



IEEE Computational Intelligence Society

IEEE Brain Initiative Workshop

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Computational Intelligence: A brief introduction

- What is CI? → Biologically inspired approaches (in contrast to GOFAI):
 - Fuzzy methods
 - Neural networks
 - Evolutionary learning
- Brain-related research in IEEE-CIS:
 - Medical image analysis (MRI, CT, microscopy)
 - EEG/MEG/fMRI/e-physiol signal analysis
 - Deep learning, BMI, Connectomics, Brain informatics, ...
- IEEE-CIS publications and activities
 - World Congress on Computational Intelligence
 - IEEE Transactions: (1) Neural networks & learning systems, (2) Cognitive and developmental systems (previously "TAMD"), (3) Fuzzy systems, (4) Evolutionary computation. → Brain-related special issues.
 - Task force/Tech comm.: (1) Mind and brain, (2) Deep learning, (3) Awareness computing, (4) Brain informatics, (4) Cognitive & devel. sys.

IEEE Brain Initiative: Some thoughts

- Must think: How can IEEE provide unique contributions to brain research?
 - What are the strengths unique to IEEE?
- Re-evaluating neuroscience research questions
 - How can we understand ... → How does the brain itself understand ... ?
 - Understand the brain ... → Understand the brain-body system
 - Information → Meaning/semantics
 - State as spatial pattern → state as temporal pattern
 - Feedforward → Recurrent
- New technologies
 - Non-invasive multi-brain-region activation
 - Beyond vision: Tactile and motor
 - Experimenting with one's own brain
- New tools for modeling and analysis
 - What if data is available today? What methods to use?
 - Couple with cloud computing for scaling
- Possible activities
 - Brain big data challenges, special sessions, special issues, workshops...