Improving Stroke Patient Motor-Imagery Classification System by Utilizing Transfer Learning

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Brain-Computer Interfaces (BCI) for Stroke Rehabilitation

Stroke causes motor disability in people.

Approach:

Utilizing Deep Learning-based BCI systems to help with post-stroke rehabilitation

Challenge:

Scarcity of available EEG MI dataset for stroke patients

Question:

Does a model trained for healthy people can be helpful in overcoming the shortage of stroke patients' data and improve the MI classification for stroke patients'?

Datasets

Data type:

Electroencephalography (EEG)

Healthy subjects dataset (Physionet MI):
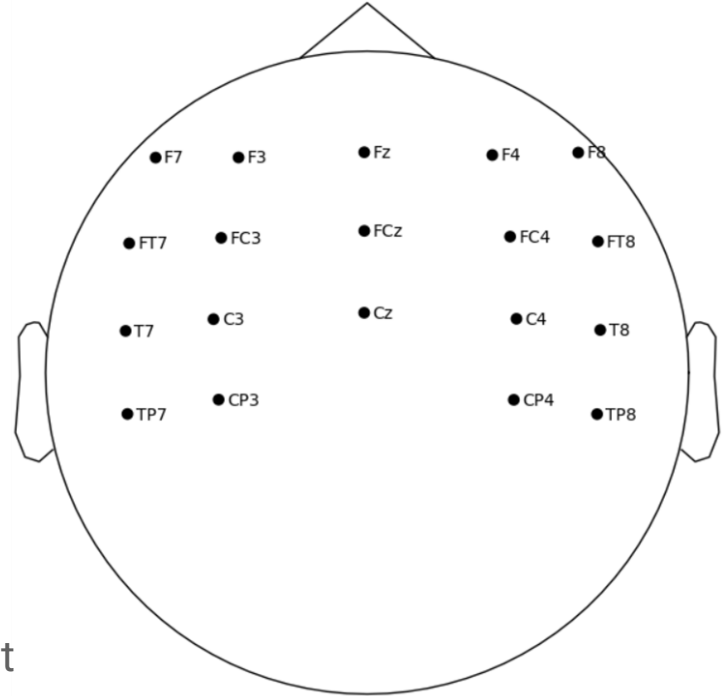
109 subjects

Channel selection: 64 -> 19
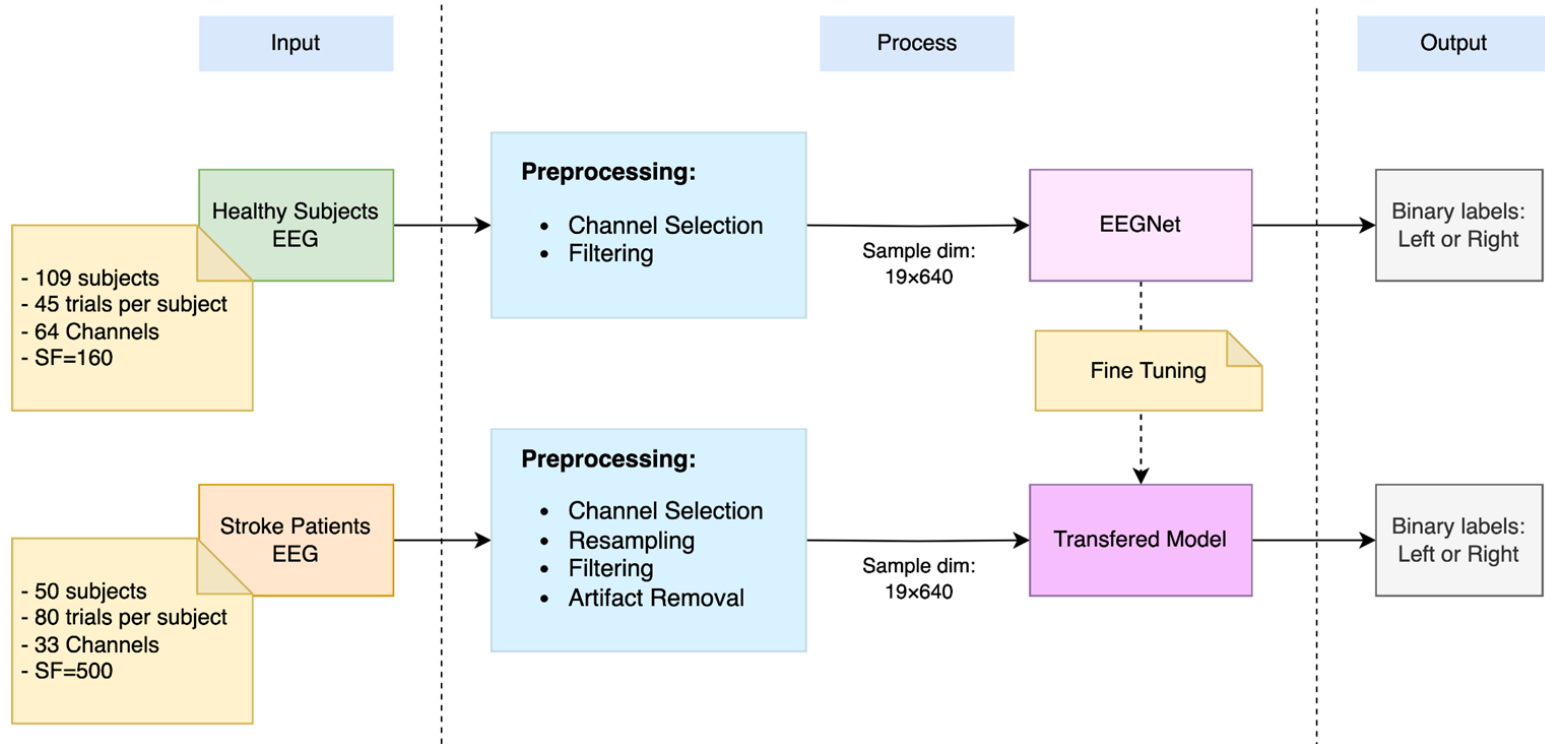
Stroke patients dataset:

