Chuanyang Jin

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Education

New York University Sep 2020 – May 2024

B.A in Computer Science with Honors; B.A in Mathematics *GPA: 3.96*

- Relevant coursework: Deep Learning (Grad), Machine Learning (Grad), Computer Vision (Grad), Natural Language Processing (Grad), Algorithms (TA), Robot Intelligence, Object Oriented Programming, Operating Systems, Computer Systems, Statistics and Probability, Differential Equations, Numerical Analysis, Real Analysis

Research Experience

Diffusion Transformers Jan 2023 – present

Advisor: Prof. Saining Xie *New York*

- Speed up DiTs with architecture modifications, Flash Attention, torch compile, and AMP/bfloat16 support.
- Working on pre-trained networks for Diffusion Transformers.

Interpretable Machine Learning for Biological Processes Jan 2022 – present

Advisor: Prof. Oded Regev *New York*

- Present a neural network model that provides insights into RNA splicing.
- Use an "interpretable-by-design" approach, and achieve predictive accuracy on par with state-of-the-art models.
- Conduct extensive biological data analysis, trace and quantify the entire process from input to speckle enrichment prediction. The model reveals novel components of the splicing logic, which we experimentally validates.

Self-supervised Visual Place Recognition May 2022 – Oct 2022

Advisor: Prof. Chen Feng *New York*

- Inspired by noisy label learning, we propose a self-supervised VPR framework that uses both the temporal neighborhoods and the learnable feature neighborhoods to discover the unknown spatial neighborhoods.
- Incorporate an encoder-decoder network that performs scene completion for perspective images.
- Conduct experiments on simulated and real datasets, and outperform baselines in recall rate and robustness.
- Refactor the pipeline and combine nine branches for the lab's previous open-source VPR project.

Work / Project Experience

Software Development Intern June 2021 – Aug 2021

Chinasoft International Ltd. *Nanjing*

- Maintain and extend the functionalities of a company's personnel/financial data management web platform.
- Design, implement, and test tools using MySQL to enable administrators to operate on shared databases.
- Leverage Django web framework, JavaScript and HTML/CSS to create a user-friendly interactive interface.

Class Embeddings Enter Class-conditional Diffusions Models Sep 2022 – Dec 2022

- Explore new ways to embed class-specific information into diffusion models, by generating learnable mappings from class labels with Class Embedding Networks (CENs) and concatenating them into the reverse diffusion process.
- Propose potential classes of embedding patterns such as Uniform embedding, Pyramid embedding, and Bottleneck embedding. Compare their properties through experiments and discuss the trade-offs.

Parallel Command Processor Sep 2022 – Dec 2022

- Build a command interpreter that handles I/O redirection and pipe, and manages background/foreground process.
- Implement a thread pool using POSIX threading to parallelize provided tasks for improved performance.

Traffic Sign Recognition Sep 2022 – Oct 2022

- Build a model that comprises Spatial Transformers and CNN layers to recognize traffic signs. Improve performance through data augmentaion, ensemble learning, etc. Ranked 7^{th}/114 in the graduate-level computer vision course.

Self-supervised Object Detection April 2022 – May 2022

- Perform Masked Autoencoder (MAE) pre-training on a Vision Transformer (ViT) model using 512K unlabeled images. Fine-tune the backbone with 3K labeled images for the task of object detection, where a feature pyramid network from ViTDet and a Faster R-CNN detection head are adopted as the predictor.

Graph Visualization of Matrices March 2022 – May 2022

- Develop a novel shift method to speed up the convergence of power iterations for computing tensor eigenpairs.
- Implement dimension reduction with power iterations, propose a *graph Laplacian*, and use them to design a toolbox for graph visualization of matrices. Apply this toolbox to uncover structures in complex real-world relations.

Gene Mutation Detection Platform May 2019 – Aug 2021

- Propose a mutation detection algorithm based on computational geometry and parameterized by deep learning.
- Launch an online platform adopted by three hospitals to reduce diagnosis periods and receive a $10k reward.

Honors/Awards

- Finalist & MAA Award & COMAP Scholarship (Top 4/27205), Interdisciplinary Contest in Modeling 2022
- Champion (Top 1/51) of Tsinghua X-lab AI Hackathon 2021
- Distinguished Honor Roll (Top 1%) in AMC12 & USAMO qualifier 2020
- National Bronze Award (Top 3/500), Shing-Tung Yau High School Computer Science Award 2019
- Finalist (Top 8/3790) of FIRST Robotics Competition World Championship 2019
- Champion of International Regions Math League 2018

Services/Activities

- Teaching Assistant of CSCI-UA 310 Basic Algorithms (Fall 2022)
- Executive board member of NYU Mathematics Society (2021 – Present)
- Director of Environmental Sustainability Committee at NYU Shanghai (2020 – 2021)
- Influential writer on Zhihu Q&A forum with 26K followers and 14,000K total reads

Skills

- Language: Python, C++, C, Java, JavaScript, Matlab, Julia, SQL, R, Octave, Linux, Git
- Framework: PyTorch, TensorFlow, Scikit-Learn, JAX, Transformers, OpenCV, OpenMP