Natalie Dullerud

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Education

M.Sc. in Computer Science 2020-2022
University of Toronto, Toronto, ON, Canada
Supervisors: Dr. Marzyeh Ghassemi, Dr. Nicolas Papernot
Overall GPA: 3.93/4.00

B.S. in Mathematics, Minors in Computer Science, Chemistry 2016-2020
University of Southern California, Los Angeles, CA, USA
Overall GPA: 3.76/4.00

Experience

Graduate Machine Learning Summer Intern 2021
Algorithms Group, Microsoft Research, Redmond, WA, USA
Supervisor: Dr. Sergey Yekhanin

- Experimental development for differentially private methods in deep learning
- Leveraged dimensionality reduction in gradient space to reduce privacy-utility trade-offs introduced by DP-SGD in deep learning

Graduate Student Researcher (Machine Learning) 2020-present
Vector Institute for Artificial Intelligence, Toronto, ON, Canada

Computational Immunology (Machine Learning) Research Intern 2019-2020
City of Hope Cancer Research Center, Duarte, CA, USA & Caltech, Pasadena, CA, USA
Supervisor: Dr. Vanessa Jonsson

- Developed computational pipeline for constraining and optimizing over viral antibody design space
- Designed dynamical systems model for modeling cellular immunotherapy treatment and presented solution for optimal immunotherapy scheduling to address solid tumor heterogeneity
- Analyzed single-cell RNA sequencing time series data using machine learning methods to assess immunological response in patients undergoing clinical trials for immunotherapy

Computational Biology (Machine Learning) Research Intern 2018-2020
University of Southern California Department of Computational Biology, Los Angeles, CA, USA
Supervisor: Dr. Liang Chen

- Combined graph theory and probabilistic techniques in order to develop method for identification of sub-populations of human and murine cells from single-cell RNA sequencing data

Bioinformatics Research Intern 2017-2018
University of Southern California Keck School of Medicine, Los Angeles, CA, USA
Supervisor: Dr. Paul Thomas

- Integration of multiple protein databases; large-scale sorting, classification and phylogenetic analysis of transcription factor data

Honors

Junior Fellow 2020-2021
Massey College, University of Toronto, Toronto, ON, Canada

Presidential Scholar 2016-2020
University of Southern California, Los Angeles, CA, USA

National Merit Scholar 2016-2020
University of Southern California, Los Angeles, CA, USA

Team Honorable Mention 2015
National Toshiba Exploravision Technology Competition, USA

Publications

Dullerud, N., Roth, K., Hamidieh, K., Papernot, N., Ghassemi, M. (2022). Is Fairness Only Metric Deep? Evaluating and Addressing Subgroup Gaps in Deep Metric Learning. *Proceedings of the 10th International Conference on Learning Representations*.

** Banerjee, I., Bhimireddy, A. R., Burns, J. L., Celi, L. A., Chen, L., Correa, R., **Dullerud, N.**, Ghassemi, M., Gichoya, J.W., Huang, S., Kuo, P., Lungren, M. P., Price, B. J., Purkayastha, S., Pyrros, A. A., Oakden-Rayner, L., Okechukwu, C., Seyyed-Kalantari, L., Trivedi, H., Wang, R., Zaiman, Z., Zhang, H. (2022). Reading Race: AI Recognizes Patient's Racial Identity In Medical Images. *The Lancet Digital Health*.

Zhang, H., **Dullerud, N.**, Seyyed-Kalantari, L., Morris, Q., Joshi, S., Ghassemi, M. (2021). An Empirical Framework for Domain Generalization in Clinical Settings. *Proceedings of the 2nd ACM Conference on Health, Inference, and Learning*.

Jia, H.*, Yaghini, M.*, Choquette-Choo, C.A.†, **Dullerud, N.**†, Thudi, A.†, Chandrasekaran, V., Papernot, N. (2021). Proof-of-Learning: Definitions and Practice. *Proceedings of the 42nd IEEE Symposium on Security and Privacy*.

