Ninapro Short EMG Dataset for Project 3

This short EMG dataset from the Ninapro website (http://ninapro.hevs.ch/) is in the form of a Matlab 8x6 cell array indexed by {gesture,repetition}, i.e. 8 gestures with 6 repetitions of each gesture. The 8 gestures are shown in the figure below:

(a) Isometric, isotonic hand configurations.

- At each cell location in emgData there is a 2d array of [samples,emgchannel], i.e. rows are samples and columns are emg channela (12 channels in total).
- The sEMG signals are sampled at a rate of 2 kHz.

For one typical gesture, i.e. gesture 1, repetition 2, you can extract the data from emgData and plot it as follows:

```
% load and plot emg data
load emgData      % load data from file emgData
X = double(emgData{1,2});  % extract gesture 1, repetition 2 into X
N = size(X,1);      % number of data samples in X
fs = 2000;          % sample rate in Hz
dt = 1/fs;          % sample time in seconds
t = [0:N-1]'*dt;    % time vector

figure;
subplot(1,2,1)
plot(t,X);
xlabel('Time (seconds)');
ylabel('EMG');
title('Raw EMG - 12 Channels');
```

The figure below on the left shows the raw EMG data, all 12 channels for gesture 1, repetition 2; on the right is shown the same data after rectification and low-pass filtering at 1 Hz (with a zero-phase filter, i.e. the *filtfilt* function in Matlab) as well as the mean taken across all 12 channels.

Note that the onset and offset of movement might vary from repetition to repetition, so for robust classification it might be useful to extract the middle third of data only.