Nicole Elyse Mitchell

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Education

Rice University, George R. Brown School of Engineering • Houston, TX — BS Dec 2018, MS May 2020

MS, Computer Science; GPA: 3.67/4.00
Advisor: Dr. Lydia Kavraki
Research Focus: Machine Learning on Graph-Structured Data
Relevant Coursework: Statistical Machine Learning, Artificial Intelligence, Research Communications

BS, Computer Science; GPA: 3.79/4.00
Capstone: Design
Relevant Coursework: Algorithms, Data Science, Probability & Statistics, Product Design, Prototyping & Fabrication, Human Factors

Awards

2019 Adobe Research Women in Technology Scholarship
2019 Rice Computer Science Graduate Research Fellowship
2019 Conference USA Commissioner's Academic Medal
2019 Rice University Honor Athlete – *all years*
2018 President's Honor Roll – *all years*
2018 CRA-W Grace Hopper Celebration Research Scholar
2017 Elizabeth D. Williams Scholarship for Study Abroad
2017 Rice Undergraduate Business Pitch Competition, First

Research Experience

Kavraki Computational Robotics, AI and Biomedicine Lab • Rice University Computer Science Dept. — January 2018 – Present

Graduate Research
- Built a deep graph convolutional network (GCN) using Keras to predict drug metabolism. Proposed the use molecular representations learned through GCNs to identify metabolically labile atoms. Compared to traditional feature extraction methods.

Undergraduate Research
- Improved an incremental docking protocol (DINC) which computationally predicts how peptides bind to protein receptors. Experimented to identify unexpected behavior; strengthened the robustness of DINC by handling these edge cases.
- Evaluated the latest version of DINC by designing re-docking experiments and writing scripts to automate these tests on the XSEDE Comet Supercomputer. Results published in Devaurs et al, 2019.

Statistical Machine Learning Term Project • Rice University Computer Science Dept. — January 2019 – May 2019
- Constructed U-Net model in Keras to identify roads in unlabeled satellite images; trained model on ~11,000 images and their corresponding road masks using an Ubuntu Deep Learning AMI instance on AWS
- Performed hyper-parameter tuning and experimented with architectures, loss functions, ensembling, and pre- and post-processing to achieve a 9.9% improvement in pixel agreement between predicted and actual masks segmenting the roads from test images

Internships

Apple • iCloud Storage Analytics, Software Engineering Intern — May 2018 – August 2018
- Built a data pipeline to query server logs and gather time-series metrics on our services
- Wrote a Spark job in Scala to process and aggregate raw data, storing the results in binary large object (BLOB) storage
- Developed and implemented an anomaly detection system in Python using Pandas, SciPy and Matplotlib to automatically detect regressions in quality of service among subsets of our network and generate reports to alert iCloud engineers. Deployed this system, which surfaces one to two critical issues each day that otherwise went unnoticed.
- Presented work to ~30 engineers at iCloud and individually to the Vice President of iCloud

Square • Appointments iOS, Software Engineering Intern — May 2017 – August 2017
- Optimized the calendar in Square Appointments iOS app by identifying performance bottlenecks and improving the search algorithm. Made a 16-fold improvement in CPU time spent rendering events and UI features that restored calendar to 60 fps scrolling.
- Added a feature to notify users when their time zone differs from that of the business they are viewing
- Developed a customized market insights tool for merchants to compare their prices to those of nearby sellers. The tool grouped similar transactions using the "word2vec" ML model. Built a Python Flask app with D3 Visualization to display interactive reports.

Facebook • FBU, Software Engineering Intern June 2016 – August 2016

- Developed an iOS mobile app in Swift that helps users remember the people they've met by using location tracking to auto-log events

Activities & Interests

Baker Institute for Public Policy • Developing Civic Scientist Leaders Program January 2020 – Present

- One of ten graduate students selected to participate in a weekly seminar to learn about the federal policymaking process and develop critical leadership skills to advance science as a public good
- Published an op-ed on a public policy issue; created one-pagers advocating for funding basic scientific research to use in our upcoming congressional visits in Washington, D.C.

Rice University Women's Track & Field • Varsity Athlete, Tutor for Athletic Academic Advising August 2015 – May 2020

- Dedicated 20 hours per week training and competing for Rice University's NCAA Division I Track & Field Team
- Tutored female student-athletes in computer science courses to instill confidence in their ability to succeed in STEM fields

Women in Computer Science • Mentor, Club Member January 2016 – May 2020

- Advised underclassmen interested in computer science on course selection, internships, and study abroad
- Planned and participated on a panel about study abroad for computer science majors

Design for America • Team Lead, Studio Member January 2016 – May 2018

- Led an interdisciplinary team of six to design a prosthetic that allows users without fingers to write using a pen or pencil
- Developed a modular toy to teach kids Boolean logic; worked on the mechanical design, fabrication, and accompanying iOS app. Won the 2017 Rice Undergraduate Business Pitch Competition for this project.

Publications

Thesis

2020 **N. Mitchell**, "Machine Learning-Based Prediction of Sites of Metabolism in Drugs: Exploring Feature Extraction Methods on Molecular Graphs," Master's Thesis, Rice University, April 2020. link

Journal Articles

2019 D. Devaurs, D. A. Antunes, S. Hall-Swan, **N. Mitchell**, M. Moll, G. Lizée, and L. E. Kavraki, "Using parallelized incremental meta-docking can solve the conformational sampling issue when docking large ligands to proteins," *BMC Molecular and Cell Biology*, vol. 20, no. 1, p. 42, September 2019. link

Posters

2019 E. Litsa, **N. Mitchell**, and L. E. Kavraki, "Applying Graph Convolutional Neural Networks for Drug Metabolism Prediction." Presented at: *Rice Data Science Conference*, October 2019; *29th Annual Keck Research Conference*, October 2019.

2019 **N. Mitchell** and L. Fox, "Road Identification in Satellite Images Using Image Segmentation Approaches." Presented at: *Rice University Statistical Machine Learning Poster Session*, April 2019.

2018 **N. Mitchell**, D. Devaurs, and L. E. Kavraki, "DINC 2.0: An Improved Version of an Incremental Docking Protocol for Large Ligands." Presented at: *Rice University Undergraduate Research Symposium*, April 2018.

Other

2020 **N. Mitchell**, "Sears: Once your Ordinary Department Store, Now a Vehicle for Tech Sector Gentrification," *Baker Institute Blog*, Rice University's Baker Institute for Public Policy, April 2020. link

2017 **N. Mitchell**, J. Wang, "Using Word2Vec to Power a Recommendation Engine," *Square Corner Blog*, Square, Inc., August 2017. link