



Status Report

BCI: SSVEP

Group 31 • 15.02.18

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Brief Overview



Summary

SSVEP

Riemannian geometry

Recent progress

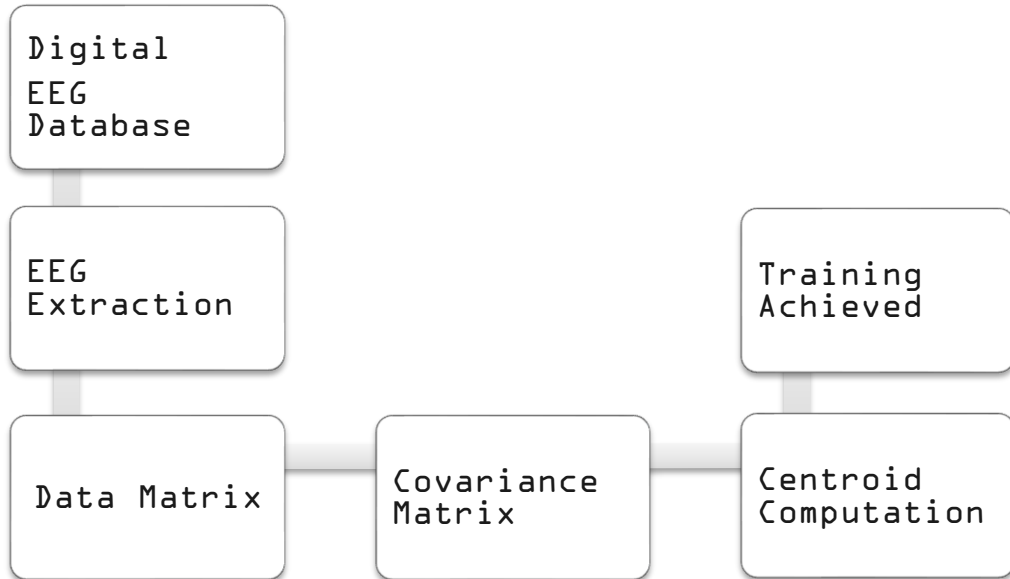
- Dataset handling and extraction
- Github
- Crude classification

Future Endeavours

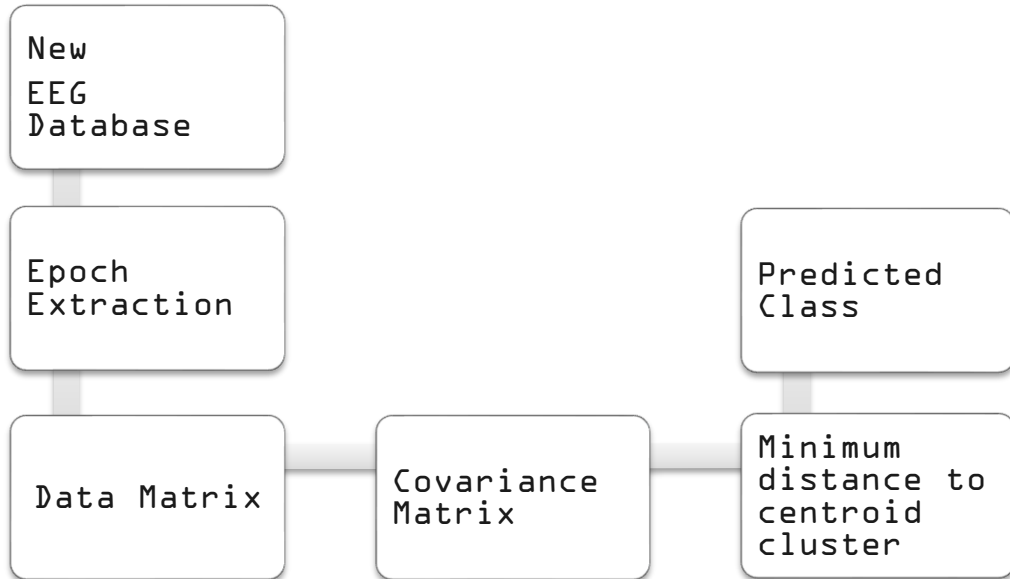
- LED Array
- Outlier removal
- Online Classification
- Performance evaluation

