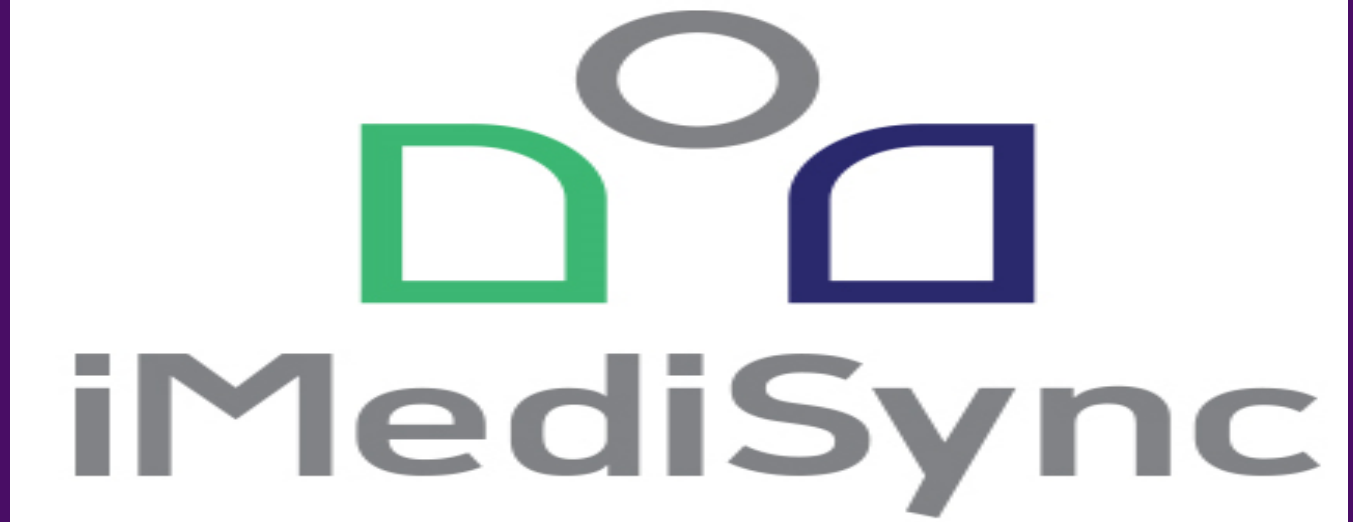


# Alpha Asymmetry as biomarker for Mild Cognitive Impairment

P1-00



JaeKang Shin<sup>1</sup>, SangUk Park<sup>1</sup>, TaeGyun Jeong<sup>1</sup>, UkEob Park<sup>1</sup>, DaeKeun Kim<sup>1</sup>, YoungChul Youn<sup>2</sup>, DoYoung Kang<sup>3</sup>, KyungWon Park<sup>4</sup>, HyunTae Park<sup>4</sup>, SangJin Kim<sup>5</sup>, YoungMin Lee<sup>6</sup>, ChangSung Seo<sup>7</sup>, SeungWan Kang<sup>1,8</sup>

- (1)iMediSync Inc., Seoul, Korea, Republic of (South)
- (2)Department of Neurology, Chung-Ang University College of Medicine, Seoul, Korea, Republic of (South)
- (3)Translational Biomedical Sciences/Dong-A University, Busan, Korea, Republic of (South)
- (4)Dong-A University, Busan, Korea, Republic of (South)
- (5)Department of Management and Information Systems at Dong A University, Busan, Korea, Republic of (South)
- (6)Pusan National University Hospital, Busan, Korea, Republic of (South)
- (7)SCT Co. Ltd, Busan, Korea, Republic of (South)
- (8)Data Center for Korean EEG, College of Nursing, Seoul National University, Seoul, Korea, Republic of (South)

## Relevance Alpha Biomarker Research for Classification of aMCI in QEEG

### INTRODUCTION

- Detecting Mild Cognitive Impairment (MCI) and taking prompt measures for cognitive function are important for the prevention of dementia.
- Although various biomarkers for classifying aMCI using Electroencephalography (EEG) have been discovered, the number of types is still limited.
- The alpha rhythm is an important feature in cognitive assessment using EEG.
- This study aims to establish meaningful biomarkers for discriminating aMCI by utilizing the asymmetry and variability of the alpha rhythm in Quantitative EEG (QEEG).

### METHODS

- EEG data from resting state with eyes closed (EC) using the 10-20 system are utilized.
- The QEEG dataset consists of N=634 participants, with 317 healthy controls (HC) and 317 individuals with MCI, for the validation of biomarkers.
- The asymmetry of Alpha Power, both inter and intra, was identified as a biomarker using Power values. The subjects divided into non-ADD group and ADD group.
- Alpha variability was assessed by calculating the standard deviation of the mean frequency of the time domain data.
- The relevance of the biomarkers is assessed through a 5-fold cross-validation (CV) using a confusion matrix.

