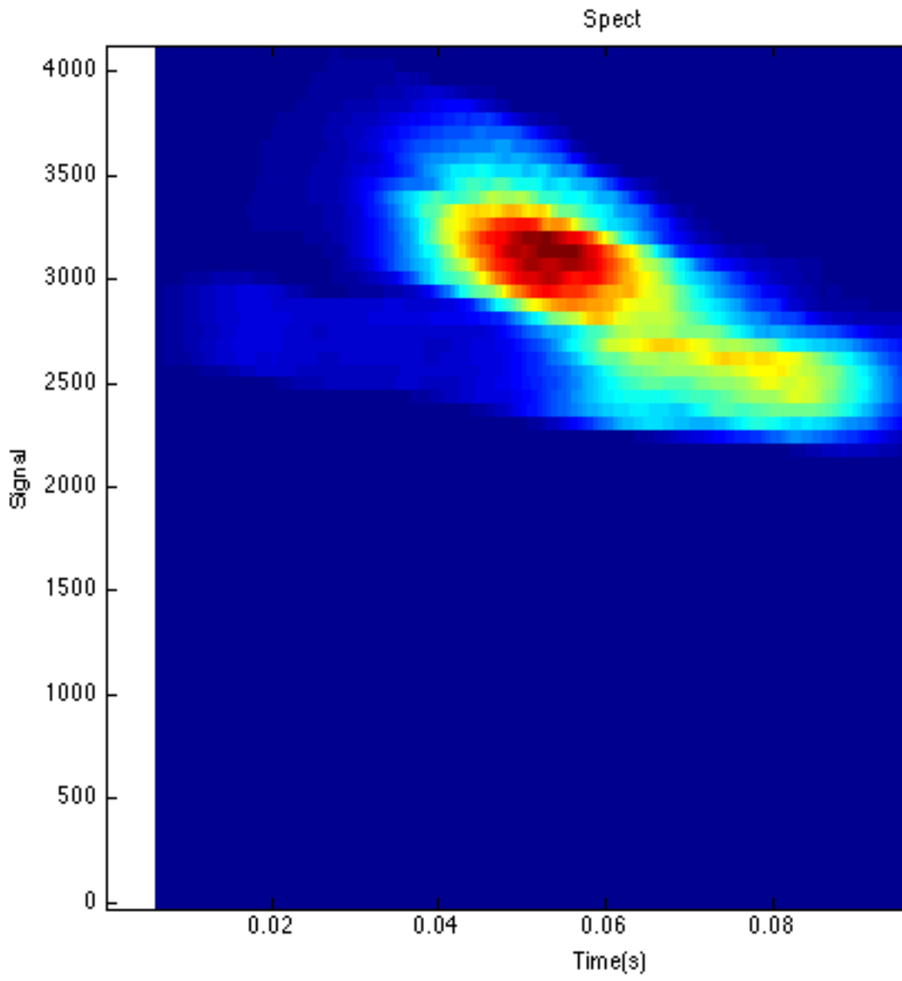




plot_all: Mean spectrogram of all data

```
figl; [h, hl] = plot_all(X,'fs',Fs,'psd_on',0);
legend(hl{1},chirpnames);
ylabel('Signal');
```





