# Nathan Ng

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https://nng555.github.io

## Research Interests

My general research interest is in developing methods to learn efficient and robust representations of discrete-valued sequence data (specifically natural language). I'm also interested in understanding and finding ways to fix their pathologies once trained. My research broadly covers topics in representation learning, interpretability, and out-of-domain robustness/generalization.

## Education

**Massachusetts Institute of Technology** — Cambridge, MA
Visiting Scholar — *Sept 2021 – June 2024*
Advisor: Prof. Marzyeh Ghassemi

**University of Toronto** — Toronto, Ontario
Ph.D. Machine Learning — *Sept 2019 – June 2024*
Advisor: Prof. Marzyeh Ghassemi

**University of California San Diego** — San Diego, California
BS Computer Science (Summa Cum Laude) — *Sep 2014 – Jun 2018*
Advisor: Prof. Zachary Lipton and Prof. Julian McAuley

## Professional Experience

**Prescient Design** — New York, New York
Research Intern (Kyunghyun Cho) — *Summer 2022*
*Blind Biological Sequence Denoising with Self-Supervised Set Learning*

**Meta** — New York, New York (Virtual)
Research Intern (Naman Goyal) — *Summer 2021*
*Growing Switch Transformers for Multilinguality*

**Google** — Mountain View, California (Virtual)
Research Intern (Qi Guo) — *Summer 2020*
*Improving Dialogue Breakdown Detection with Semi-Supervised Learning*

**Meta (Full Time)** — Menlo Park, California
Research Engineer (Michael Auli) — *Sep 2018 – Sep 2019*

**Meta** — Menlo Park, California
Software Engineering Intern — *Summer 2016 / Summer 2017*

**Qualcomm** — San Diego, California
Software Engineering Intern — *Summer 2015*

## Refereed Publications

1. **N. Ng**, J. W. Park, J. H. Lee, R. Kelly, S. Ra, and K. Cho. "Blind Biological Sequence Denoising with Self-Supervised Set Learning". In: *TMLR*. 2024.
2. **N. Ng**, N. Hulkund, K. Cho, and M. Ghassemi. "Predicting Out-of-Domain Generalization with Neighborhood Invariance". In: *TMLR*. 2023.
3. J. Bae, **N. Ng**, A. Lo, M. Ghassemi, and R. Grosse. "If Influence Functions are the Question, What is the Answer?" In: *Proc. of NeurIPS*. 2022.
4. **N. Ng**, K. Cho, and M. Ghassemi. "SSMBA: Self-Supervised Manifold Based Data Augmentation for Improving Out-of-Domain Robustness". In: *Proc. of EMNLP*. 2020.
5. T. Lau, **N. Ng**, J. Gingold, N. Desai, J. McAuley, and Z. C. Lipton. "Embryo staging with weakly-supervised region selection and dynamically-decoded predictions". In: *Proc. of Machine Learning for Healthcare*. 2019.

6. **N. Ng**, K. Yee, A. Baevski, M. Ott, M. Auli, and S. Edunov. "Facebook FAIR's WMT19 News Translation Task Submission". In: *Proc. of WMT*. 2019.

7. K. Yee, **N. Ng**, Y. Dauphin, and M. Auli. "Simple and Effective Noisy Channel Modeling for Neural Machine Translation". In: *Proc. of EMNLP*. 2019.

8. **N. Ng**, R. Gabriel, J. McAuley, C. Elkan, and Z. Lipton. "Predicting surgery duration with neural heteroscedastic regression". In: *Proc. of Machine Learning for Healthcare*. 2017.

## Preprints (In Review)

1. **N. Ng**, R. Grosse, and M. Ghassemi. *Measuring Stochastic Data Complexity with Boltzmann Influence Functions*. 2024.

2. K. O'Brien, **N. Ng**, I. Puri, J. Mendez, H. Palangi, Y. Kim, M. Ghassemi, and T. Hartvigsen. *Improving Black-box Robustness with In-Context Rewriting*. 2024.

## Workshop Publications

1. **N. Ng**, N. Thangarajan, J. Pan, M. Ghassemi, and Q. Guo. "Improving Dialogue Breakdown Detection with Semi-Supervised Learning". In: *Proc. of Workshop on Human in the Loop Dialogue Systems at NeurIPS*. 2020. Oral.

2. M. Ott, S. Edunov, A. Baevski, A. Fan, S. Gross, **N. Ng**, D. Grangier, and M. Auli. "fairseq: A fast, extensible toolkit for sequence modeling". In: *Proc. of NAACL-HLT: Demonstrations*. 2019.

3. **N. Ng**, J. McAuley, Z. Lipton, and N. Desai. "Predicting Embryo Morphokinetics in Videos with Late Fusion Nets & Dynamic Decoders". In: *Proc. of ICLR Workshops*. 2018.

## Professional Activities

**Chief Organizer**

Workshop on Robustness in Sequence Modeling at NeurIPS *2022*

**Reviewer**

ICML *2024*
NeurIPS *2023*
ICLR *2023*
NeurIPS *2022*
Machine Learning for Healthcare *2020*

## Shared Tasks

**1st** in Dialogue Breakdown Detection Challenge English task *2020*
**1st** in WMT News Translation English ↔ German task *2019*
**1st** in WMT News Translation English ↔ Russian task *2019*

## Honors and Awards

- OpenAI Preparedness Challenge Winner *2024*
- Jacobs Scholarship, University of California San Diego *2014*
- Regents Scholarship, University of California San Diego *2014*

## Teaching and Talks

**University of Toronto** Teaching Assistant

CSC 2515: Introduction to Machine Learning (Graduate Level) *Fall 2020*
CSC 2541: Topics in Machine Learning: Machine Learning for Health *Winter 2020*
CSC 311: Introduction to Machine Learning *Fall 2019*

**Meta** Internal Lecturer

Special Topics in Deep Learning: NLP and Translation *Feb 2019, Sep 2019*

**University of California, San Diego** Teaching Assistant

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|---|---|
| CSE 101: Design and Analysis of Algorithms | *Winter 2018* |
| CSE 158: Web Mining and Recommender Systems | *Fall 2017* |
| CSE 21: Mathematics for Algorithms and Systems | *Winter 2017* |
| CSE 11: Introduction to Object-Oriented Programming | *Fall 2015* |