Ruoyang (Jessica) Hu

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Education

University of Rochester **Aug. 2019 – May 2025**
Joint Ph.D. in Brain and Cognitive and Computer Science

Rutgers University **Sep. 2015 – May 2019**
Bachelor of Science in Computer Science

Skills

- **Programming Languages:** Python | SQL | R | Java | JavaScript
- **Tools:** PyTorch | Pandas | Seaborn | Scikit-learn | Tableau | PowerBI | Git | AWS | Bash | Jupyter | Docker
- **Statistics:** Experimental Design | Hypothesis Testing | Bayesian Statistics | Quantitative Analysis
- **Machine Learning:** Deep Learning | Computer Vision | Natural Language Processing

Experience

Research Assistant, University of Rochester, Rochester, NY **Sep. 2019 – Present**

Modeling the effect of visual attention using Cascaded neural networks

- Designed a neural network architecture inspired by human visual attention, featuring a dual-network system where a primary network is guided by a secondary network to adapt flexibly to different tasks, achieving a 260.85% improvement in accuracy **[Python, Pytorch CUDA, Neural Network Design, Transfer Learning]**
- Integrated a pre-trained convolutional neural network into the system and trained it using cascaded error propagation on custom datasets, including modified Multi-MNIST **[Custom Dataset Training]**
- Developed visualizations of the model's learned weights and compared its behavior to human visual attention, enhancing insights into both human and machine perception **[Matplotlib, Explainable AI, Comparative Analysis (Human vs. AI), Performance Benchmarking]**

Investigating whether category or semantics boosts human visual memory

- Designed experiments to measure human visual memory, recorded participant responses over 30k trials, and collected and processed human behavioral data **[ETL pipeline, SQL, JavaScript, AWS, Amazon Mechanical Turk]**
- Utilized A/B testing to validate if groups with category information performed better, and visualize performance differences **[Pandas, SciPy]**
- Used mixed effect logistic regression model to fit data and identify if category is a significant factor for response correctness **[R, Mixed-effects Modeling]**
- Built Bayesian Generative models and ran simulations to compare with human behavior, found that using categorical information is an optimal decision, and validated that human behavior aligns with these optimal decisions **[Bayesian Generative Modeling, Simulation]**

Modeling natural language inference with deep learning models

- Built deep learning models, including LSTM, multi-layer perceptron, and RoBERTa embeddings in PyTorch, for sentence processing and inference prediction. Fitted isotonic regressions to calibrate models trained on diverse datasets **[NLP, Scikit-learn]**

Selected Publications

- **Hu, Ruoyang**, and Robert A. Jacobs. Semantic influence on visual working memory of object identity and location. Cognition (2021)
- **Hu, Ruoyang**, and Robert A. Jacobs. Does Stimulus Category Coherence Influence Visual Working Memory? A Rational Analysis. Cognitive Science (2024)