Algorithmic Briefing

Training



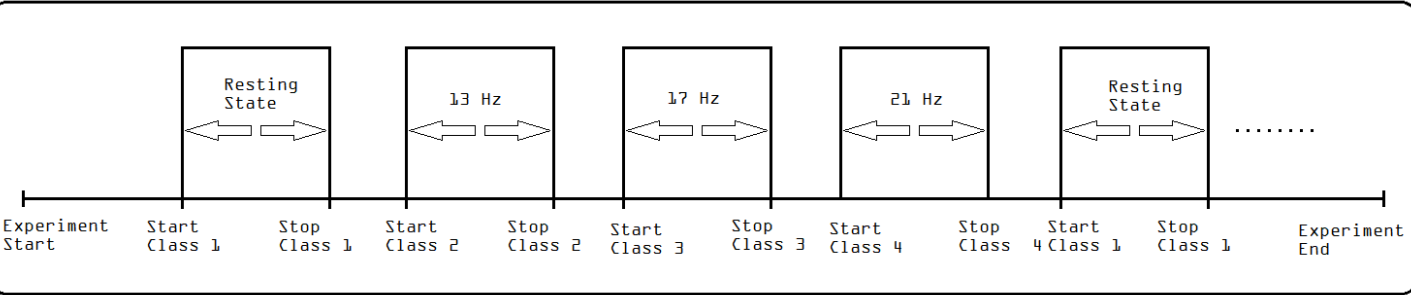
Testing



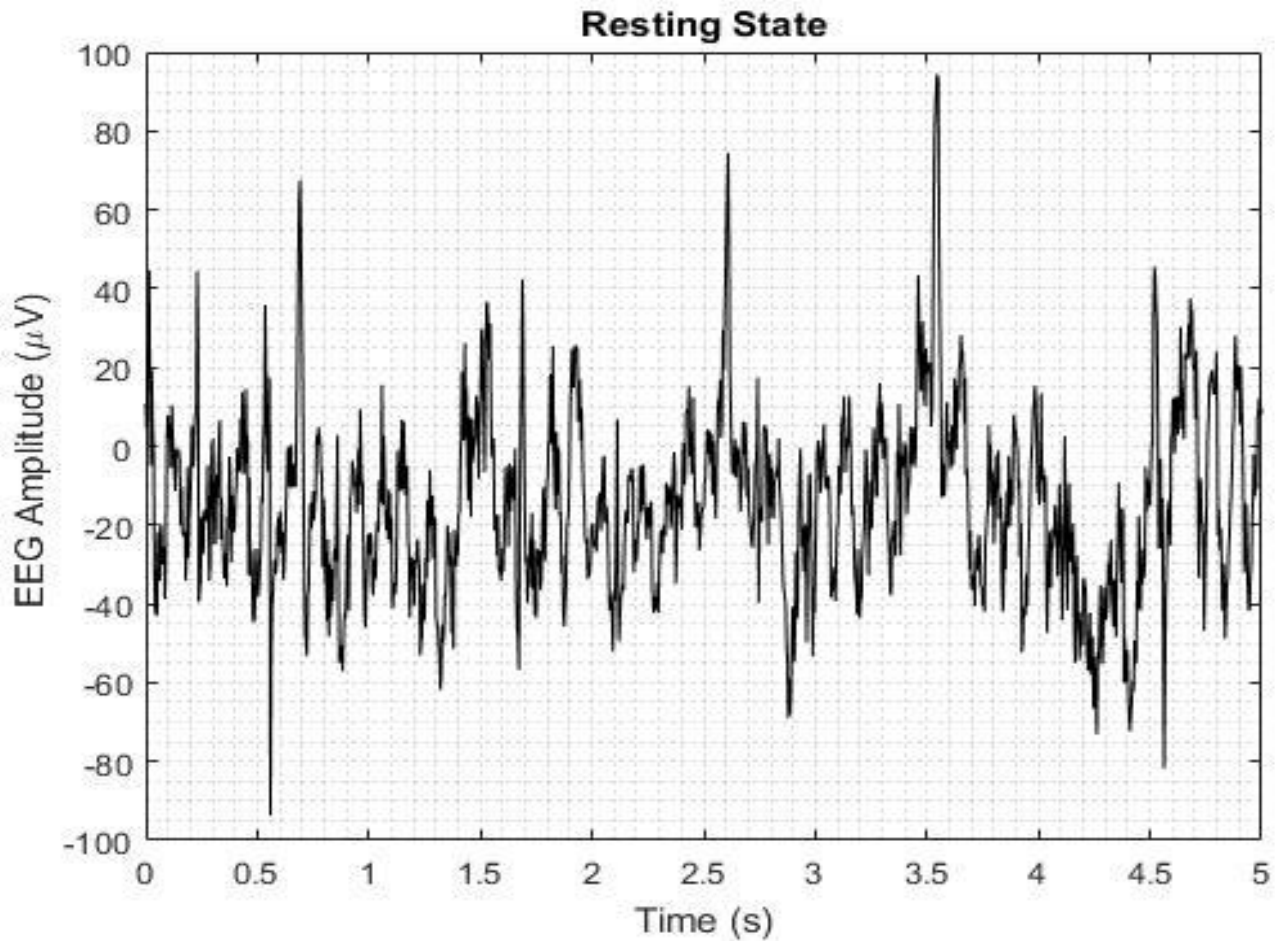
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The Data

