**Support Information**

Table S1: Classification accuracy (%) of all four methods with LASSO feature selection in four classification tasks.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Method | MCI vs. NC | lMCI vs. eMCI | eMCI vs. NC | ADHD vs. NC |
| Baseline | 66.9 | 66.0 | 53.8 | 61.5 |
| THR | 74.3 | 73.6 | 68.5 | 67.7 |
| SPA | 72.5 | 70.7 | 70.8 | 65.8 |
| DNTL (Ours) | **78.1** | **76.4** | **74.0** | **73.2** |

Table S2: Performance of four methods with different brain atlases for MCI vs. NC classification. ACC: Accuracy; SEN: Sensitivity; SPE: Specificity.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Method | 200 ROIs | | | |  | 160 ROIs | | | |
| ACC | SEN | SPE | AUC |  | ACC | SEN | SPE | AUC |
| Baseline | 68.3 | 88.0 | 25.0 | 0.62 |  | 67.6 | 76.0 | **50.0** | 0.61 |
| THR | 77.8 | 76.1 | **83.0** | 0.79 |  | 73.3 | 96.0 | 25.0 | 0.56 |
| SPA | 75.6 | 84.0 | 58.0 | 0.75 |  | 77.5 | 92.2 | 41.7 | 0.54 |
| DNTL (Ours) | **79.0** | **92.2** | 75.0 | **0.80** |  | **81.3** | **96.1** | **50.0** | **0.74** |

Table S3: Classification accuracy (%) of all four methods using SVM with RBF kernel.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Method | MCI vs. NC | lMCI vs. eMCI | eMCI vs. NC | ADHD vs. NC |
| Baseline | 67.0 | 63.2 | 63.8 | 64.4 |
| THR | 76.1 | 70.7 | 73.2 | 67.7 |
| SPA | 72.5 | 71.8 | 70.6 | 67.7 |
| DNTL (Ours) | **79.4** | **76.4** | **76.2** | **72.3** |

Table S4: Classification accuracy (%) of all four methods using decision tree classifier.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Method | MCI vs. NC | lMCI vs. eMCI | eMCI vs. NC | ADHD vs. NC |
| Baseline | 60.0 | 59.3 | 55.7 | 56.3 |
| THR | 66.4 | 65.2 | 61.1 | 61.8 |
| SPA | 65.6 | 65.2 | 63.6 | 62.0 |
| DNTL (Ours) | **71.8** | **70.8** | **70.1** | **64.5** |

Table S5: Discriminative ROIs of CC Features identified by our DNTL method in the task of eMCI vs. NC classification.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Index | Full Name | Abbr. | | |
| 1 | Orbitofrontal cortex (middle) left | ORBmid.L | | |
| 2 | Orbitofrontal cortex (middle) right | ORBmid.R | | |
| 3 | Inferior frontal gyrus (opercular) right | IFGoperc.R | | |
| 4 | Orbitofrontal cortex (medial) left | ORBsupmed.L | | |
| 5 | Orbitofrontal cortex (medial) right | ORBsupmed.R | | |
| 6 | Rectus gyrus right | REC.R | | |
| 7 | Anterior cingulate gyrus right | ACG.R | | |
| 8 | Middle cingulate gyrus left | DCG.L | | |
| 9 | Posterior cingulate gyrus left | PCG.L | | |
| 10 | Cuneus left | CUN.L | | |
| 11 | Superior occipital gyrus right | SOG.R | | |
| 12 | Middle occipital gyrus right | MOG.R | |
| 13 | Superior parietal gyrus right | SPG.R | |
| 14 | Inferior parietal lobule left | IPL.L |
| 15 | Precuneus right | PCUN.R | | |
| 16 | Temporal pole (superior) right | TPOsup.R | | |
| 17 | Temporal pole (middle) left | TPOmid.L | | |

Table S6: Discriminative ROIs of CC Features identified by our DNTL method in the task of ADHD vs. NC classification.

