



Stroke Effects and Recovery Observed through EEG-Based Brain-Computer Interface Analysis and Connectivity Analysis

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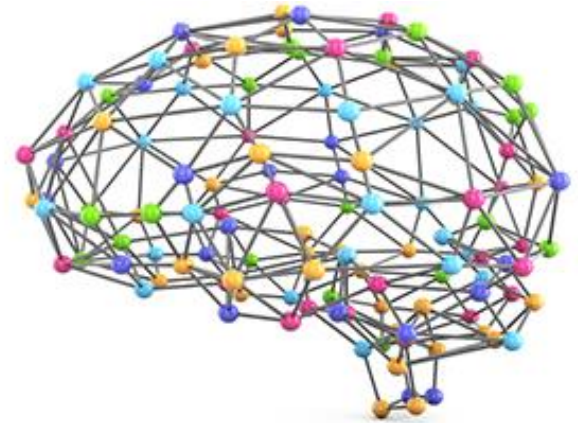


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Introduction

- What is a brain network?
- How does stroke affect brain networks?
- How are brain networks affected by stroke?
- What is the best way to measure this change?

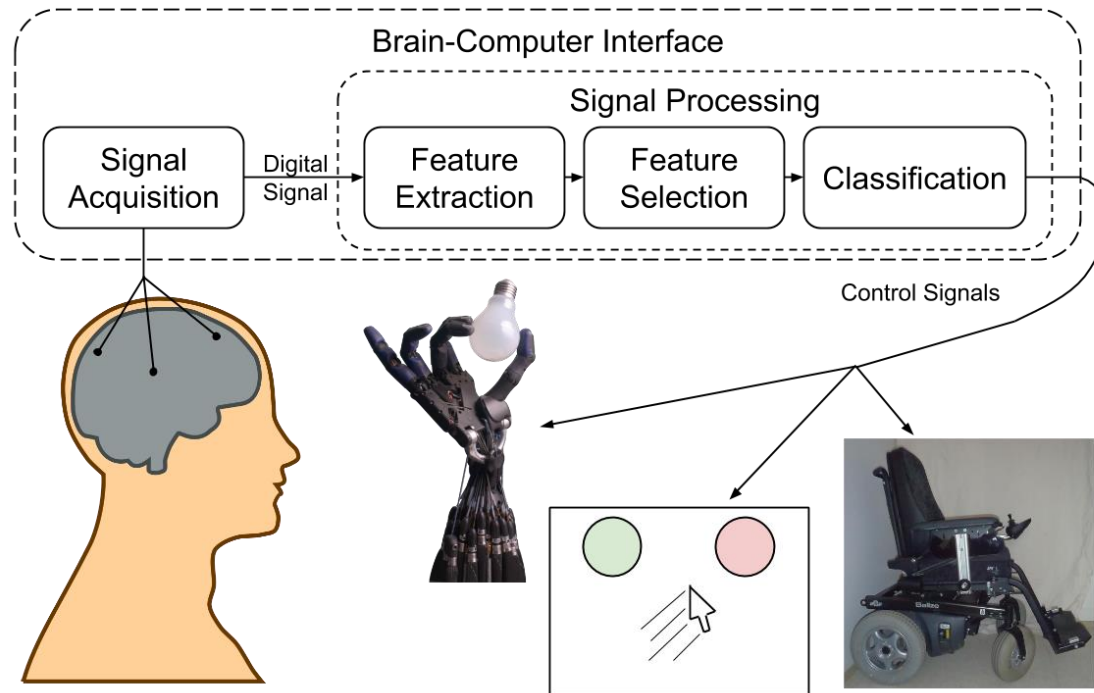


Data Recording

- Subjects: 10 healthy and 5 stroke-affected
 - Loss of hand motor strength
 - Two sessions for stroke subjects
- Task: Finger-tapping and Rest
 - 20 of each task per session
 - Alternating
- Acquisition: 32 channel full-head EEG
 - Biosemi Active Two
 - Reference-free



Brain-Computer Interface (BCI)

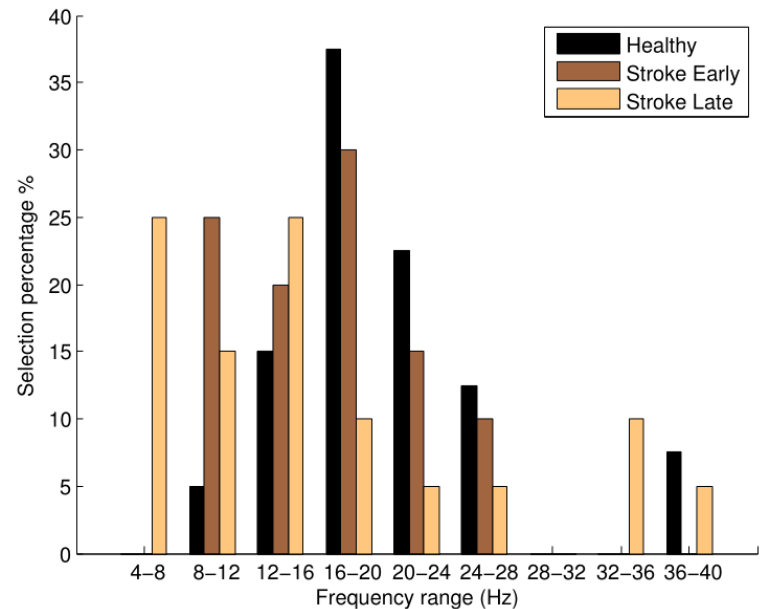


- Filter Bank CSP feature extraction
- Marginal Relevance feature selection
- Gaussian Process (GP) classification
- BCI Training / BCI Testing

Results

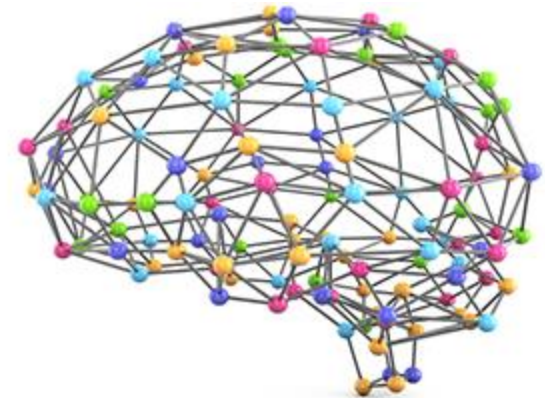
- Classification accuracies
- Selected frequency ranges
- Indirect measure of brain networks

Train EEG dataset	Test EEG dataset	Accuracy
S1E	S1L	82.5
S2E	S2L	72.5
S3E	S3L	95.0
S4E	S4L	62.5
S5E	S5L	75.0
Average		77.5 ± 12.1



Connectivity Analysis

- Measure of brain network edges
- Phase Slope Index (PSI)
 - Information flow – cause and effect
 - Source localisation
 - Fixed time delay between nodes
 - Linear phase shift as a function of frequency
- Direct measure of brain networks
- Ongoing work



Conclusions

- Guiding rehabilitation therapy
- Portable hardware
- Easy to use
- At-home therapy



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Questions?

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