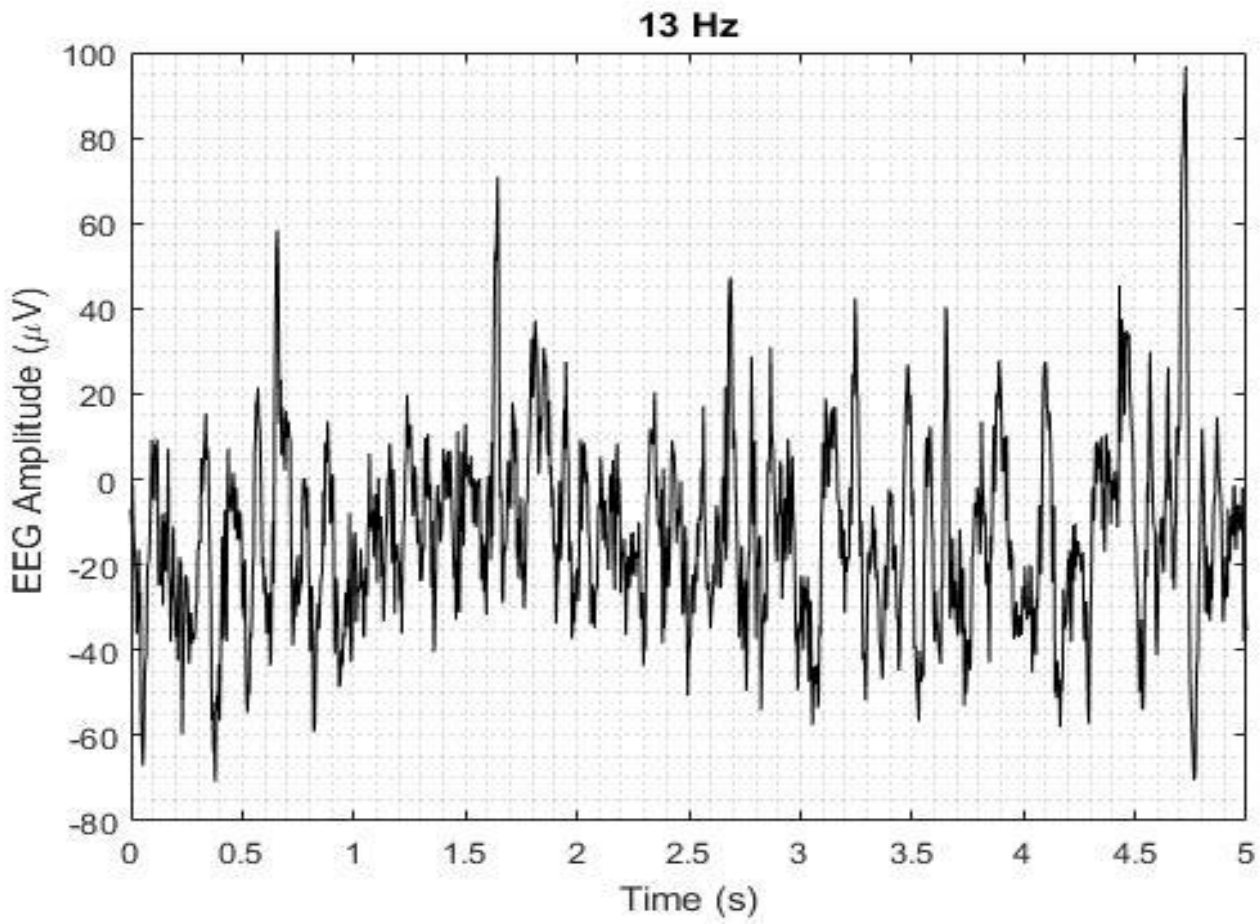
Data Recording Format

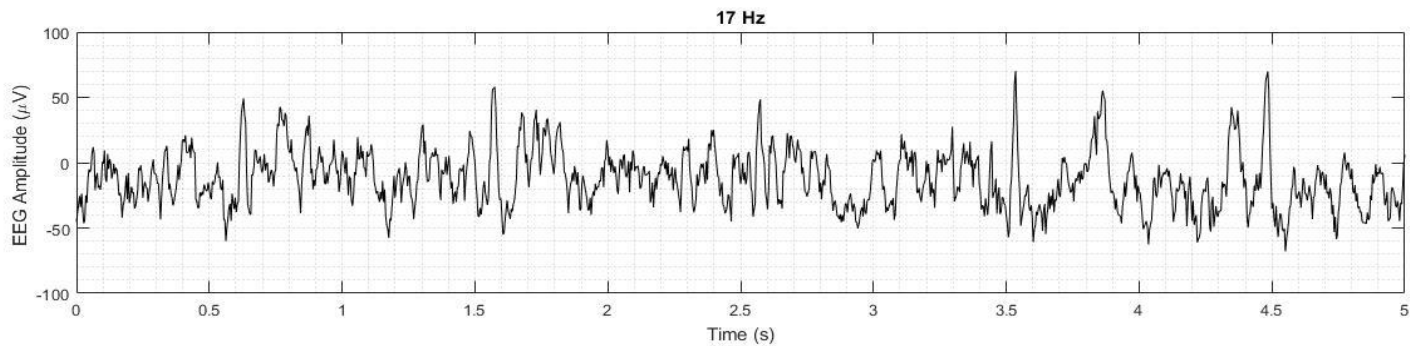
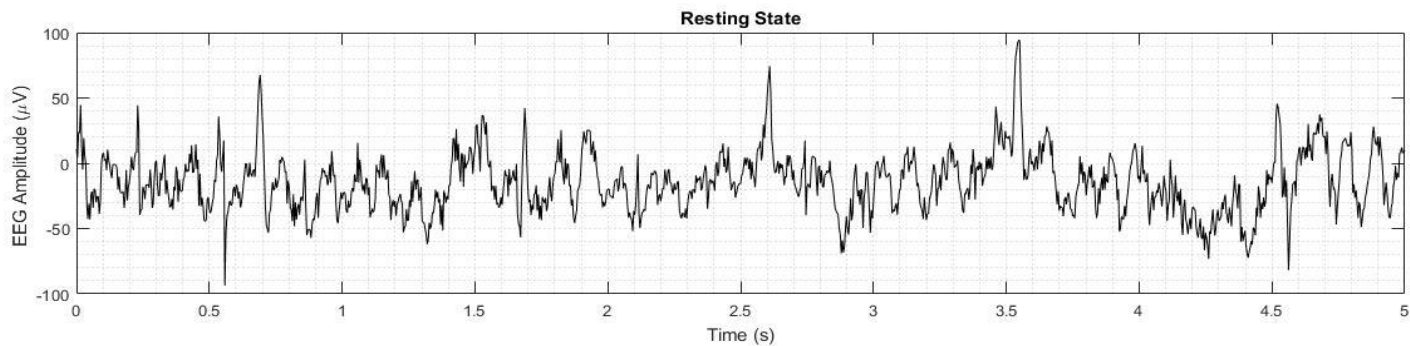


