Brain Imaging and Computation for Precision Psychiatry

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09/01/2020

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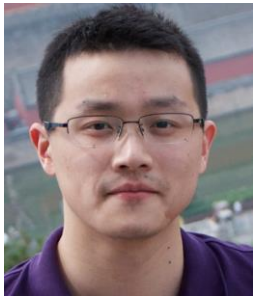
Biography



Yu Zhang, PhD
IEEE Senior Member
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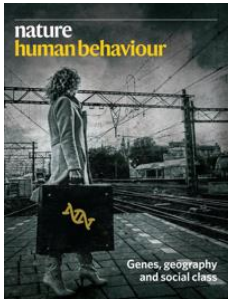
- 2017-2020, Postdoc, Stanford University
- 2016-2017, Postdoc, UNC Chapel Hill
- 2013-2016, Assistant Professor, ECUST
- 2010-2012, Research Associate, RIKEN
- 2008-2013, PhD, ECUST
- 2004-2008, BS, ECUST

Data-driven EEG analysis for psychiatric subtyping (2020)
Yu Zhang, Wei Wu, Amit Etkin

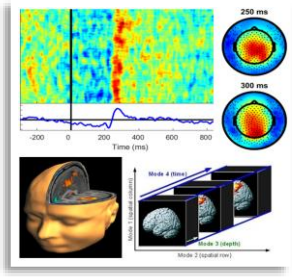
EEG latent mapping for antidepressant outcome prediction (2020)
Wei Wu, **Yu Zhang**, Amit Etkin



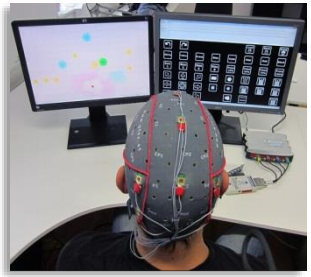
Functional MRI regulation differentiates antidepressant response (2019)
Gregory Fonzo, Amit Etkin, **Yu Zhang**

From Neural Circuits to Biomarkers for Precision Psychiatry

Brain Disease Diagnosis & Treatment



Brain-Machine Interaction



Keywords: Brain imaging, machine learning, computational neuroscience, neural biomarker, precision psychiatry

What physiology and pathology to be studied?

- Mental disorders caused by brain dysfunctions
- Biomarkers associated with psychopathology underlying the disorders
- Mechanism of neural circuits for neurobiological phenotype

Why is this topic significant?

- Affect a large population but mechanism/pathology is underexplored.
- One-size-fits-all treatment limits clinical outcome
- Lack of powerful computational tools to reveal intrinsic neural circuits for biomarker identification
- Cutting-edge AI techniques bring new opportunities

How is this topic studied?

- Advanced neuroimaging techniques, including EEG and fMRI, etc.
- Machine learning/Deep learning
- Brain-computer interaction system design

What are the future directions of this research?

- Quantification of neural biomarkers for early diagnosis of brain diseases
- Data-driven subtype identification and clinical outcome prediction
- Advanced brain-computer interaction and intelligent medicine using AI techniques

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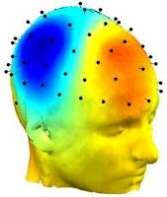
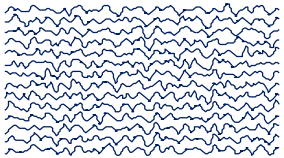
Research Approach

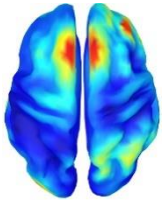
Neuroimaging Techniques

EEG

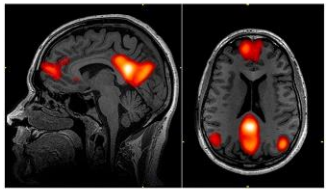




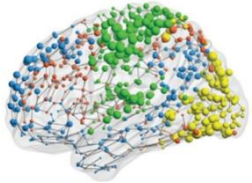
Source signals



fMRI

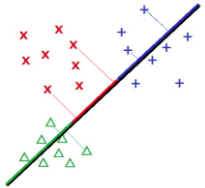


Connectivity

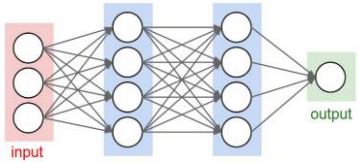


Cutting-edge AI Techniques
Machine Learning & Deep Learning

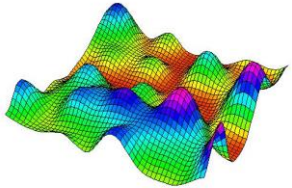
Dimension reduction



Neural network

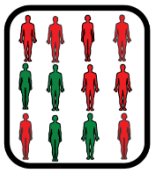


Optimization

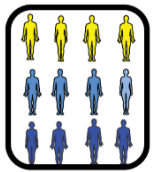


Personalized Medicine

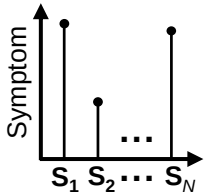
Diagnosis



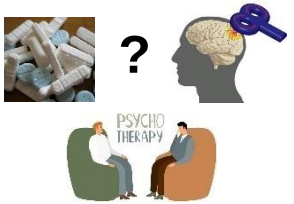
Subtyping



Prediction



Treatment optimization



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