Brain Mapping Center

SEMINAR SERIES

Sponsored by the UCLA Brain Mapping Center Faculty

The focus of these talks is on advancing the use of brain mapping methods in neuroscience with an emphasis on contemporary issues of neuroplasticity, neurodevelopment, and biomarker development in neuropsychiatric disease.

Hosted By: Shantanu Joshi, PhD, Neurology, UCLA

"Sex-dependent anatomic patterns of brain aging specific to Alzheimer's disease revealed using deep learning"

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The gap between chronological age and biological brain age, as estimated from magnetic resonance images (MRIs), reflects how individual patterns of neuroanatomic aging deviate from their typical trajectories. MRI-derived brain age estimates are often obtained using deep learning models that may perform relatively poorly on new data or that lack neuroanatomic interpretability. We introduced (Yin et al., 2023, PNAS) a novel convolutional neural network (CNN) to estimate brain age after training on the MRIs of 4,681 cognitively normal (CN) participants and testing on 1,170 CN participants from an independent sample. Brain age estimation errors are significantly lower than those of previous studies. At both individual and cohort levels, the CNN provides detailed anatomic maps of brain aging patterns that reveal sex dimorphisms and neurocognitive trajectories in adults with mild cognitive impairment (MCI, N = 351) and Alzheimer's disease (AD, N = 359). In individuals with MCI (54% of whom were diagnosed with dementia within 11 years from MRI acquisition), brain age is significantly better than chronological age in capturing dementia symptom severity, functional disability, and executive function. Profiles of sex dimorphism and lateralization in brain aging also map onto patterns of neuroanatomic change that reflect cognitive decline. Significant associations between brain age and neurocognitive measures suggest that the proposed framework can map, systematically, the relationship between aging-related neuroanatomy changes in CN individuals and in participants with MCI or AD. Early identification of such neuroanatomy changes can help to screen individuals according to their AD risk.

May 4, 2023 11:00am - 12:00pmPDT

Zoom and Neuroscience Research Building (NRB 132)
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