Normal EEG



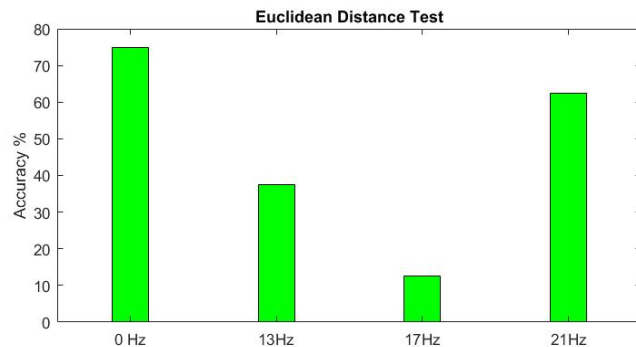
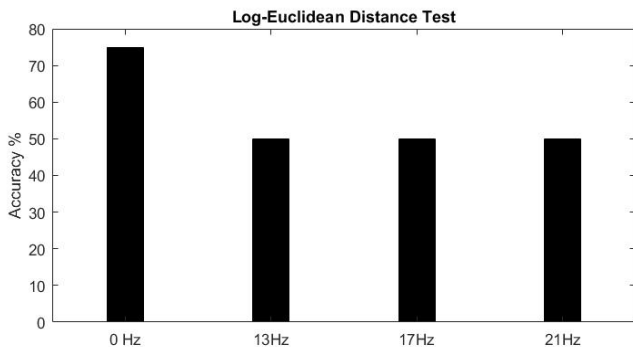
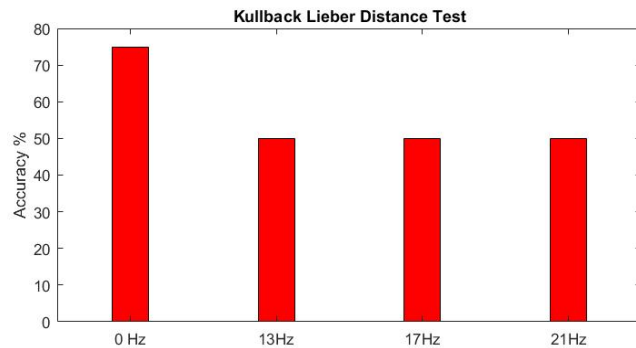
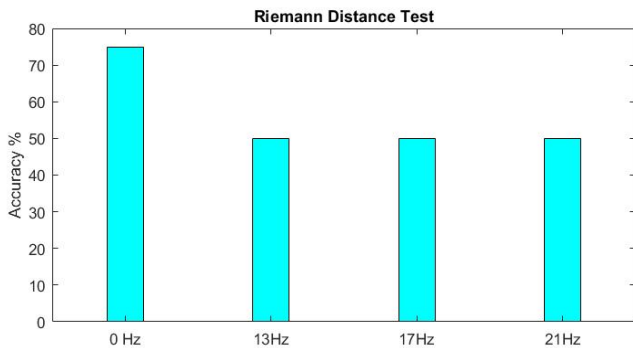
EEG in SSVEP





