Haoliang Wang

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Education

2019- *PhD*, Psychology, UC San Diego
Advisors: Judith E. Fan, Nadia Polikarpova

2015-2019 *BS*, Automation, Xi'an Jiaotong University
Advisor: Pengju Ren
Thesis: Spiking neural network learning algorithms based on temporal modulation.

Research Interests

Computational Cognitive Science: intuitive physics, theory acquisition, concept learning
Machine Learning: program synthesis, representation learning, neural-symbolic models

Publications

2021 **Wang, H.**, Polikarpova, N., and Fan, J. (2021). Learning part-based abstractions for visual object concepts. *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society.*

2021 **Wang, H.**, Vul, E., Polikarpova, N., and Fan, J. (2021). Theory acquisition as constraint-based program synthesis. *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society.*

2021 McCarthy*, W., Hawkins*, R., **Wang, H.**, Holdaway, C., and Fan, J. (2021). Learning to communicate about shared procedural abstractions. *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society.*

2020 **Wang, H.**, and Fan, J. (2020). Library learning for structured object concepts. *ICML Workshop on Object-Oriented Learning: Perception, Representation, and Reasoning.*

Talks & Posters

2021 Talk: Learning to communicate about shared procedural abstractions at *43rd Annual Meeting of the Cognitive Science Society.*

2021 Poster: Learning part-based abstractions for visual object concepts at *43rd Annual Meeting of the Cognitive Science Society.*

2021 Poster: Theory acquisition as constraint-based program synthesis at *43rd Annual Meeting of the Cognitive Science Society.*

2020 Poster: Library learning for structured object concepts at *ICML Workshop on Object-Oriented Learning: Perception, Representation, and Reasoning.*

Research experience

2019- **UC San Diego, Cognitive Tools Lab**
Graduate Student (Principal Investigator: Judith E. Fan)
· Developed web-based experiments where participants infer alien physics dynamics.
· Developed an algorithm for learning part-based structures of visual concepts represented as graphics programs; designed an efficient algorithm for learning latent physics theories from observations by augmenting traditional program synthesis techniques with constraints.

2018 **MIT, Computational Cognitive Science Group**
Research Assistant (Principal Investigator: Josh Tenenbaum)
· Studied the impact of stimulus strength on the speed and accuracy of perceptual decisions.
· Adopted both drift-diffusion model (DDM) and POMDP to explain reaction time in human's decision making and planning behavior in mazes under uncertainty.

2018 **UC Los Angeles, Center for Vision, Cognition, Learning, and Autonomy**
Research Assistant (Principal Investigator: Song-Chun Zhu)
· Collected a large-scale dataset from Grand Theft Auto (GTA), annotated with rich information including 3D mesh for dynamic environment, human skeleton and pose.
· Developed an EM-like algorithm to learn both the structure and the parameters of a probabilistic context-free grammar (PCFG) that models human-object interaction in the dataset.

2017 **The Chinese University of Hong Kong, Multimedia Laboratory**
Research Assistant (Principal Investigator: Dahua Lin)
· Collected a new sketch-photo dataset containing over 8k sketch-photo face pairs.
· Developed an ANN model for mapping examples in a weak modality (sketch) to examples in a stronger modality (photo) by inferring the conditional distribution of a semantic representation in the strong modality given an example from the weak modality using GANs.

2016 **Chinese Academy of Sciences, Institute of Artificial Intelligence and Robotics**
Research Assistant (Principal Investigator: Ran He)
· Investigated the role of identity-preserving transformation in cross-modality face retrieval.
· Designed and implemented a human-like Artificial Neural Network (ANN) architecture where a global encoder-decoder network and four local patch networks work jointly to perceive both global structures and local details of faces.

Selected Academic Honors

2018 Samsung Scholarship, First Prize in Mathematical Modeling Contest

Skills

Modelling and Analysis: Python, Julia, R, MATLAB, C++
Experimental Design: JavaScript, HTML, CSS
Software and Tools: git, Adobe CC, LaTeX