Set up data for plotting statistics

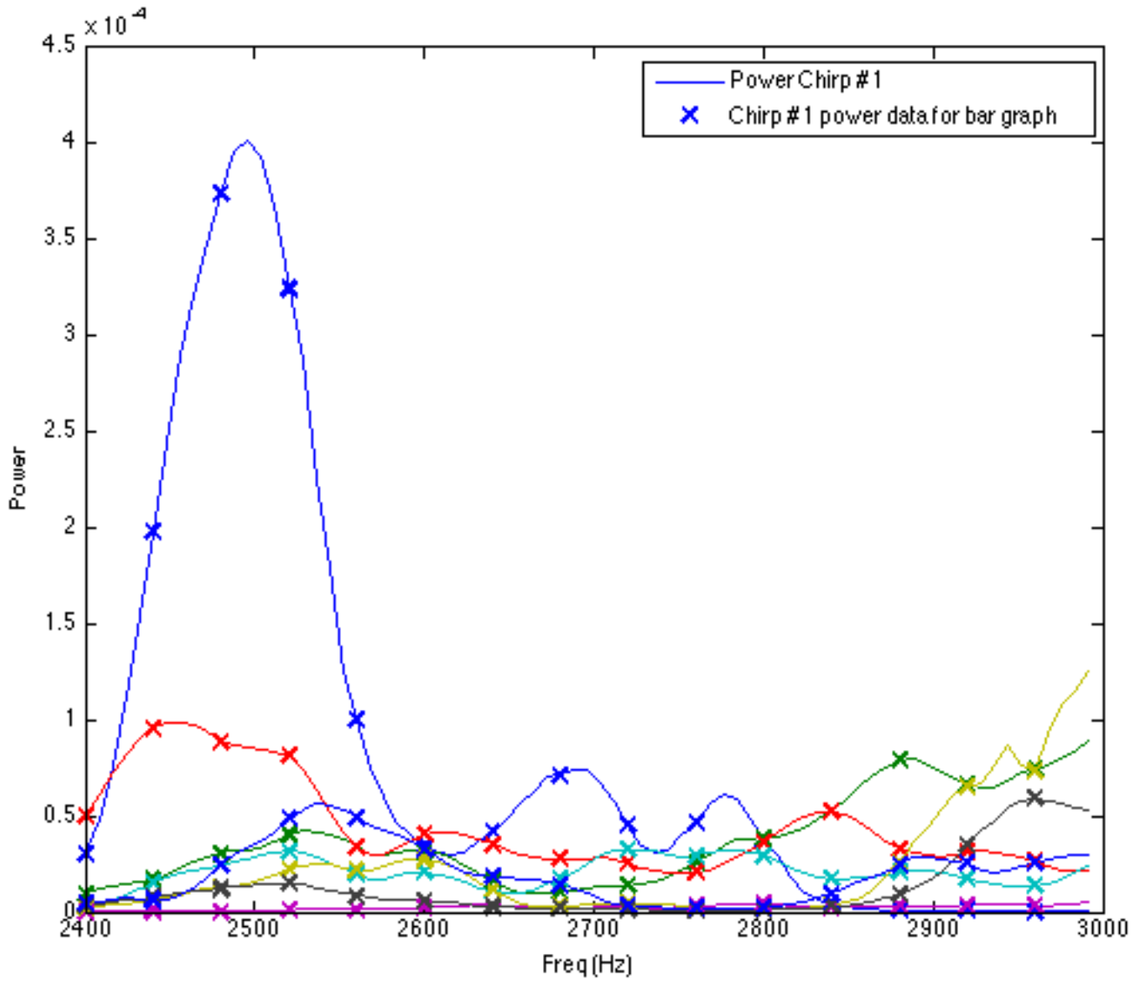
Calculate all spectra

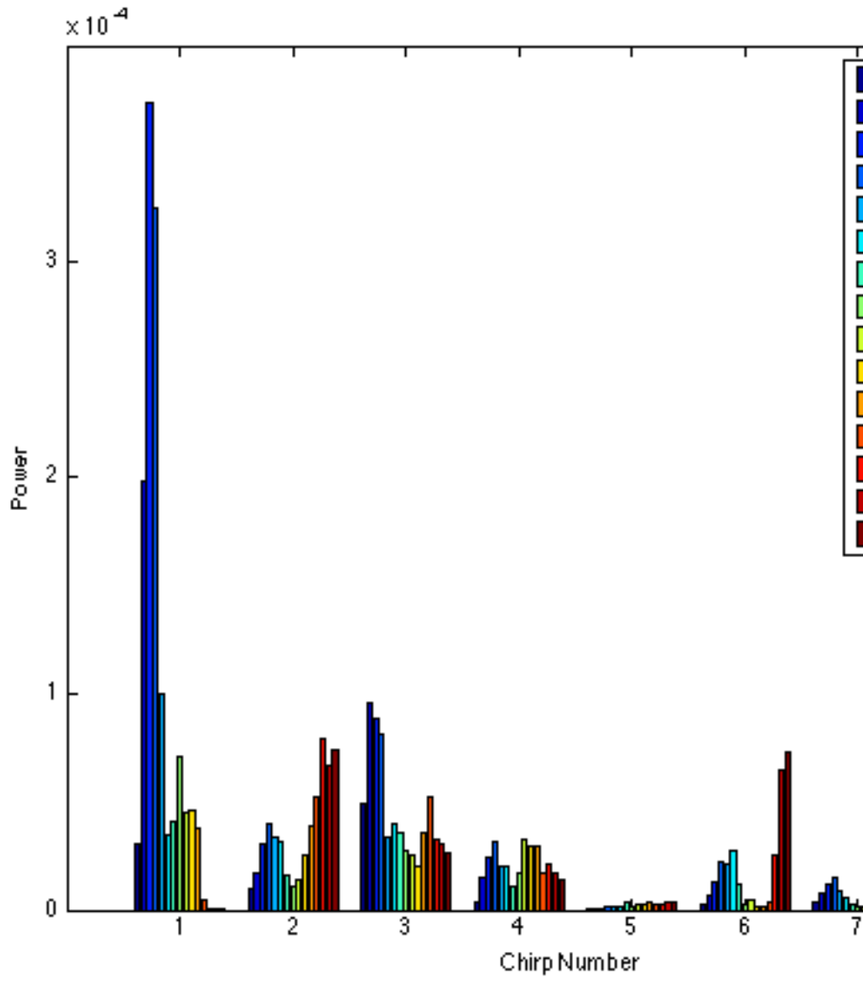
```
[P, f] = psd_wrapper(X,'fs',Fs);

% Take segment of data from 2300-4000Hz.
index = find(f >= 2400 & f < 3000);
Y = P(index,:);
f2 = f(index);
```