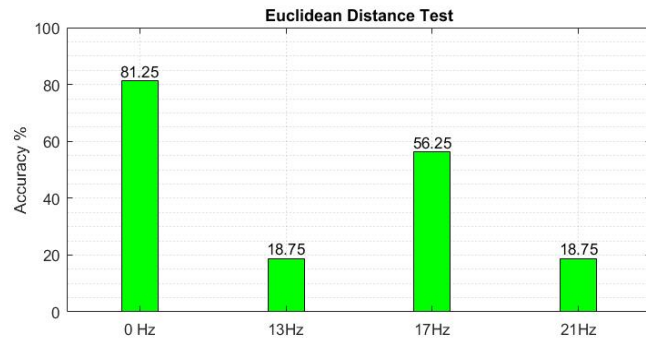
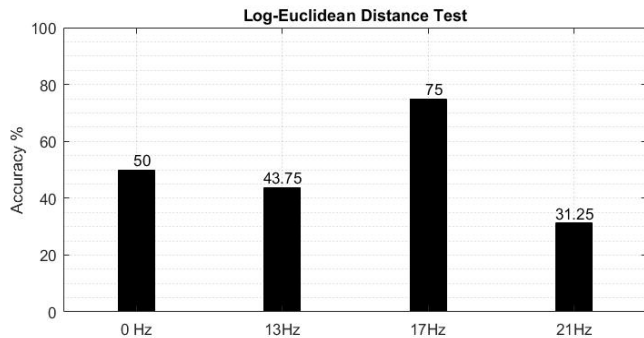
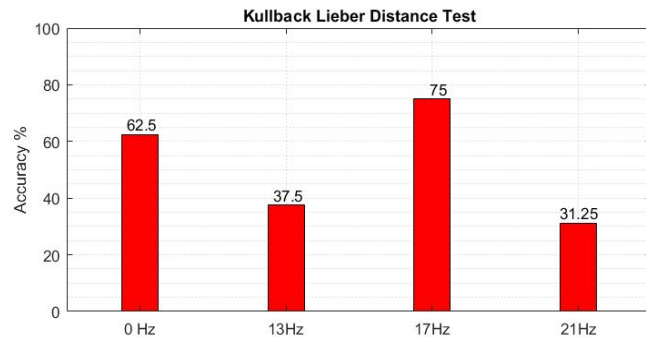
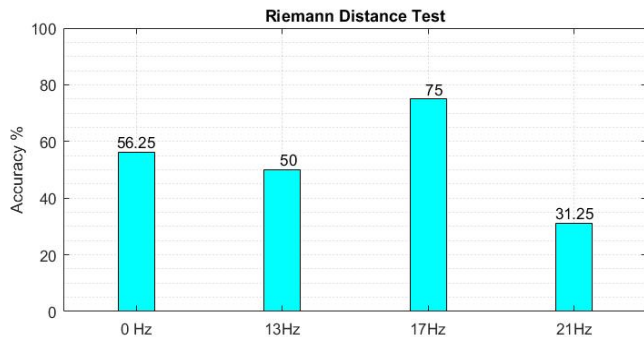
Results

Classification Accuracy



Results

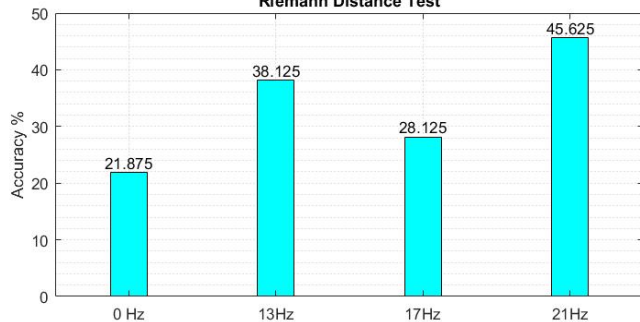
Covariance with Riemannian Mean



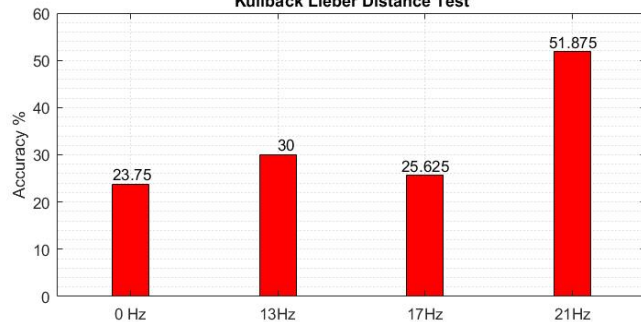
Results

Classification Accuracy (Shrinkage Covariance)