50 subjects

Channel selection: 33 -> 19

Motor Imagery Task:

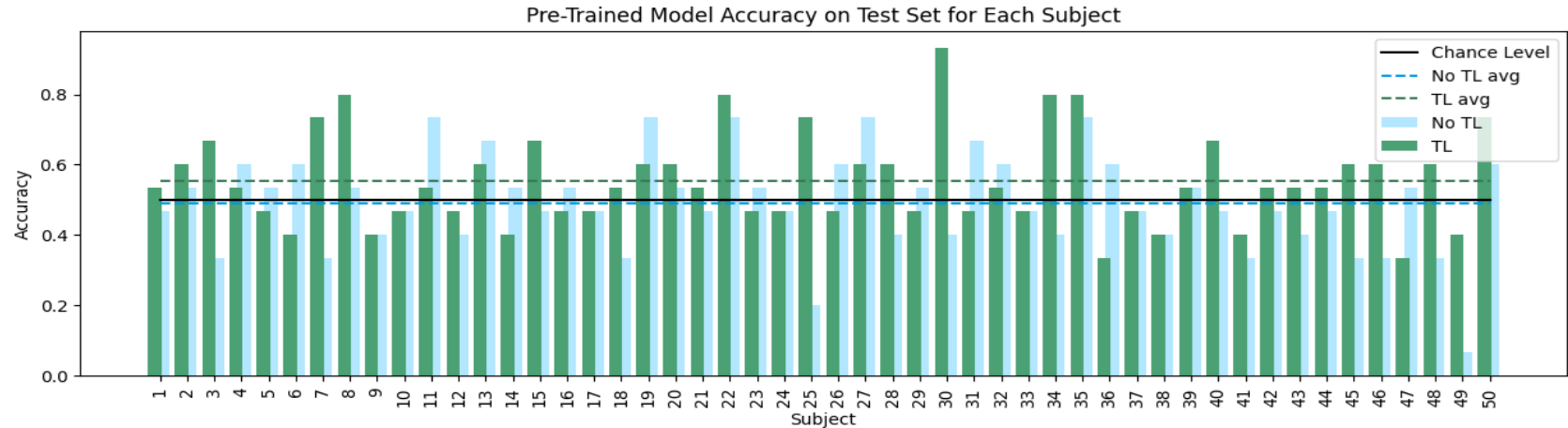Imagining opening and closing the right or left fist

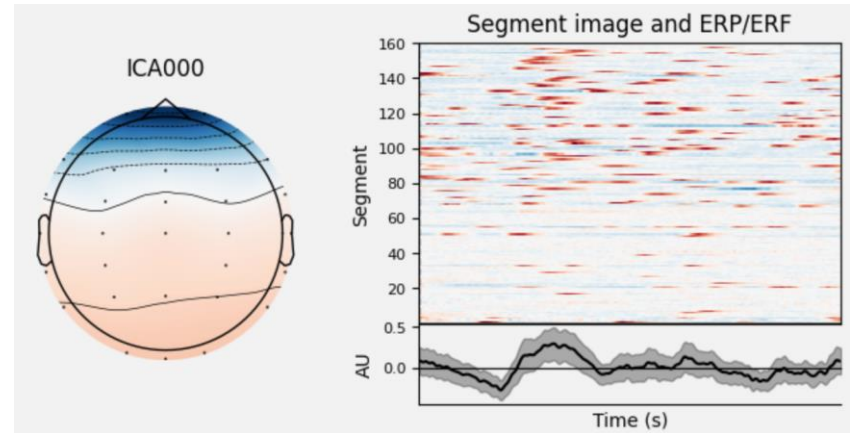# Method

Results

Healthy dataset

- Average test accuracy: 82%

Stroke dataset

	Without TL	With TL
All Subjects Training	47.2	49.7
Subject Specific Training	48.9	**55.5**

Pre-Trained Model Accuracy on Test Set for Each Subject

Conclusion

- Transfer learning from healthy data can improve the results

- Subject-specifically fine-tuned models work better

- EEG data preprocessing is crucial, specially if transfer learning is employed

- Exploring more advanced models and transfer learning algorithms could possibly improve the results

Thank you for your attention!