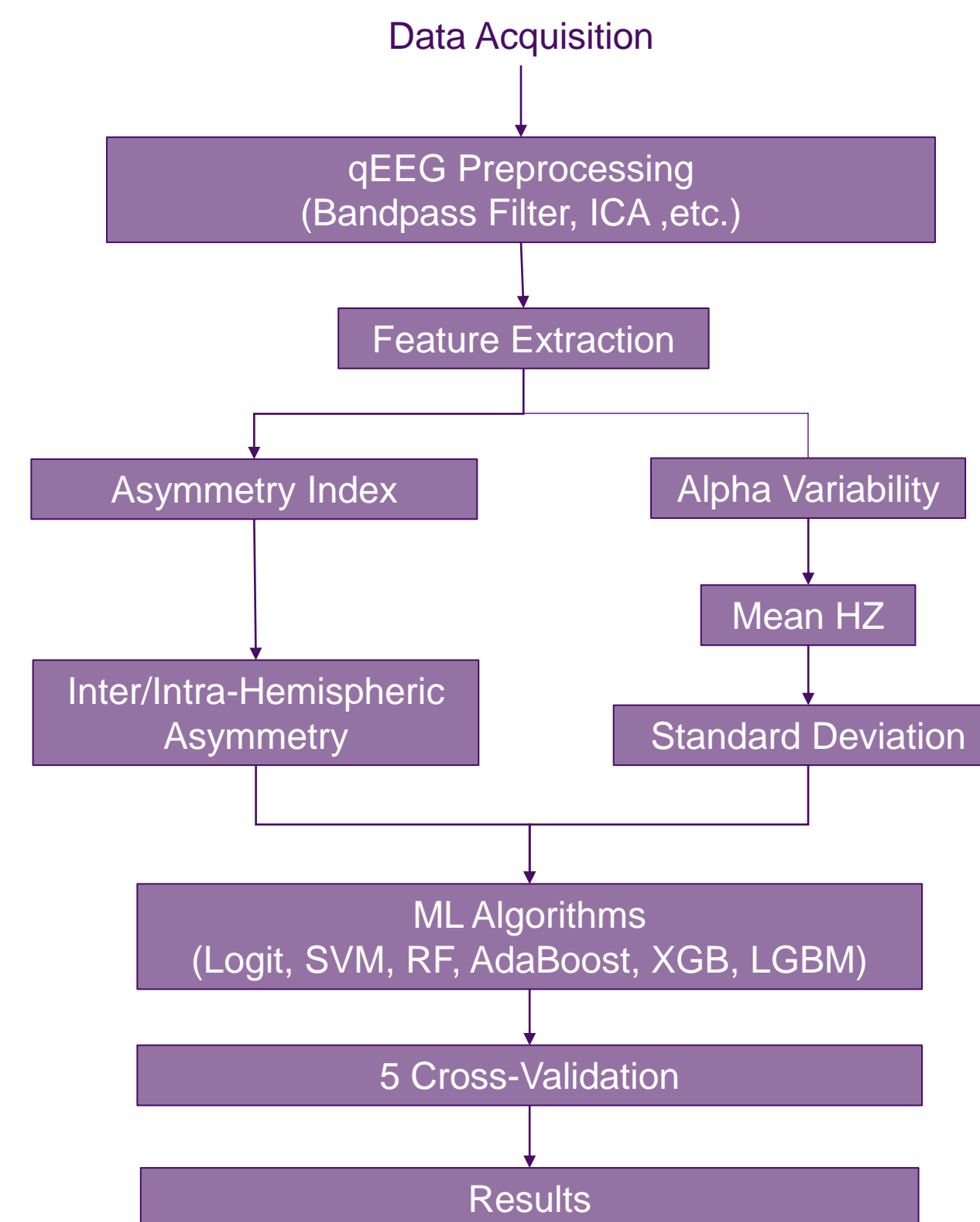


Figure 1. Analysis Flow Chart

### RESULTS

- Accuracy: 84.61%
- Sensitivity: 74.02%
- Specificity: 95.25%
- F1-Score: 0.8273

### CONCLUSIONS

- Sensor region power, alpha asymmetry, and variability demonstrate the potential as biomarkers for early diagnosis of aMCI, as confirmed by 5-fold CV.
- The use of alpha asymmetry based on EEG also shows potential as a biomarker for aMCI related to depression.

### REFERENCES

- [1] Ismail, Zahinoor, et al. "Prevalence of depression in patients with mild cognitive impairment: a systematic review and meta-analysis." JAMA psychiatry 74.1 (2017): 58-67.
- [2] Dustman, Robert E., Donald E. Shearer, and Rita Y. Emmerson. "Life-span changes in EEG spectral amplitude, amplitude variability and mean frequency." Clinical neurophysiology 110.8 (1999): 1399-1409.

### CONTACT

sjk@imedisync.com  
 swpark@imedisync.com  
 seungwkang@imedisync.com  
 iMediSync, Inc.  
<https://www.imedisync.com/en/>

