NATHAN T. HATCH

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EDUCATION

University of Washington, Seattle January 2020 - expected 2023
Ph.D. in Computer Science & Engineering; Advisor: Dr. Byron Boots

Georgia Institute of Technology August 2017 - December 2019
Ph.D. student in Machine Learning; Advisor: Dr. Byron Boots

University of Chicago September 2010 - June 2014
B.S. in Mathematics with honors
B.S. in Computer Science with honors

PUBLICATIONS

A. Shaban, C. Cheng, **N. Hatch**, and B. Boots. "Truncated Back-Propagation for Bilevel Optimization." *Proceedings of the 22nd International Conference on Artificial Intelligence and Statistics (AISTATS 2019).* http://proceedings.mlr.press/v89/shaban19a.html.

N. Hatch. "Group Theory: An Introduction and an Application." *University of Chicago VIGRE REU*; 2011. http://www.math.uchicago.edu/~may/VIGRE/VIGRE2011/REUPapers/Hatch.pdf.

UNPUBLISHED RESEARCH PROJECTS

High-speed obstacle avoidance for autonomous vehicles June 2019 - present

- Adapted model-predictive path-integral control to a goal-seeking navigation and mapping stack
- Sped up the LIDAR processing pipeline to 10Hz to support 3m/s vehicle velocities
- Designed and ran three days of experiments on Clearpath Jackal robots with Ouster LIDAR sensors

Curriculum-based learning for bipedal locomotion over rough terrain May 2018 - May 2019

- Extensively studied prior work in locomotion and summarized it in a two-hour lab presentation
- Invented an algorithm to learn a real-time, dynamic bipedal locomotion controller
- Tested the algorithm on challenging "stepping stone" environments using the DART simulator

PERSONAL PROJECTS

https://github.com/nhatch/slam	Factor graph SLAM implemented from scratch
https://github.com/nhatch/rrt	RRT motion planning implemented from scratch
https://github.com/nhatch/ilqr	Iterative LQR control implemented from scratch
https://github.com/nhatch/mcts	A (pretty good) AI for Mancala using Monte Carlo tree search
https://github.com/nhatch/mnist	Multilayer perceptron for MNIST digit recognition from scratch

WORK EXPERIENCE

eSpark Learning *Chicago, IL*
Full-stack software engineer June 2014 - July 2017

- Led the annual iOS app release, removing 300ms tap delay and rewriting the video uploader
- Increased sales pipeline by 25% by integrating our product with Airwatch
- Improved academic fidelity metric from 80% to 87% by refining our app deployment system
- Implemented Apple's "Device Assignment" protocol, making our MDM first-to-market (solo project)
- Conducted ~20 interviews and code challenge reviews for recruiting

Dept. Computer Science, University of Chicago *Chicago, IL*
chiTCP developer October 2013 - June 2014

· Implemented a TCP-over-TCP daemon for use in Borja Sotomayor's networks class

Mission Street Manufacturing *Santa Barbara, CA*
Software intern June - August 2013

· Developed prototype front- and back-end software for consumer-friendly 3D printing

CLASS PROJECTS

S. Foley, N. Hatch, and A. Beedu. *A Global Optimal Solution to Non-Minimal Relative Pose Estimation.* ECE 8823 Convex Optimization; Spring 2019.
PDF: https://nhatch.github.io/files/FoleyHatchBeeduNotes.pdf

N. Hatch and E. Wijmans. *Probabilistic Graphical Modeling of Data-Dependent Annotator Accuracy for Active Learning.* CS 8803 Probabilistic Graphical Models; Spring 2018.
Paper: https://nhatch.github.io/files/Hatch_Wijmans_final_report.pdf
Slides: https://nhatch.github.io/files/Hatch_Wijmans_presentation_slides_v2.pdf

N. Hatch, A. Sundaresan, M. Dutreix, R. Kuppan, and P. Pattanashetty. *Google Landmark Recognition and Retrieval Challenges.* ECE 6254 Statistical Machine Learning; Spring 2018.
Paper: https://nhatch.github.io/files/landmarks_report.pdf
Poster: https://nhatch.github.io/files/landmarks_poster.pdf

N. Hatch. *Unsupervised Curriculum Learning for Image Clustering.* CS 7643 Deep Learning; Fall 2017.
Poster: https://nhatch.github.io/files/image-clustering.pdf

Other graduate-level classes (exam-based): Linear Systems, Theoretical Statistics, Machine Learning Theory, Mathematical Foundations of Machine Learning

AWARDS AND HONORS

Georgia Institute of Technology, Presidential Fellowship	2017 – 2019
University of Chicago, Dean's List	2010 – 2014
University of Chicago, University Scholarship	2010 – 2014
University of Chicago, National Merit Scholarship	2010 – 2014
University of Chicago, Student Marshal	2013
Phi Beta Kappa	2013
University of Chicago, Fulton Prize for Orchestral Excellence	2012

TEACHING EXPERIENCE

College of Computing, Georgia Tech *Atlanta, GA*
Teaching assistant, undergraduate machine learning Fall 2019

· Graded homework, held weekly office hours, answered Piazza questions, and wrote the final project

Insight Tutoring *Chicago, IL*
Volunteer tutor January 2015 - May 2017

· Reviewed homework and class material for three economically disadvantaged sixth-grade students
· Periodically revisited old material for spaced retrieval practice

Dept. Computer Science, U. of Chicago *Chicago, IL*
Homework grader, graduate discrete mathematics October - December 2012

· Graded twice-weekly problem sets for Laszlo Babai's graduate-level class

Dept. Mathematics, U. of Chicago *Chicago, IL*
SESAME teaching assistant July 2012

· Assisted teaching a class for middle school math teachers on "problem-based learning"

Dept. Mathematics, U. of Chicago *Chicago, IL*
Young Scholars Program Counselor June - July 2012

· Tutored four 9th/10th-grade math students in an advanced summer math program
· Assisted teaching a class in basic computer programming
· Gave weekly reports on student progress, including helping to write a diagnostic exam

PROFESSIONAL SERVICE

Georgia Tech Machine Learning (ML@GT) *Atlanta, GA*
Co-creator of Machine Learning Student Seminar Fall 2019

· With one co-organizer, started a new seminar with eight presentations to a 25-student audience
· Invited presenters, including five faculty lightning talks
· Organized catering, room reservations, and publicity

TECHNICAL STRENGTHS

Programming Languages	Python, C++, Javascript/HTML/CSS, Ruby
Robotics and Simulation Software	ROS, Gazebo, DART
Deep Learning Frameworks	PyTorch, TensorFlow
Tools	Git, Vim, LaTeX
Foreign Languages	Spanish

HOBBIES

Places visited	Spain, United Kingdom, Japan, Argentina, Brazil, Taiwan, Hong Kong, Singapore, China, Peru, South Africa, Namibia, Botswana, Zimbabwe, Turkey
Other interests	viola performance, rock climbing, go (the board game)