HYBRID DEEP LEARNING APPROACHFOR CLASSIFYING ALZHEIMER DISEASE BASEDON MULTIMODAL DATA

Summary

FCI-Bioinformatics
Graduation Project

Problem Diagnosis ***AD*** disease (Classification problem)

Objective Distinguish between 4-stages of ***AD***

- Huntington's disease (*HD*)
- Normal
- minor Alzheimer's disease (*MAD*)
- *AD*

Hybrid model of **DBN** & **CNN** is better than traditional approaches.

Datasets from **ADNI** contains

- **MRI** magnetic reverberation imaging
- **EEG** electroencephalography signal

Methodology

- **Median Filtering** for **EEG** preprocessing.
- **Gaussian filtering** for **MRI** preprocessing.
- **Gray level co-occurrence matrix GLCM** Feature Extraction.
- Classifiers
  - Support Vector Machine **SVM**
  - Multi-Layer Perceptron **MLP**
  - Deep Belief Network **DBN**
  - Conventional Neural Network **CNN**

hybrid

Results

To evaluate Models performance, using **Accuracy**, **Sensitivity**, **Specificity** and Matthews correlation coefficient **(MCC)** matrices.

Methods	Accuracy	Sensitivity	Specificity	MCC
SVM	50.45	58.36	87.2	76.8
MLP	53.79	52.14	82.66	81.2
CNN	84.6	84.11	86.98	86.88
DBN	84.5	82.86	83.75	82.05
Hybrid	92.5	90.89	90.67	93.5

Figure 1. Performance metrics in percentage of different algorithms on Alzheimer dataset with MR and EEG data

Summary

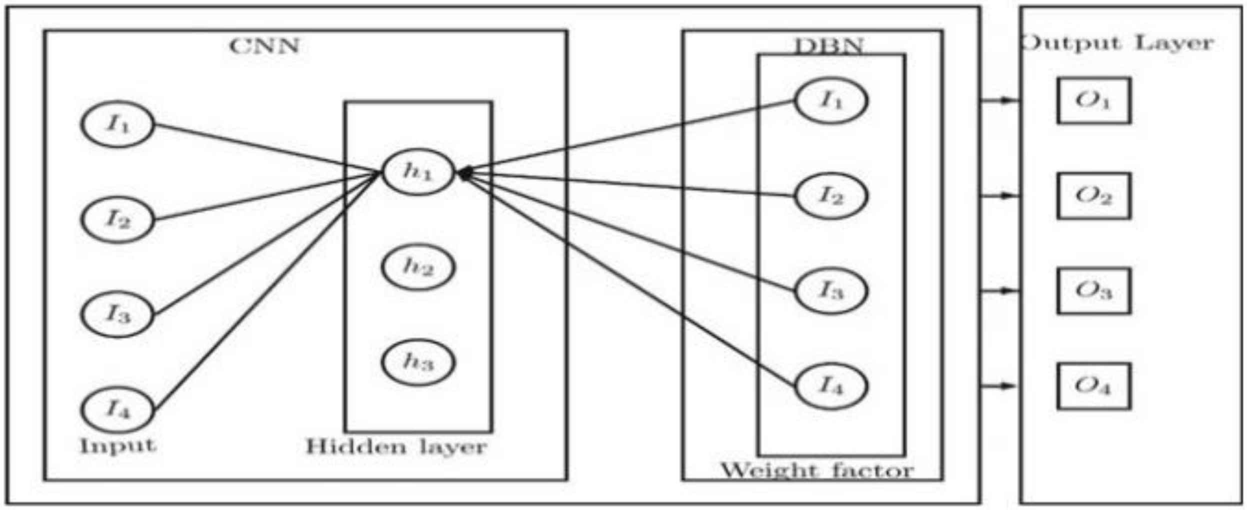

Figure 2. Hybrid Approach

References

Reference	Data Modality	Methods	Dataset	Objective
[Hybrid Deep Learning Approach for Classifying Alzheimer Disease Based on Multimodal Data | SpringerLink]()	**MRI** **EEG**	**GLCM** **Gaussian** **Median** **CNN** **DBN** **SVM** **MLP**	**ADNI** **Polikar Rowan University**	Distinguish between 4-stages of ***(Normal, MAD, AD, HD)*** Hybrid model **of DBN & CNN** is better than traditional approaches