Cheng, V., Suriyakumar, V., **Dullerud, N.**, Joshi, S., Ghassemi, M. (2021). Can You Fake It Until You Make It?: Impacts of Differentially Private Synthetic Data on Downstream Classification Fairness. *Proceedings of the 4th ACM Fairness, Accountability, and Transparency Conference*.

Choquette-Choo, C.A.*, **Dullerud, N.***, Dziedzic, A.*, Zhang, Y.*, Jha, S., Wang, X., Papernot, N. (2021). CaPC Learning: Confidential and Private Collaborative Learning. *Proceedings of the 9th International Conference on Learning Representations*.

Dullerud, N., Freedman-Susskind, T., Gnanapragasam, P., Snow, C., West, A.P., and Jonsson, V.D. (2020). Feature selection and combinatorial optimization on fitness landscapes to constrain anti-SARS-CoV2 antibody design and address viral escape. *Proceedings of Learning Meaningful Representations of Life (LMRL) Workshop at the 34th Conference on Neural Information Processing Systems.*

Dullerud, N., Jonsson, V.D. (2020). Cellular Immunotherapy Treatment Scheduling to Address Antigen Escape. *Proceedings of the 59th IEEE Conference on Decision and Control.*

Jonsson, V.D., Ng, R., **Dullerud, N.**, Wong, R.A., Hibbard, J., Wang, D., Aguilar, B., Starr, R., Weng, L., Alizadeh, D., Forman, S., Badie, B., Brown, C.E. (2022). CAR T cell therapy drives endogenous locoregional T cell dynamics in a responding patient in glioblastoma. [In Review *Nature Medicine* 2022]

*,† Equal contribution, authors listed alphabetically
** All authors listed alphabetically

Invited Presentations

CaPC—Confidential and Private Collaborative Learning, *AI Superstream Series: Securing AI, O'Reilly Media Sponsored by Intel*, Virtual, 2021

Proof of Learning: Definitions and Practice, *Endless Summer School Seminar: AI Model Governance, Vector Institute*, Toronto, ON, Canada, 2021

Reading Race: AI Recognises Patient's Racial Identity In Medical Images, *Workshop Seminar, Ethical Principles of AI Club, Engineering Society*, *University of Toronto*, Toronto, ON, Canada, 2021

Computer Languages / Skills

Programming Languages	Python, Java, C/C++, R, MATLAB, Swift
Web Development/Database Languages	HTML/CSS, SQL, Firebase, RealmSwift
ML Packages	Pytorch, Tensorflow, Keras, sklearn, JAX

Mentoring Experience

Undergraduate Research Mentor 2021
University of Toronto, Toronto, ON, Canada
Mentee: Aditi Misra; Co-mentor: Dr. Nicolas Papernot

Undergraduate Research Mentor 2021
University of Toronto, Toronto, ON, Canada
Mentee: Sierra Wyllie; Co-mentor: Dr. Nicolas Papernot

Summer Undergraduate Research Fund (SURF) Mentor 2020
California Institute of Technology, Pasadena, CA, USA
Mentee: Tea Freedman-Susskind; Co-mentor: Dr. Vanessa Jonsson

Teaching Experience

Enriched Theory of Computation (CSC240) Teaching Assistant 2021
University of Toronto, Toronto, ON, Canada
Supervisor: Dr. Faith Ellen

Theory of Computation (CSC236) Teaching Assistant 2020
University of Toronto, Toronto, ON, Canada
Supervisors: Dr. Francois Pitt, Dr. Bahar Aameri

Mathematics Center Tutor Assistant 2018-2020
University of Southern California, Los Angeles, CA, USA
Supervisors: Chaunte Williams, Dr. Cymra Haskell

Reviewer Experience

Reviewer for *Conference on Health, Inference and Learning 2022* 2022
External Reviewer for *International Conference on Machine Learning 2021* 2021
External Reviewer (First Round) for *IEEE Symposium on Security and Privacy 2021* 2021
External Reviewer (Second Round) for *IEEE Symposium on Security and Privacy 2021* 2021