2009-09-13 GAIT2 PROJECT – HOW TO PLOT

Technical tutorial on generating figures. Everything is done in MATLAB.

Load data

1. Download a mat file from http://featureserver.bme.uci.edu/~bcilab/data/gait2/analysis_protocol_20090828
2. Drag mat file to MATLAB, or use the **load** command
3. You should have loaded **rawdata_m1m2**, **labels**, and **ChanNames**. *rawdata_m1m2* is (chan, time points, trials). Inside *trials*, 0 is standing still (idle), 1 is left step, 2 is right step.

Feature extraction matrix – DO NOT SKIP THIS SECTION

```
TrainData = rdreshape(rawdata_m1m2); % Reshape the data (collapse channels and time points).
TrainLabels = labels > 0; % This is for idle vs move.
Fdim = 1; % Set the feature space dimension
[trfmat, Ftrain, Flabel] = cpca_aida(TrainData,TrainLabels,Fdim); % Uses CPCA + AIDA
```

%Note: Use **cpca_lda** instead of **cpca_aida** for LDA.

Filter image

```
Fs = 512;
TrainLabels = labels>0;  % For idle vs move
Fdim = 1;  % Feature dimension.
StdThreshold = 1;  % Standard deviation threshold
TimeRange = [1/Fs,size(rawdata_m1m2,2)/Fs];
generate_filter_image(rawdata_m1m2,TrainLabels,[],Fdim, ...
                      StdThreshold,ChanNames,TimeRange);
```

%Note: Remove TimeRange to leave the X-axis in time sample points.
%Note: To change to LDA, edit line 42 of this function file.

Advanced usage – Plot filter image based on your own feature extraction algorithm

```
%The example here uses CPCA + LDA.
[trfmat, Ftrain, Flabel] = cpca_lda(TrainData,TrainLabels,Fdim);
Nchan = size(rawdata_m1m2,1);  % Number of channels.
for s = 1:length(trfmat); Filter{s} = reshape(trfmat{s},Nchan,[]); end;
% The for loop reshapes trfmat to (chan,time) format
generate_filter_image(Filter,[],[],[], ...
                      StdThreshold,ChanNames,TimeRange);
```

%Note: By not supplying TrainLabels, the first argument is treated as the filter cell.

EEG Topographic Map

%Obtain **trfmat** first. Use filter image to find out on which filter and at which time point you want to plot a topography map.
%The following example plots topography map on the first filter (subspace 0) at time point number 1.

```
TimePoint = 1;  % Time sample point to plot. Specify one time point only.
Nchan = size(rawdata_m1m2,1);  % Number of channels.
for s = 1:length(trfmat); Filter{s} = reshape(trfmat{s},Nchan,[]); end;
% The for loop reshapes trfmat to (chan,time) format
eeg_topoplot(Filter{1},ChanNames,TimePoint);  % Plots first filter topography.
```

To plot more than one time points and save as FIG files:

```
Fs = 512;
eeg_topomultiplot(Filter{1},ChanNames,Fs,[1 2 10 20],'Idle vs Move');
```

%plots the first filter and saves time points 1, 2, 10, and 20. Prefix file name by “Idle vs Move”

Feature space

%Obtain **Ftrain** and **Flabel** first. The following function can automatically plot the feature space up to 3 dimensions.

```
plotfeaturespace(Ftrain{1},Flabel,'o+','br');
```

%plots feature space based on subspace 0, using blue circles for class 0, red crosses for class 1.