Haoming Yang

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EDUCATION

Duke University **Durham, North Carolina**

- ***PhD*** *in Electric and Computer Engineering* Expected Graduation: Spring 2027
- ***Master of Science*** *in Statistical Science* Graduation: Dec 2022

University of Illinois at Urbana-Champaign | Highest Honor **Urbana, Illinois**

- ***Bachelor of Science*** *in Engineering Physics &* ***Bachelor of Science*** *in Statistics* Graduation: May 2021

CURRENT RESEARCH

Mean-field Stochastic Differential Equation ***Advised by Prof. Vahid Tarokh***

- Studied complex **M**ckean-**V**lasov **S**tochastic **D**ifferential **E**quation (MV-SDE) through mean-field approximation. Leveraging the richer gradient flow, developed three deep learning architectures to estimate complex mean-field stochastic processes. (***Set to appear in AISTATS 2024***)
- Applying MV-SDE in machine learning application beyond parameter estimation such as parameter estimation, image diffusion generation, and trajectory predictions.
- Extending stochastic-partial differential equation connection to applications in deep learning. Offering new insights in generalizability of DL architectures to spurious correlation and out-of-distribution data through a PDE perspective.
- Theoretical analysis of stochastic differential equations and the related applications in machine learning. Deriving architecture optimization properties, convergence, and error bounds.

Interdisciplinary ML Applications in Insect Neuroscience ***Multi-domain Research Collaboration***

- Developed novel cross-subject transfer learning technique through Fisher-Restricted Boltzmann Machine for moth motor-program decoding. The Fisher-RBM improves the state-of-the-art by 300%. (***Under review***)
- Designing semi-interpretable machine learning framework through a novel spatial-temporal attention mechanism to analyze synchronized spiking activities in moth sensory system.
- Establishing Lexicographic machine learning architecture to connect moth's sensory and motor system, furthering the simulation of a fast and agile moth in an interactive environment.
- Analyzing insect free flight behavior and trajectories' connection with biological and environmental features.

Brain Connectome Inference with Deep Learning ***Advised by Prof. David Dunson***

- Design the **St**ructural **a**nd **F**unctional **G**raph **A**u**t**o-**E**ncoder (Staf-GATE), a latent graph based deep learning architecture for generating structural (physical neuron connections) and functional brain network (correlation of neuron activations) jointly. Achieved state-of-the-art result. Propose a perturbation-based interpretation algorithm to leverage Staf-GATE for interpretable inference. (***Under review***)

WORK EXPERIENCE

Tencent **Shenzhen, China**

Data Science Intern June 2020 - Sept. 2020

- Led the design and implementation of data analysis tool to capture product demographic similarity. Conducted multiple A/B tests and market analysis on behavioral data. Improved user stickiness by 30%.

UNDERGRADUATE RESEARCH

- **IRisk Lab, NLP Risk Management Group:** Developed Multiple Natural Language Processing Tools for Actuarial Science Application including an unsupervised natural language method to identify businesses' related industry. (***Appeared in the 56th Actuarial Research Conference***)
- **High Energy Physics Group:** Designed a Convolution Neural Network (CNN) to differentiate particle decays with similar single-sited event trajectory (Mainly Gamma rays and Double Beta Decay) using TensorFlow.

SKILLS

- **Coding Languages**: Proficient with Python, R, SQL; Familiar with C++, Java.
- **Techniques**: Familiar with Pytorch, Tensor-Flow, Sklearn, Pandas. Familiar with statistical/deep learning algorithm.
- **Languages**: Chinese (Native), English (Fluent), French (Intermediate)