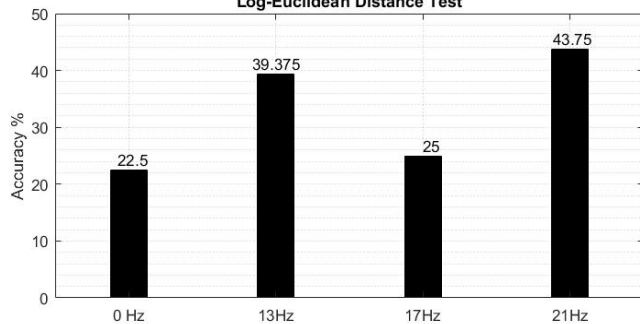
Riemann Distance Test



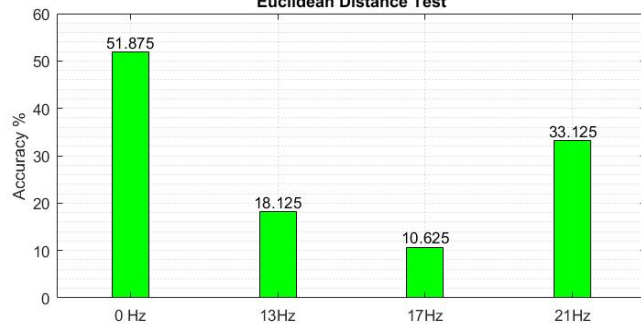
Kullback Lieber Distance Test



Log-Euclidean Distance Test

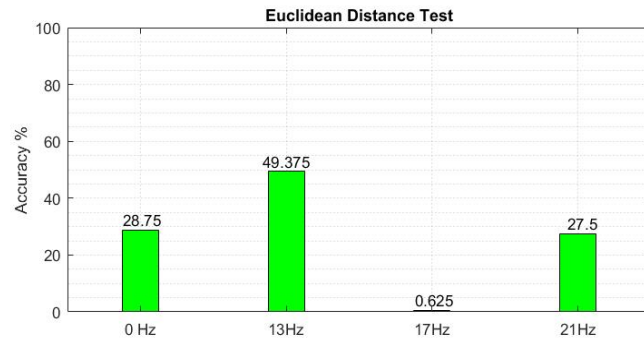
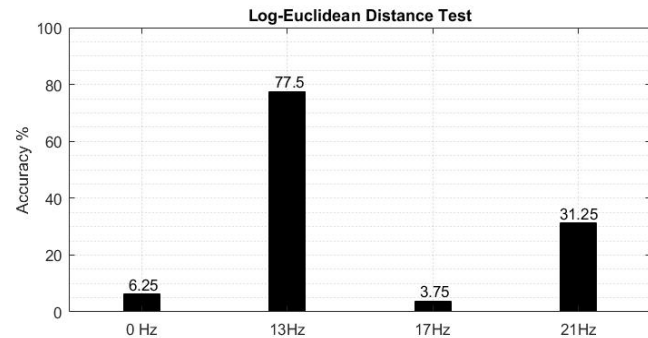
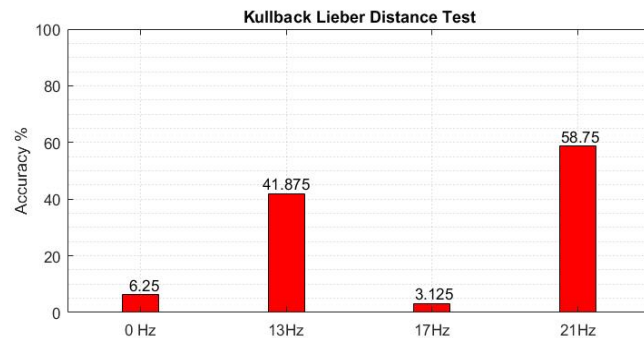
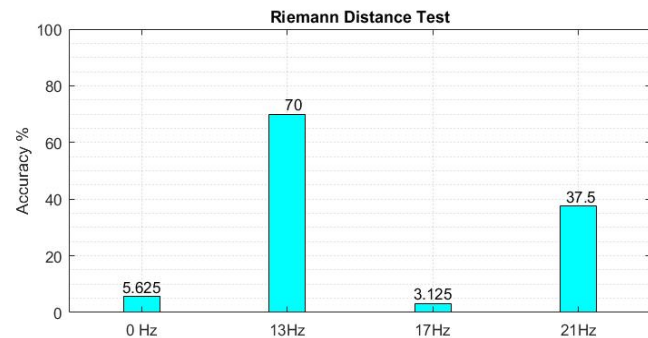


