Step 1:

Data cleaning: bandpass filtering (0.1-30 Hz) of EEG channels
Data selection: using the trigger signal
MATLAB file: filtroEEG.m

NOTE: all the Matlab codes can be run using 'run_filtering_and_features_extraction.m'

Step 2:

Feature extraction:
various statistical measures in different band frequencies:

RangeFeatures																
RangeMean				RangeMedian				RangeLowerMargin				RangeUpperMargin				
0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	
RangeWidth				RangeSD				RangeCV				RangeAssymetry				
0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	
all features were calculated in each channel																
AmplitudeFeatures																
AmplitudePower				AmplitudeSD				Skew				Kurtosis				
0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	
EnvelopeMean				EnvelopeSD												
0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	0,5:4Hz	4:7Hz	7:13Hz	13:30Hz									
all features were calculated in each channel																
Spectral Features																
Power				RelativePower				Flatness				Entropy				
0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	
Difference	EdgeFrequency															
0,5:30Hz	0,5:30Hz															
all features were calculated in each channel																
ConnectivityFeatures																
BSI				CoherenceMean				CoherenceMax				Correlation				
0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	0,5:4Hz	4:7Hz	7:13Hz	13:30Hz	
calculated considering chanels FC5, FC6, C5, C6																

MATLAB file: EEGyesAllFeatures.m
EEGnoAllFeatures.m

Step 3:

Feature Selection:
top k-best score with ANOVA F-value

For step 3, 4 and 5, Python code: Final_code.jpynb

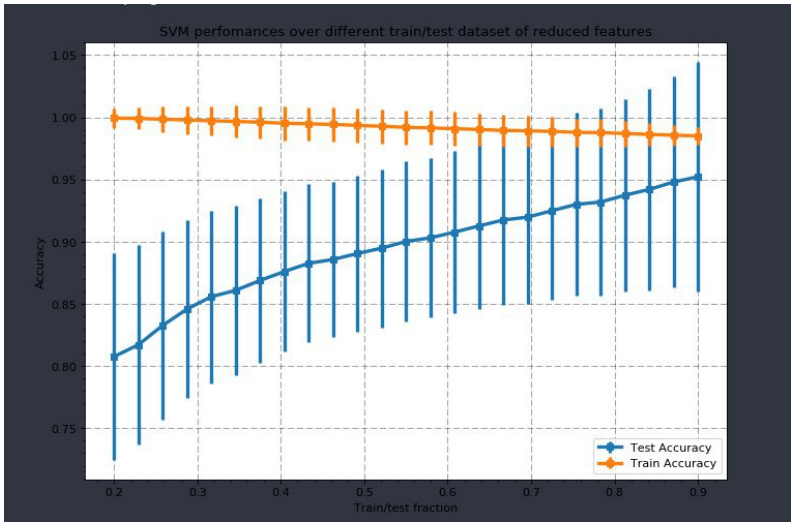
Step 4:

Model:
Hard margin SVM with linear kernel, C=1. (Note: since the smallness of the dataset, the performances of the model vere assessed with a full search using leave-p-out method with p = 1,2,3)
The best k (which represent the number of top features retained) is chosen as the one that outputs the highest performances using leave-one-out.

Step 5:

Results: k = 21, leave-3-out: 96% accuracy

Accuracy varying train/test dimensions (figure) (note: error bars are standard deviation)
The figure results from 5000 randomly sampled train/test dataset, fixed the train/test fraction



The 21 features selected are:

Feature index	Feature Name	Band Frequency	Channel
66	Flatness	7:13Hz	1
67	Flatness	13:30Hz	1
71	Entropy	13:30Hz	1
82	Range Lower Margin	0,5:4Hz	2
115	Skew	4:7Hz	2
165	Range Width	4:7Hz	3
169	Range SD	4:7Hz	3
173	Range CV	4:7Hz	3
192	Kurtosis	0,5:4Hz	3
244	Range SD	7:13Hz	4
256	Amplitude Power	7:13Hz	4
260	Amplitude SD	7:13Hz	4
262	Skew	0,5:4Hz	4
272	Envelope Mean	7:13Hz	4
276	Envelope SD	7:13Hz	4
287	Flatness	4:7Hz	4
288	Flatness	7:13Hz	4
291	Entropy	4:7Hz	4
292	Entropy	7:13Hz	4
304	Range Lower Margin	0,5:4Hz	5
320	Range CV	0,5:4Hz	5

Channel 1: FC5
Channel 2: FC6
Channel 3: C5
Channel 4: C6
Channel 5: Cz