**Scripts associated with 'Identifying Shared Pathways Across Multiple Muscle Groups of the Human Upper Limb'**

**Author information**

Author: Thomas C Richards

Email: Tcrichards1990@gmail.com

Researchgate: <https://www.researchgate.net/profile/Thomas-Richards-2>

Linkedin: [www.linkedin.com/in/thomas-richards](http://www.linkedin.com/in/thomas-richards)

Github: <https://github.com/TCR1990>

ORDID: <https://orcid.org/0000-0002-4447-4334>

**Contributors**

Amey D Desai: amey.desai07@gmail.com

Samit Chakrabarty: s.chakrabarty@leeds.ac.uk

Ioannis Delis: i.delis@leeds.ac.uk

**Abstract**

This dataset contains the scripts used to conduct Chapter 3 and Chapter 4 of my PhD thesis 'Identifying Shared Pathways Across Multiple Muscle Groups of the Human Upper Limb'. In Chapter 3, I describe a pipeline which enables the time at peak response to stimulation to be marked in EMG data, and then measurements of instantaneous power spectral density to be taken at marked time points using the wavelet synchro-squeezed transform. In Chapter 4, I describe onset and offset marking of muscle bursts during isometric muscle contractions, calculation of intermuscular coherence in bands identified in Chapter 3, wavelet correlation analysis, and muscle synergy analysis using this data. Scripts are written in the CED Spike 2 script language, VBA, BASH, Matlab, and R. The scripts are subdivided into .zip files by the chapter in which they were used. There are associated README files in the .zip files for the appropriate chapter, as well as the subfolders containing the scripts for different steps of the analysis/processing.

**Important information**

Some of the scripts provided herein include references to existing relative paths in order to function. I have therefore structured the repository to be downloaded with the existing file structure and run as is. Of course, you can make any edits within scripts to meet your requirements. Unfortunately, the scripts for some aspects of batch processing may not be completely generalisable as they are based on specific subject names/require specific file name formats.

The raw data files are not included in this repository, but I can provide them if requested.

The scripts and data for the cluster analysis have also not been included as they were provided by a colleague (Dr Ioannis Delis), which I then adapted for my purposes. Please contact Ioannis for these.

Disclaimer: I was naïve to programming when I began this work and the scripts included in this repository were written throughout many steep learning curves. The tools and processes are perhaps not what I would opt for with the virtue of hindsight. Nonetheless, I have done my best to clean and test them, and they are, I believe, functional. However, it should be noted that they may have been adapted further since the thesis for use in publications. Some small differences may also be present in the datasets, which have been thoroughly checked for the same reason. For the purposes of providing a complete toolset, this means that the names of the scripts are different to what is referred to in the thesis. Please check the README file in each folder for descriptions of how to use them and what they do, and contact me if you have troubles.

Some scripts have been borrowed from other sources or require credit. These are credited in the README for the sections they are used in as well as below.

**References**

Benjamin Pillot (2022). findFileInFolder(parentFolderPath, fileExtension, varargin) (https://www.mathworks.com/matlabcentral/fileexchange/59357-findfileinfolder-parentfolderpath-fileextension-varargin), MATLAB Central File Exchange. Retrieved July 1, 2022.

Calvin Eiber (2022). Remove Line Noise (https://www.mathworks.com/matlabcentral/fileexchange/54228-remove-line-noise), MATLAB Central File Exchange. Retrieved July 1, 2022.

Desai A, Richards T, Chakrabarty S (2021). FAST: An extension of the Wavelet Synchrosqueezed Transform. Published online 2021. doi:10.36227/techrxiv.15177819.v2

Ioannis Delis (2017). BCT tool box and associated scripts.

Jerry (2022). Cell Array to CSV-file [improved cell2csv.m] (https://www.mathworks.com/matlabcentral/fileexchange/47055-cell-array-to-csv-file-improved-cell2csv-m), MATLAB Central File Exchange. Retrieved June 16, 2022.

Thomas Pearson (2017). Coher+Phase\_Batch.S2S. Cambridge electronic Design (CED).