Euclidean Distance Test



Results

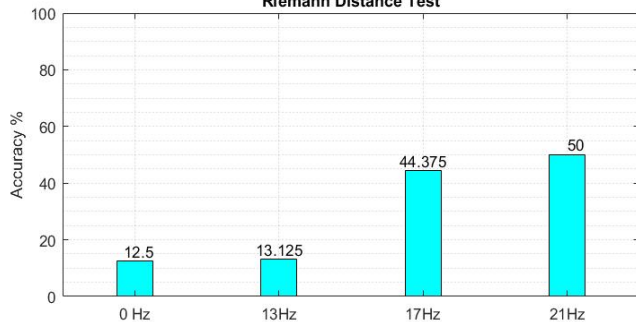
Shrinkage Covariance with Geodesic Mean



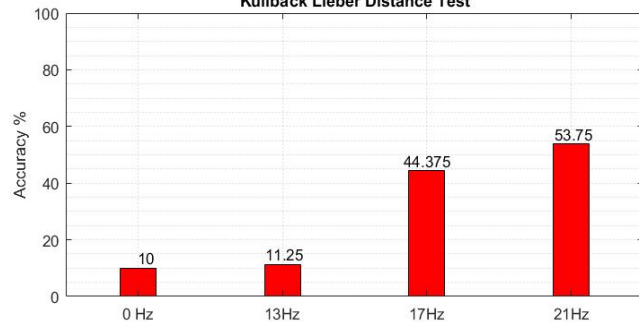
Results

Shrinkage Covariance with Harmonic Mean

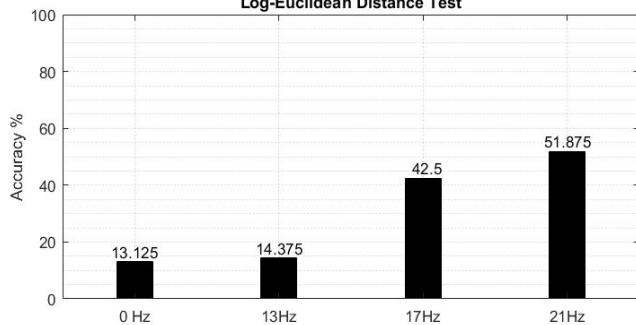
Riemann Distance Test



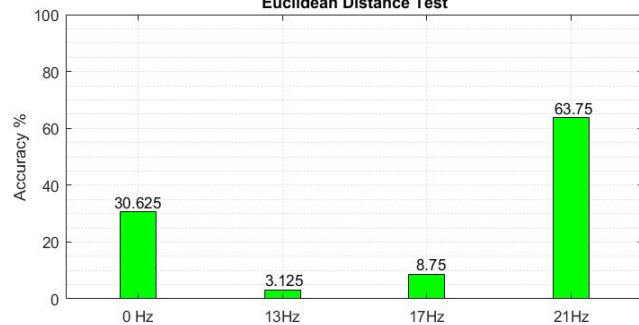
Kullback Lieber Distance Test



Log-Euclidean Distance Test

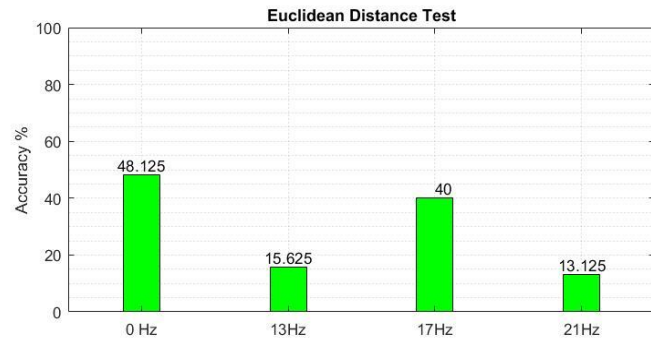
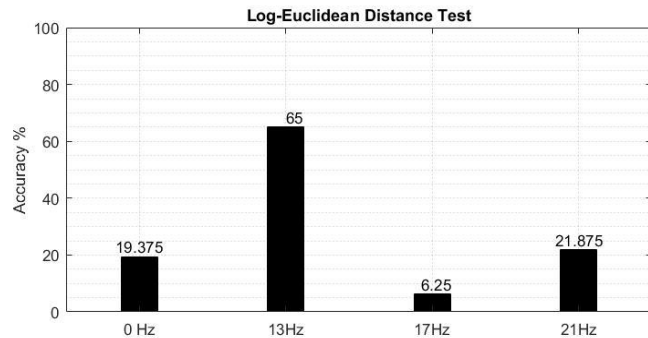
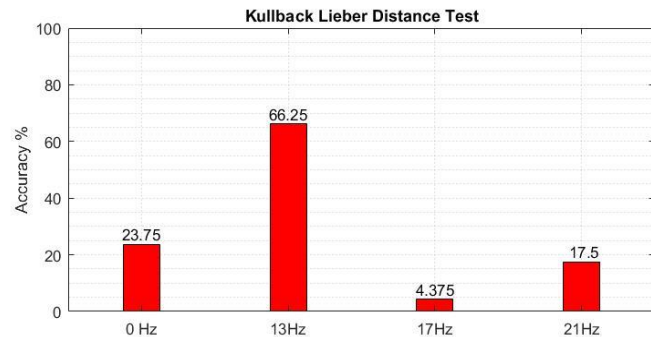
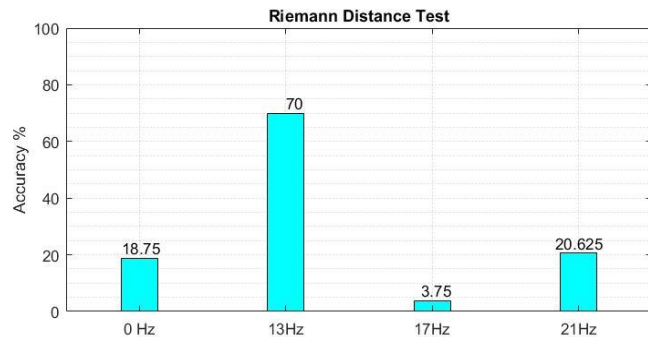