|  |  |  |
| --- | --- | --- |
| Index | Full Name | Abbr. |
| 1 | Middle frontal gyrus left | MFG.L |
| 2 | Orbitofrontal cortex (inferior) left | ORBinf.L |
| 3 | Olfactory right | OLF.R |
| 4 | Anterior cingulate gyrus right | ACG.R |
| 5 | Middle cingulate gyrus right | DCG.R |
| 6 | Amygdala left | AMYG.L |
| 7 | Calcarine cortex right | CAL.R |
| 8 | Cuneus left | CUN.L |
| 9 | Cuneus right | CUN.R |
| 10 | Angular gyrus right | ANG.R |
| 11 | Precuneus left | PCUN.L |
| 12 | Precuneus right | PCUN.R |
| 13 | Caudate right | CAU.R |
| 14 | Temporal pole (middle) right | TPOmid.R |

Table S7: Discriminative ROIs of DN Features identified by our DNTL method in the task of eMCI vs. NC classification.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Index | Full Name | Abbr. | | |
| 1 | Orbitofrontal cortex (superior) left | ORBsup.L | | |
| 2 | Orbitofrontal cortex (superior) right | ORBsup.R | | |
| 3 | Orbitofrontal cortex (middle) right | ORBmid.R | | |
| 4 | Inferior frontal gyrus (opercular) left | IFGoperc.L | | |
| 5 | Inferior frontal gyrus (opercular) right | IFGoperc.R | | |
| 6 | Inferior frontal gyrus (triangular) left | IFGtriang.L | | |
| 7 | Orbitofrontal cortex (inferior) left | ORBinf.L | | |
| 8 | Orbitofrontal cortex (inferior) right | ORBinf.R | | |
| 9 | Orbitofrontal cortex (medial) right | ORBsupmed.R | | |
| 10 | Middle cingulate gyrus left | DCG.L | | |
| 11 | ParaHippocampal gyrus right | PHG.R | | |
| 12 | Calcarine cortex left | CAL.L | |
| 13 | Supramarginal gyrus left | SMG.L | |
| 14 | Thalamus left | THA.L |
| 15 | Temporal pole (middle) right | TPOmid.R | | |

Table S8: Discriminative ROIs of DN Features identified by our DNTL method in the task of ADHD vs. NC classification.

|  |  |  |
| --- | --- | --- |
| Index | Full Name | Abbr. |
| 1 | Superior frontal gyrus (dorsal) right | SFGdor.R |
| 2 | Orbitofrontal cortex (superior) right | ORBsup.R |
| 3 | Orbitofrontal cortex (middle) right | ORBmid.R |
| 4 | Inferior frontal gyrus (opercular) right | IFGoperc.R |
| 5 | Orbitofrontal cortex (medial) left | ORBsupmed.L |
| 6 | Orbitofrontal cortex (medial) right | ORBsupmed.R |
| 7 | Insula left | INS.L |
| 8 | Putamen left | PUT.L |
| 9 | Pallidum left | PAL.L |
| 10 | Temporal pole (middle) left | TPOmid.L |

ORBmid.L

ORBsupmed.L

REC.R

ACG.R

PCG.L

CUN.L

SOG.R

MOG.R

SPG.R

IPL.L

PCUN.R

TPOsup.R

TPOmid.L

ORBmid.R

IFGoperc.R

ORBsupmed.R

DCG.L

(a) eMCI vs. NC

ORBsup.L

ORBsup.R

IFGoperc.L

IFGtriang.L

ORBinf.L

ORBinf.R

PHG.R

CAL.L

SMG.L

THA.L

TPOmid.R

MFG.L

ORBinf.L

OLF.R

ACG.R

DCG.R

AMYG.L

CAL.R

CUN.L

CUN.R

ANG.R

PCUN.L

PCUN.R

CAU.R

TPOmid.R

SFGdor.R

ORBsup.R

ORBmid.R

IFGoperc.R

ORBsupmed.L

ORBsupmed.R

INS.L

PUT.L

PAL.L

TPOmid.L

(b) ADHD vs. NC

Figure S1: The Venn diagram of selected ROIs using local clustering coefficient feature (left) and node degree feature (right) for (a) eMCI vs. NC and (b) ADHD vs. NC classification tasks.



NC

NC

eMCI

ADHD

1. eMCI vs. NC
2. ADHD vs. NC

Figure S2: The thresholded FC network using the thresholds by the proposed method in the first cross validation for patient group (left) and NC group (right).