Yizirui Fang

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Education

Johns Hopkins University May. 2024
MSE in Computer Science, GPA: 3.9 *Baltimore, MD, USA*

Imperial College London Jul. 2019 - Aug. 2019
Machine Learning and Applied Statistics Program, 7.5 ECTS, 3.7/4.0 *London, UK*

University of Nottingham Jul. 2022
BSc in Computer Science with Honors, First Class, Top 5% *Nottingham, UK*

Research Interests

Trustworthy Machine Learning, Uncertainty Quantification, Embodied Assistance

Publication

- **Fang, Y.** & E. Nalisnick, (AISTATS Under Review), Learning to Defer with an Uncertain Rejector via Conformal Prediction, also Accepted in 2024 NeurIPS workshop onBayesian Decision-making and Uncertainty
- Ying, L., Liu, J. X., Aarya, S., **Fang, Y**., Tellex, S., Tenenbaum, J. B., & Shu, T. (ICRA Under Review) SIFToM: Robust Spoken Instruction Following through Theory of Mind. *arXiv preprint arXiv:2409.10849*, also Accepted in 2024 AAAI Symposium on Unifying Representations for Robot Application Development
- **Fang, Y.**, & Bellotti, A. (Under Review). Investigating Data Usage for Inductive Conformal Predictors. *arXiv preprint arXiv:2406.12262*

Research Experience

Social Cognitive AI Lab, Johns Hopkins Jan. 2024 - Present
Student Research Assistant, advised by Prof. Tianmin Shu, collaborated by Prof. Josh Tenenbaum *MD, US*

- Developed a LLM enhanced representation learning for a fusion of speech and visual representation data with **PyTorch** and **litgpt** to estimate the goal of human under unclear and ambiguous instructions
- Created GPU optical flow tracking pipeline with **Python** and **OpenCV** with object and motion path highlighting
- Surveyed multi-modal LLM for semantic learning and their representation fusion with **OpenAI API** and **LlaMA**
- Automated and distributed experiments over GPUs with **Slurm**, **Shell**, and **Docker** at **Linux HPC**

Learning to Defer with an Uncertain Rejector via Conformal Prediction Jan. 2024 - Present
Student Research Assistant, advised by Prof. Eric Nalisnick *MD, US*

- **AISTATS** under review, **NeurIPS workshop** on Bayesian Decision-making and Uncertainty accepted
- Proposed distribution-free framework uncertainty-based for learning to defer trustworthy human-AI collaboration
- Developed surrogate loss functions for wide ResNet, human simulators and data augmentation with **PyTorch**
- Proposed active learning pipeline with **uncertainty quantification** methods including batch ensemble, SNGP, MC-Dropout, and BNN for Wide ResNet on CIFAR-10/100 dataset using **TensorFlow** and **Python**
- Developed and automated experiments on CIFAR10 w/ corruption, human, Hate Speech, and Street View dataset
- Surveyed distribution shift on wide ResNet using **OpenCV** and visualized using **matplotlib** and **seaborn**

Investigation of Data Usage for Inductive Conformal Predictors May. 2021 - Jun. 2022
Research Assistant - First author journal article pending

- Proposed and demonstrated a data inducting algorithm to refine the machine learning uncertainty quantification with 54% upgrade in accuracy and 16% in efficiency with **Scikit Learn**, **seaborn**, and **TensorFlow**
- Proposed and proved with theoretical and empirical analysis the relationship among an uncertainty quantification algorithm, conformal predictor, three data sets and verified hypotheses with **Python**, **Scipy** and **Statsmodel**
- Surveyed neural networks architecture for cover type classification and assumption-free uncertainty quantification

Augmentation for Distribution Drift in Credit Scoring May. 2020 - Aug. 2021
Research Assistant

- Proposed data augmentation algorithms against distribution drift of credit scoring models, and improve the AUC of ML models from 0.73 to 0.85 with **LightGBM** and **PyTorch** under various economic factors
- Analysis and visualize experimental data statistically with **Pandas** and **matplotlib**
- Created large-scale databases for ∼2 bn financial time-series data points with **Spark** and **SQLAlchemy**

Development Experience

Full-stack Software Engineer Intern May. 2023 - Aug. 2023

League of Southeastern Credit Unions, Digital Operation Team *Remote, US*

- Delivered 2 web systems for 100+ credit unions using **TypeScript** and **Python**, attracting 10k users from 0 to 1
- Designed and developed for **RESTful API**s, middleware and data mutation including search, customizable dashboard and form with **Next.js**, **node.js** and **NextAuth**, customizable event triggers with **webhook**
- Engineered robust cache and real-time notification systems with **Redis** and **RabbitMQ** infra and designed TTL, cache eviction and polling policies, reduced fetch and search time by 32%, scaled to handle 50k tps
- DevOpsed with **Nginx**, **Docker**, **Jenkins**, **Shell** at **AWS** EC2, ECS and EKS, Tested with **Jest** in CI/CD

Technical Skills

Languages: Python, C/C++, C#, TypeScript, JavaScript, Java, SQL, Shell, OCaml, Haskell
Frameworks & Tools: PyTorch, TensorFlow, LightGBM, OpenCV, Slurm, Unity, PostgreSQL, Django, Docker