HAONAN DUAN

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EDUCATION

PhD in Computer Science

University of Toronto

Sept 2021 – June 2025 (expected)

Research supervisor: Chris Maddison and Nicolas Papernot

MMath and BMath in Computer science

University of Waterloo

Sept 2016 – June 2021

Grade: 93 / 100
Research Supervisor: Pascal Poupart

EXPERIENCES

Doctoral Research Assistant

University of Toronto

Sept 2021 - Ongoing Toronto

- Led multiple research projects with publications in top machine learning venues such as NeurIPS and ICML. Highlighted projects include:
  - Rep4CO: Designed self-supervised learning algorithms for combinatorial optimization, improving label efficiency by 99%.
  - PromptPATE: Pioneered the first differential privacy algorithm for prompting large language models, offering privacy guarantee of the user data.
  - PAIR: Improved training of protein language models with human annotations, increasing the accuracy by 10% averaged across various protein function tasks.

Software Engineer Intern

Uber

Jan 2021 - May 2021 San Francisco (Remote)

- Built classification models in PyTorch to improve the recall of the ranking algorithms in Uber search by 20%.
- Integrated the trained models into Uber's engineering framework and conducted A/B testing on users' satisfaction on the new model.

Data scientist Intern

Thomson Reuters

May 2020 - Aug 2020 Toronto

- Developed PyTorch-based text classification models for automated approval or rejection of law firm bills, achieving 90% accuracy compared to human expert performance.
- Designed and implemented a named entity recognition model to extract key information from legal cases.
- Leveraged AWS framework and machine learning services, including S3 and SageMaker, for efficient model deployment

RESEARCH INTERESTS

Large Language Models | AI for science | Discrete Reasoning | Trustworthy ML

PAPERS

- S. Arlt, **H. Duan**, F. Li, S. M. Xie, Y. Wu, and M. Krenn, "Meta-designing quantum experiments with language models," *In submission*, 2024.
- **H. Duan**, M. Skreta, L. Cotta, *et al.*, "Boosting the predictive power of protein representations with a corpus of text annotations," *In submission*, 2024.
- **H. Duan**, A. Dziedzic, N. Papernot, and F. Boenisch, "Flocks of stochastic parrots: Differentially private prompt learning for large language models," *NeurIPS*, 2023.
- **H. Duan**, A. Dziedzic, M. Yaghini, N. Papernot, and F. Boenisch, "On the privacy risk of in-context learning," *ACL*, 2023.
- **H. Duan**, P. Vaezipoor, M. B. Paulus, Y. Ruan, and C. Maddison, "Augment with care: Contrastive learning for combinatorial problems," *ICML*, 2022.
- A. Dziedzic, **H. Duan**, M. A. Kaleem, *et al.*, "Dataset inference for self-supervised models," *NeurIPS*, 2022.
- Y. Luo, G. Liu, **H. Duan**, O. Schulte, and P. Poupart, "Distributional reinforcement learning with monotonic splines," *ICLR*, 2022.
- **H. Duan**, S. Nejati, G. Trimponias, P. Poupart, and V. Ganesh, "Online bayesian moment matching based sat solver heuristics," *ICML*, 2020.
- **H. Duan**, A. Rashwan, P. Poupart, and Z. Chen, "Discriminative training of feed-forward and recurrent sum-product networks by extended baum-welch," *International Journal of Approximate Reasoning*, 2020.

SERVICES

Reviewer: NeurIPS, ICML and ICLR (2021-2024), AAAI (2023), JMLR (2024)

Teaching assistant:

- CSC 311: Intro to ML (3 terms)
- CSC 412: Probabilistic Learning and Reasoning (2 terms)
- CSC 413: Neural Networks and Deep Learning (2 terms)