Plot differences in power across chirps

Only keep every 5th datapoint to ensure data is independent

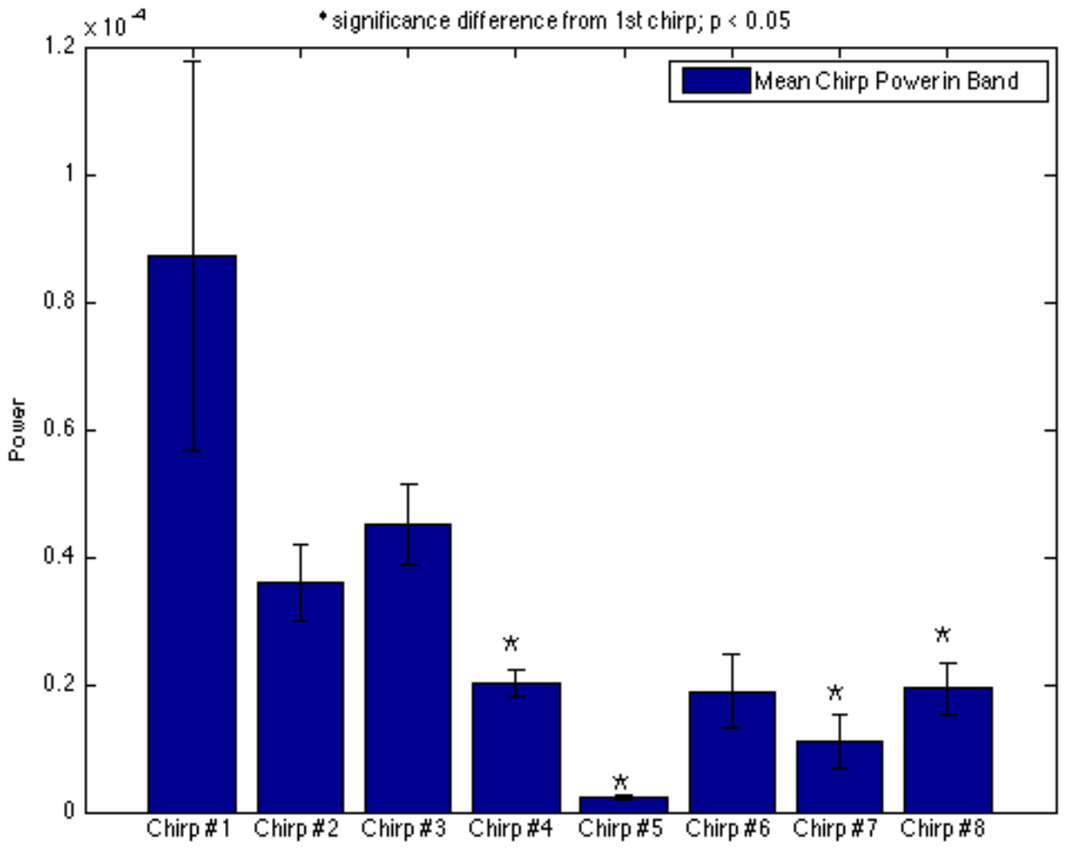
```
figl;
subplot(1,2,1); hl1 = plot(f2,Y);
Ysparse = Y(1:5:end,:); f_sparse = f2(1:5:end);
hold on; hl2 = plot(f_sparse,Ysparse,'x','MarkerSize',10,'LineWidth',2);
legend([hl1(1) hl2(1)],'Power Chirp #1','Chirp #1 power data for bar graph');
xlabel('Freq (Hz)'); ylabel('Power');
subplot(1,2,2); hl = bar(Ysparse'); xlabel('Chirp Number');
% freqbinnames = ;
legend(hl,arrayfun(@(x) ['Freq bin #' num2str(x)], 1:size(Ysparse,1),'UniformOutput',0) );
ylabel('Power');
```





bar_matrix3D: Plot difference across chirps

```
figure; [hl] = bar_matrix3D(Ysparse);
set(gca,'XTickLabel',chirpnames);
legend('Mean Chirp Power in Band');
title('* significance difference from 1st chirp; p < 0.05');
ylabel('Power');
```



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