Alzheimer's Disease Dementia Classifying Artificial IntelligentModel by Using Brain Functional Network from Electroencephalography

iMediSync

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High AD dementia classifying performance through AI model adopting brain functional network from EEG

INTRODUCTION

- Alzheimer's disease dementia (ADD) is the most common and dangerous neurodegenerative disorder.

- However, it mainly depends on self or clinical way to diagnose one subject with dementia.

- Electroencephalography (EEG) is easy to use, cheap and it can present fast results by using real time signal.

- We propose artificial intelligent (AI) model to classify the ADD subject with non-ADD one by adopting EEG.

METHODS

- EEG data recorded from 10-20 system with eye closed and resting state.

- 68 regions of interests (ROIs) from 19 channel using standardized low resolution brain electromagnetic tomography (sLORETA).

- Functional network using imaginary part of coherence (iCoh) of two ROIs

- The subjects divided into non-ADD group and ADD group.

- The ADD classifying AI model using 68 source ROIs features and network features from functional brain network.
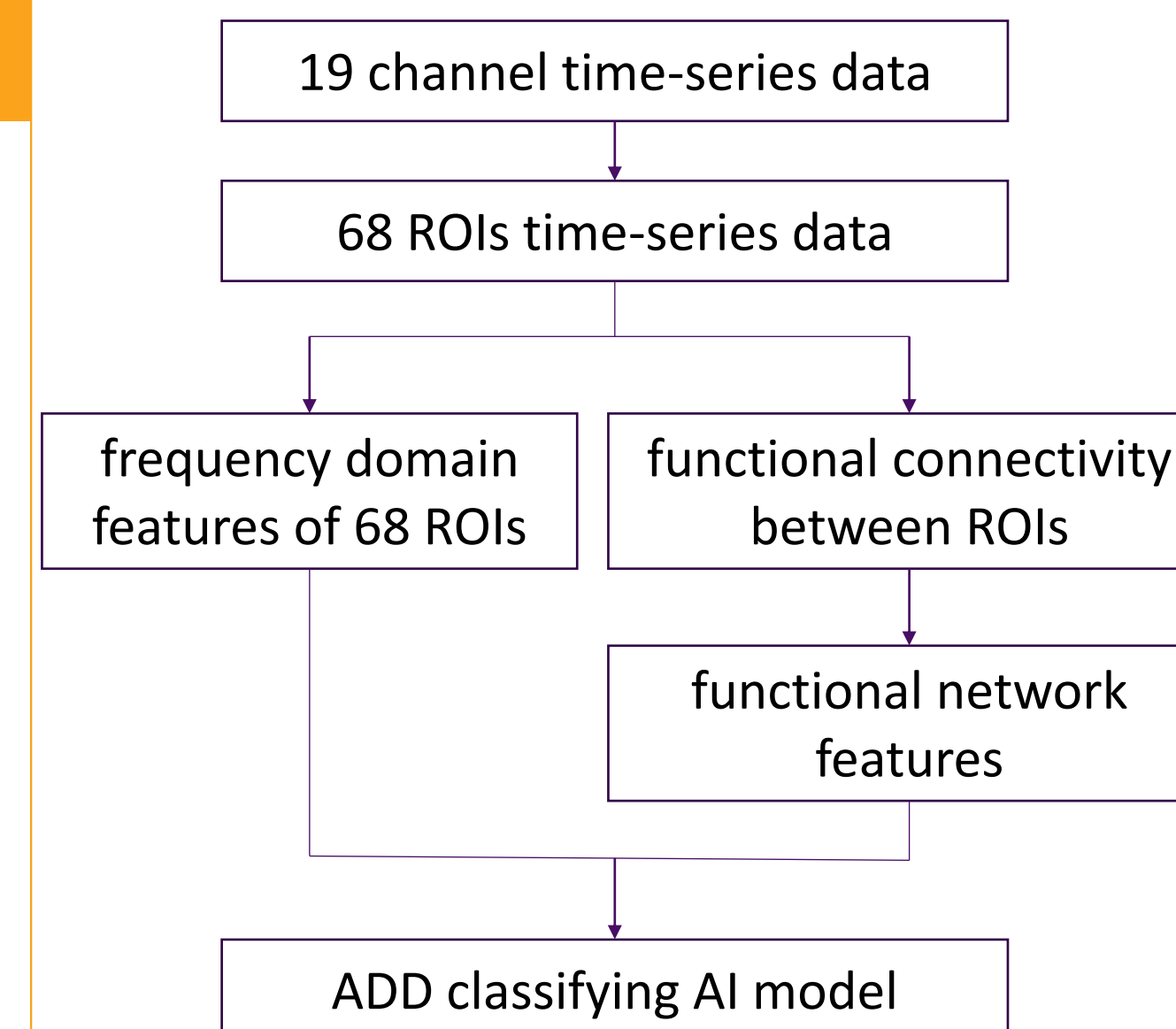
Figure

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┌─────────────────────────────┐
│  19 channel time-series data │
└─────────────────────────────┘
              │
┌─────────────────────────────┐
│   68 ROIs time-series data   │
└─────────────────────────────┘
        │            │
┌──────────────┐ ┌──────────────────┐
│ frequency    │ │ functional       │
│ domain       │ │ connectivity     │
│ features of  │ │ between ROIs     │
│ 68 ROIs      │ │                  │
└──────────────┘ └──────────────────┘
                         │
                 ┌──────────────────┐
                 │ functional       │
                 │ network          │
                 │ features         │
                 └──────────────────┘
              │
┌─────────────────────────────┐
│  ADD classifying AI model    │
└─────────────────────────────┘
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Figure 1. Block diagram of feature extraction

	True ADD	True nADD
Pred ADD	24	59
Pred nADD	3	417

Table 1. Confusion matrix of ADD classifying AI model

RESULTS

- 87.67% accuracy

- 88.89% ADD sensitivity

- 87.61% ADD specificity

- 0.9506 AUC

CONCLUSIONS

- The AI model proved great classification performance without using any other data except EEG signal.

- Furthermore, the functional brain network feature had high importance compared to source features.

REFERENCES

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