RUISEN TU

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EDUCATION

Bucknell University **August 2020 – July 2022**
Bachelor of Science in Computer Science GPA: 4.0/4.0 (Dean's List)

University of Illinois at Urbana-Champaign **August 2022 – May 2024**
Bachelor of Science in Computer Science GPA: 3.99/4.0 (Dean's List)

RESEARCH INTERESTS

My research interests lie in Computer Vision, Reinforcement Learning, and Machine Learning. I aim at building intelligent and trustworthy agents that can understand and interact with the world and learn from it.

RESEARCH EXPERIENCE

Gupta AI Lab, University of Illinois at Urbana-Champaign

Hand Pose Estimation in Egocentric Images in the Wild ***May 2023 – Present***

- Assisting in a project that addresses the challenges of a lack of 3D hand pose annotations for wild images and perspective distortion-induced shape ambiguity.
- Build tools using OpenCV package in Python to annotate hand key points.
- Collect **Epic-HandKps**, containing 2D hand key point annotations on 5K images from in-the-wild VISOR dataset to evaluate 2D projects of estimated 3D hand pose.
- Reach out to annotation services for hand key points annotation and image labeling on large scale.
- Model (**WildHands**) achieves the best scores for 3D hand pose on the ARCTIC leaderboard and outperforms the FrankMocap approach by 45.3% on the Epic-HandKps dataset.

Learning Hand-Held Object Reconstruction from In-The-Wild Videos ***September 2023 – Present***

- Assisting in a project that addresses the problem of reliance on direct 3D shape supervision in previous approaches for reconstructing hand-held objects from single images in real-world settings.
- Extract sequences from in-the-wild raw video that provide multi-view hand-object interaction.
- Produce instructions for data annotation through online tools based on Segment Anything Model and collaborate with lab members to mask hands and objects in extracted sequences.

Advanced Controls Research Laboratory, University of Illinois at Urbana-Champaign

Development of Gym-APSIM ***August 2023 – Present***

- Developing **gym-APSIM** based on the highly advanced and widely used *Agricultural Production Systems sIMulator (APSIM)*.
- Build modules that establish communications between simulation and python agent in collaboration with APSIM development team in Australia.
- Aim at wrapping the environment into an OpenAI gymnasium that can be used to train reinforcement learning agent on agricultural decision making.

Advanced Analytics Research Lab, Bucknell University

Getting Away with More Network Pruning: From Sparsity to Geometry and Linear Regions
February 2022 – July 2022

- Assisted in an NSF-funded project that explores how sparsity affects the geometry of the linear regions defined by a neural network, and consequently reduces the expected maximum number of linear regions based on the architecture.
- Proposed and implemented a method based on Mixed-Integer Linear Programming (MILP) for counting the number of linear regions on subspaces of arbitrary dimension.
- Collaborated with researchers to run experiments and regularly presented findings at team meetings, contributing to the strategic direction of the project.

PUBLICATIONS

- Aditya Prakash, **Ruisen Tu**, Matthew Chang, Saurabh Gupta (2023). Hand Pose Estimation in Egocentric Images in the Wild. Submitted to *CVPR 2024*, Under Review.
- Aditya Prakash, Matthew Chang, Matthew Jin, **Ruisen Tu**, Saurabh Gupta (2023). Learning Hand-Held Object Reconstruction from In-The-Wild Videos. Submitted to *CVPR 2024*, Under Review.
- Junyang Cai, Khai-Nguyen Nguyen, Nishant Shrestha, Aidan Good, **Ruisen Tu**, Xin Yu, Shandian Zhe, Thiago Serra (2022). Getting Away with More Network Pruning: From Sparsity to Geometry and Linear Regions. *CPAIOR 2023*, Accepted. Also presented at the *ICLR 2023 Workshop on Sparsity in Neural Networks*. [*Paper*]

PROJECT HIGHLIGHTS

Deep Generative Modeling for Learning Medical Image Statistics ***January 2023 – June 2023***

- Finetuned Style-Gan2-ADA to learn from unlabeled dataset containing 100,000 8-bit 512x512 medical images of coronal slices from anthropomorphic breast phantoms
- Accurately reproduce the training data distribution of morphological and intensity-derived statistical measures as well as breast-density relevant features, while still producing perceptually realistic images and avoiding overfitting/memorization of the training data.

WORK EXPERIENCE

Bucknell University

Teaching & Learning Center ***August 2021 – May 2022***

- **Math Tutor** - held 45-minute 1-on-1 tutoring sessions on Calculus I-III for students who have questions about their homework, quizzes, exams, or learning strategy.
- **Calculus Help Session TA** - lead 2-hour help session at school day nights where students can walk in and get help with their homework.
- **Study Group Facilitator** - facilitated 90-minute weekly study group for STEM (Science, Technology, Engineering and Mathematics) subjects in which students can discuss their homework, quizzes, and exams, or practice problems and tests assigned by facilitator.

Yanfei Technology Inc.

Data Analyst Intern ***December 2020 – January 2021***

- Developed C++ learning and practice website that was used by local elementary school for Computer Science education.
- Helped with data mining and cleaning, built web crawler to collect data and wrote monthly and annual summary report for local government based on information presented by data.

VOLUNTEER EXPERIENCE

Forest School

Volunteer ***January 2021 – February 2021***

- Designed toilet with my team that could be easily and cheaply manufactured to address sewage system challenges for people living in mountainous areas in Tibetan Autonomous Prefecture of Ganzi, China.
- Recorded videos and make documentary for this program

Huaihua Elementary School

Volunteer Teacher ***June 2018 – July 2018***

- Volunteer to teach elementary school students living in deep mountain knowledge that they had no opportunity to learn in school, share news, and bring modern technology to them to broaden their horizon