KYLE SWANSON

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EDUCATION

Stanford University, Stanford, CA
- PhD in Computer Science *September 2021–Present*

Imperial College London, London, United Kingdom
- MSc in Applied Biosciences and Biotechnology *October 2021*

University of Cambridge (Trinity College), Cambridge, United Kingdom
- MASt in Mathematical Statistics (Part III of the Mathematical Tripos) *July 2020*

Massachusetts Institute of Technology, Cambridge, MA
- MEng in Computer Science and Engineering, advised by Regina Barzilay *June 2019*
- BS in Computer Science and Engineering (Course 6-3) and Mathematics (Course 18) *June 2018*

RESEARCH/WORK EXPERIENCE

Scholarships and Honors: Marshall Scholarship, Phi Beta Kappa (PBK), Tau Beta Pi (TBP), Eta Kappa Nu (HKN)
Programming Skills: Python, PyTorch, scikit-learn, HTML, CSS, JavaScript

MIT CSAIL – Graduate Researcher in Machine Learning, Cambridge, MA *September 2018–Present*
- Working with Regina Barzilay in MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL) to develop message passing neural networks to improve molecular property prediction
- Developed and benchmarked Chemprop (https://github.com/chemprop/chemprop), a new message passing neural network, on 19 public and 16 proprietary property prediction datasets in collaboration with Amgen, BASF, and Novartis [5]
- Tested a wide variety of uncertainty quantification methods to estimate the uncertainty of Chemprop's predictions [2]
- Developed a new technique for enhancing the quality and diversity of the output of molecular generation models [3]
- Collaborated with the Broad Institute of MIT and Harvard to discover new antibiotic candidates using Chemprop [1]

ASAPP, Inc. – Machine Learning Research Intern, New York, NY *Summer 2018 and Summer 2019*
- Investigated using optimal transport to increase the interpretability of neural models for natural language processing [4]
- Designed a retrieval-based chatbot with a 56% improvement in performance over ASAPP's previous model [6]
- Implemented the new chatbot in ASAPP's production system, handling thousands of customer support issues every day

MIT CSAIL and MGH – Undergraduate Researcher in Machine Learning, Cambridge/Boston, MA *September 2016–June 2018*
- Collaborated with Regina Barzilay at MIT CSAIL and Constance Lehman at Massachusetts General Hospital (MGH) to use convolutional neural networks to improve breast cancer risk prediction in mammography
- Designed a neural network model capable of assessing breast density—an important risk factor for breast cancer—with accuracy on par with expert radiologists and implemented it in the clinic at MGH [7]

Suleyman Demirel University – Machine Learning Teacher, Almaty, Kazakhstan *January 2018*
- Developed and taught a one-month machine learning course to 20 undergraduates: https://github.com/swansonk14/IntroML

Driver, Inc. – Data Science Intern, San Francisco, CA *Summer 2017*
- Developed an algorithm to accurately detect near-duplicate content in cancer patients' medical records

Microsoft Corporation – Front-end Software Engineering Intern, Bellevue, WA *Summer 2016*
- Improved the performance and aesthetic of an internal web tool used to view application events in near real-time

PUBLICATIONS

[1] J. Stokes, K. Yang, **K. Swanson**, *et al*. A Deep Learning Approach to Antibiotic Discovery. *Cell*, 2020.
[2] L. Hirschfeld, **K. Swanson**, K. Yang, R. Barzilay, and C. Coley. Uncertainty Quantification Using Neural Networks for Molecular Property Prediction. *Journal of Chemical Information and Modeling*, 2020.
[3] K. Yang, W. Jin, **K. Swanson**, R. Barzilay, and T. Jaakkola. Improving Molecular Design by Stochastic Iterative Target Augmentation. *Proceedings of the 37th International Conference on Machine Learning*, 2020.
[4] **K. Swanson**, L. Yu, and T. Lei. Rationalizing Text Matching: Learning Sparse Alignments via Optimal Transport. *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics*, 2020.
[5] K. Yang, **K. Swanson**, W. Jin, *et al*. Analyzing Learned Molecular Representations for Property Prediction. *Journal of Chemical Information and Modeling*, 2019.
[6] **K. Swanson**, L. Yu, C. Fox, J. Wohlwend, T. Lei. Building a Production Model for Retrieval-Based Chatbots. *Workshop on NLP for Conversational AI at the 57th Annual Meeting of the Association for Computational Linguistics*, 2019.
[7] C. Lehman, A. Yala, T. Schuster, B. Dontchos, M. Bahl, **K. Swanson**, and R. Barzilay. Mammographic Breast Density Assessment Using Deep Learning: Clinical Implementation. *Radiology*, 2018.