

Yanna Ding

Portfolio: <https://dingyanna.github.io>

Work Authorization: U.S. Permanent Resident

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Education

- ▷ Rensselaer Polytechnic Institute (RPI) Spring 2022 - Current
Ph.D. program in Computer Science GPA: 4.0/4.0
Expected Graduation: June 2025
- ▷ University of Toronto (UofT) 2017 - 2021
Honours Bachelor of Science in Computer Science and Mathematics GPA: 3.92/4.0

Work Experience

- ▷ Samsung Research America, Research Engineer Intern Fall 2025 (Upcoming)
- ▷ IBM, Research Extern Summer 2024, 2025
- ▷ RPI, Research Assistant Spring 2022 - Current

Selected Publications

- ▷ Epigraph Based Multilevel Optimization (EMO) For Enhancing Chain Of Thought Reasoning Capabilities
Lu S., Ding Y., Horesh L., Gao J, Magdon-Ismail M. ICASSP'25 (acceptance rate ~48%)
- ▷ Architecture-Aware Learning Curve Extrapolation via Graph Ordinary Differential Equation
Ding Y., Huang Z., Shou X., Guo Y., Sun Y., Gao J. AAAI'25 (acceptance rate 23.4%)
- ▷ Inferring from Logits: Exploring Best Practices for Decoding-Free Generative Candidate Selection
Ma M.*, Ding Y.*, Huang Z., Gao J., Sun Y., Wang W. ACL'25 (acceptance rate ~22%)
* (Equal contribution)
- ▷ Efficient Parameter Inference in Networked Dynamical Systems via Steady States: A Surrogate Objective Function Approach Integrating Mean-field and Nonlinear Least Squares
Ding Y., Gao J., Magdon-Ismail M. Phys. Rev. E'24 (acceptance rate 20-30%)
- ▷ Learning Network Dynamics via Noisy Steady States
Ding Y., Gao J., Magdon-Ismail M. ASONAM'23 (acceptance rate 36.5%)

Selected Projects

- ▷ TRANSFORMER EXPRESSIVITY FOR DYNAMIC SEQUENCE LEARNING IBM, Research Extern (Summer 2025)
 - Established theoretical framework proving multi-layer Transformers can learn Markov chains with regime shifts through systematic attention construction
 - Designed bi-level probabilistic language model with discourse and token dependencies, validated empirical transition probabilities on natural language datasets support bi-level modeling assumptions
 - Achieved ~90% accuracy in next-token prediction for regime-shift sequences using disentangled Transformer with multi-layer attention
 - * *Related Skills: Theoretical Machine Learning, Sequence Modeling, Probabilistic Methods*
- ▷ DYNAMICS OF LANGUAGE MODEL TRAINING SYSTEMS IBM, Research Extern (Summer 2024)
 - Developed a theoretical framework to understand the mechanism of in-context learning for Markovian data
 - Discovered a novel interpretation of Transformers in in-context learning for Markov chains
 - Implemented a multilevel optimization framework to enhance chain-of-thought reasoning capabilities, achieving up to a 40% reduction in out-of-distribution errors compared to traditional training strategies
 - * *Related Skills: LLM Reasoning, Learning Theory, Multilevel Optimization*
- ▷ ARCHITECTURE-AWARE LEARNING CURVE EXTRAPOLATION UCLA, Visiting Student (Spring 2024)
 - Developed a novel architecture-aware neural differential equation model to predict learning curve trajectories

- Achieved a 20x speedup in model selection with an up to 59.63% improvement in extrapolation accuracy compared to existing methods
- * *Related Skills: Neural Differential Equations, Graph Neural Networks, Neural Architecture Search (NAS)*
- ▷ DECODING-FREE CANDIDATE SELECTION UCLA, Visiting Student (Spring 2024)
 - Introduced and evaluated novel decoding-free methods for generative candidate selection
 - Analyzed diverse datasets from QA tasks and clinical decision-making scenarios with up to 94k candidates
 - Achieved up to a 29.25-point improvement in recall for lab test orders compared to full decoding methods, while reducing runtime by up to 145x on selected tasks.
 - * *Related Skills: Language Model Inference, Generative Candidate Selection*
- ▷ REVERSE ENGINEERING NETWORKED DYNAMICAL SYSTEMS RPI, Research Assistant (Spring 2022)
 - Developed a surrogate objective function to infer parameters from noisy steady-state data
 - Achieved up to a 300x speed-up in runtime compared to baseline methods
 - * *Related Skills: Differential Equations, Network Dynamics, Optimization, Mean-field Approach*

Honours and Awards

- ▷ Selected as a graduation spotlight student UofT, Spring 2021
- ▷ Dean's List Scholar, Faculty of Arts and Science UofT, 2018 - 2021
- ▷ Mitacs Research Training Award UofT, Fall 2020
- ▷ Department of Computer Science, Undergraduate Research Award UofT, Summer 2020
- ▷ The Chancellor's Scholarship for high academic achievement St. Hilda's Fund, 2019-2020
- ▷ Admission Scholarships UofT, Fall 2017

Service

- ▷ Reviewer for ICML 2022, KDD 2024, COLM 2025

Skills

- ▷ Programming Languages: Python, \LaTeX C/C++, MATLAB, Java, JavaScript, and Markdown
- ▷ Libraries: Pytorch, Weights & Biases, Scikit-learn, Pandas, NumPy, SciPy, NetworkX, Git, MongoDB