Euclidean Distance Test



Results

Shrinkage Covariance with Median



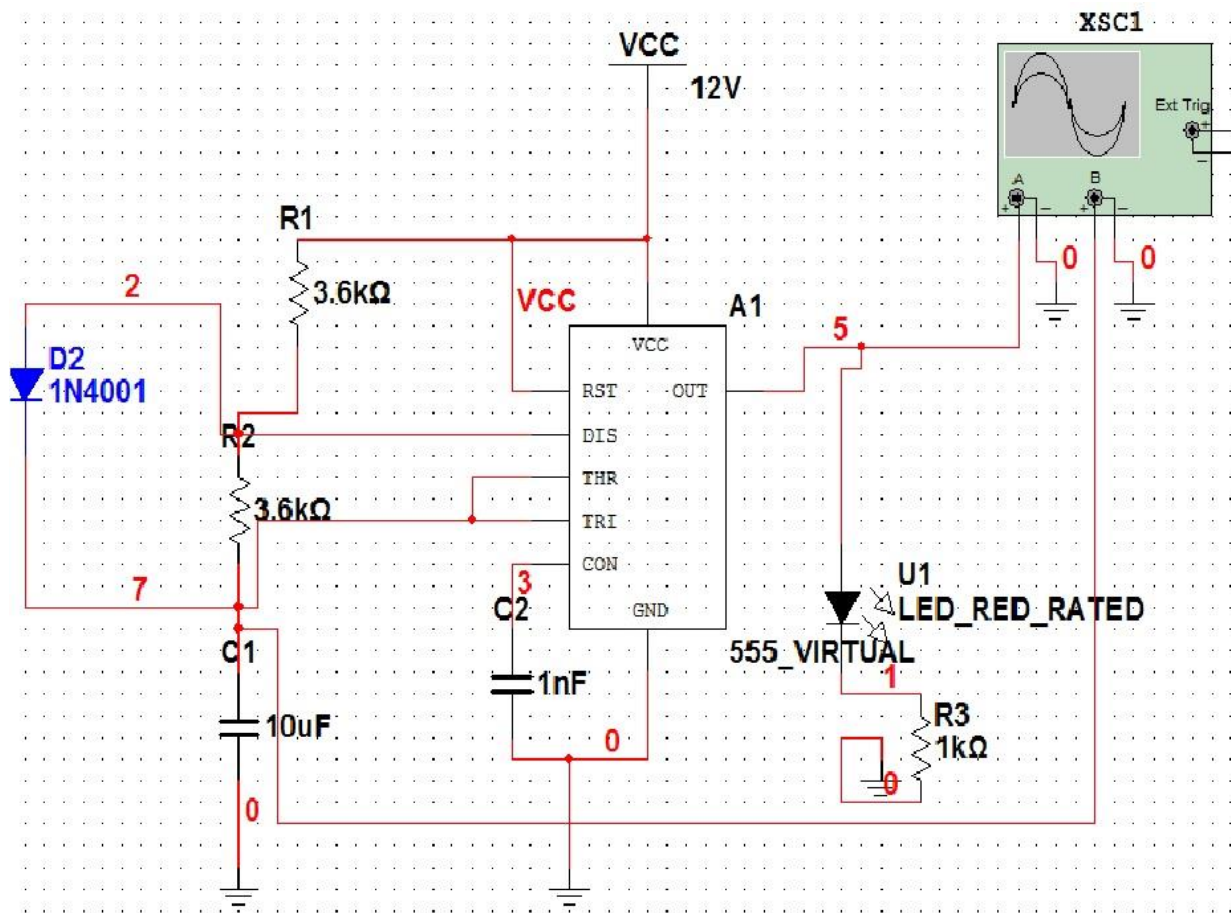
Progress so Far



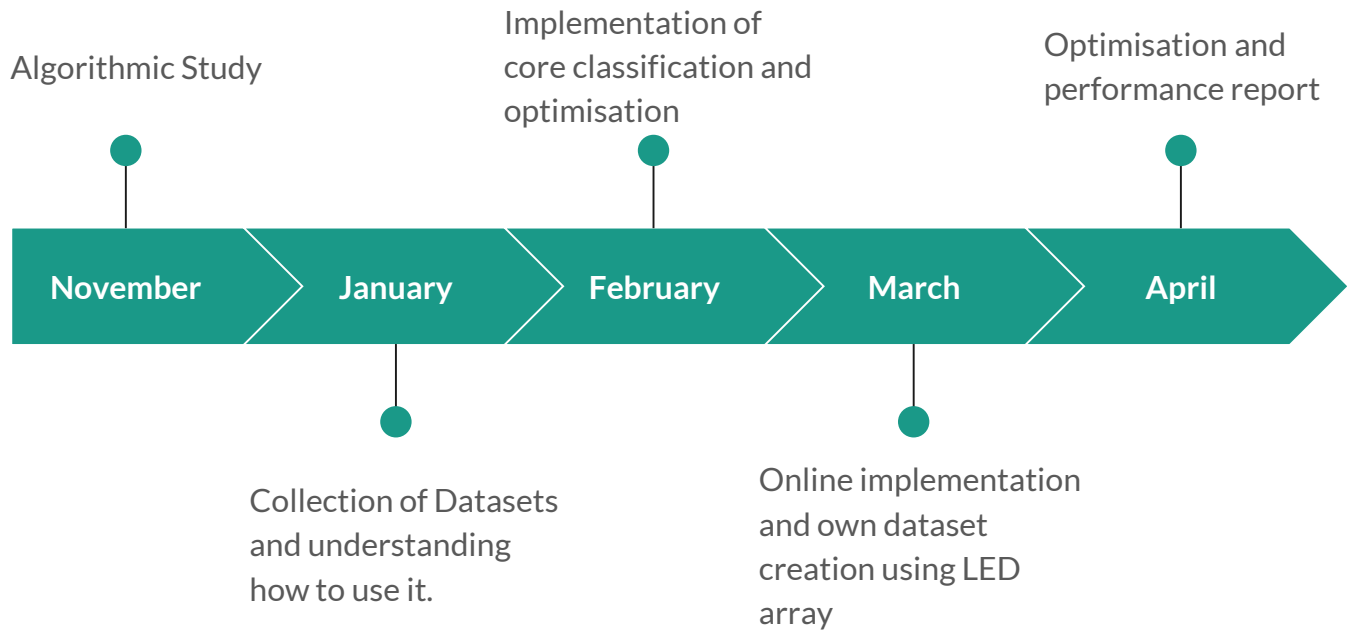
Accomplishments

- Extraction of EEG segments
- Data organisation
- Covariance matrix formation from extracted segments
- Crude Classification

Led Array Schematic



Schedule





Next steps

Assignment 1

Optimisation of Classification by outlier removal, EEG pre-processing.

Assignment 2

LED array module and Recording of own EEG dataset

Assignment 3

Online Extraction and its optimisation



Goals for next meeting

1. Outlier removal and Optimized Offline Classifier
2. LED array Prototype

Thank You