Nhung Hoang

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EDUCATION

Vanderbilt University Nashville, TN
Ph.D. Student in Computer Science Aug 2019 – present

Swarthmore College Swarthmore, PA
B.A. in Computer Science with a minor in Engineering Aug 2015 – May 2019

RESEARCH INTERESTS

Computational Neuroscience and Genomics: My research seeks to elucidate how genes regulate brain activity, how abnormalities of gene expression give rise to brain disorders, and how these disorders differ from person to person.
Transfer Learning: I am also interested in developing transfer learning techniques that leverage established population datasets to enhance neurogenomic research for traditionally understudied human groups.

RESEARCH EXPERIENCE

Genomic Underpinnings of Functional Brain Connectivity July 2019 – present
Dr. Mikail Rubinov, Vanderbilt University
Evaluating optimized search methods for candidate genes that regulate correlated activity across brain regions. Integrating genetic and neural datasets from distinct modalities, including gene expression and neuroimaging, for transcriptomic analyses spanning many brain regions and many human individuals.

Visual Analytics Platform for Deriving Brain Parcellations March 2020 – Aug 2020
Dr. Matthew Berger, Vanderbilt University
Designed an interactive tool for deriving individualized brain parcellations from population-based atlases, as a means for analyzing individual variability in functional organization. Engaged in an iterative design process with feedback from neuroimaging domain experts and a qualitative user study.

Deep Learning-based Inference in Population Genetics June 2018 – May 2019
Dr. Sara Mathieson, Swarthmore College
Developed a Hidden Markov Model to Convolutional Neural Network method for inferring genetic variants under natural selection in the context of evolutionary history. Applied to population samples generated using a coalescent simulator, as well as human genotype data from the 1000 Genomes Project.

Machine Learning for 3D Depth Reconstruction May 2017 – Aug 2017
Dr. Nathan Sprague, James Madison University, NSF REU Program
Engineered a bat-inspired echolocation simulator that uses convolutional neural networks for 3D depth reconstruction. Potential applications of the artificial echolocation device include assistive technology for the visually impaired and room activity recognition for energy consumption control.

Medical Capsule Robots for Minimally Invasive Diagnosis Jan 2014 – Dec 2014

Dr. Pietro Valdastri, Vanderbilt University

Formulated a light-based protocol for swarms of wireless capsule endoscopes to communicate during colonoscopy. Demonstrated proof of concept using light emitting diodes and capsule endoscopy prototypes in a simulated gastric environment.

PUBLICATIONS

Wang, Z., Wang, J., Kourakos, M., **Hoang, N.,** Lee, H., Mathieson, I., Mathieson, S., "Automatic Inference of Demographic Parameters Using Generative Adversarial Networks," *Molecular Ecology Resources*, 2021.

Bayrak, R.G.*, **Hoang, N.*,** Hansen, C.B., Chang, C., Berger, M., "PRAGMA: Interactively Constructing Functional Brain Parcellations," *IEEE Transactions on Visualization and Computer Graphics*, 2020. **Honorable Mention for Best Short Paper**. **equal contribution*

Hoang, N., Bell, C., Valdastri, P., "Utilization of LEDs in a Communication Protocol for Endoscopic Submarine Capsules," *Young Scientist*, vol. 5, 2015.

PRESENTATIONS

Note: underscore denotes presenter(s)

Hoang, N., Benton, M.L., Capra, J.A., Rubinov, M., "Transcriptomic Underpinnings of Individual Variation in Brain Co-activity," *Organization for Human Brain Mapping Annual Meeting*, 2021.

Bayrak, R.G., **Hoang, N.,** Hansen, C.B., Chang, C., Berger, M., "PRAGMA: Interactively Constructing Functional Brain Parcellations," *IEEE Visualization Conference*, 2020.

Hoang, N., Lee, H., Mathieson, S., "An HMM-CNN Method for Inferring Natural Selection Strengths in Evolutionary History," *ISMMS Undergraduate Research Symposium in Biological, Chemical, Structural, and Computational Sciences* (Oct 2018). Icahn School of Medicine at Mount Sinai, New York, NY. **Best Poster Award.**

Hoang, N., Lee, H., Mathieson, S., "An HMM-CNN Method for Inferring Natural Selection Strengths in Evolutionary History," *Sigma Xi Research Symposium* (Sept 2018). Swarthmore College, Swarthmore, PA.

Hoang, N., Godja, D., Sprague, N., "Depth Reconstruction Using Artificial Echolocation," *JMU Summer NSF REU Symposium* (Aug 2017). James Madison University, Harrisonburg, VA.

Garcia, V., **Hoang, N.,** Price, S., "The Development of a Frog-logging Android Application," *Tennessee Junior Academy of Sciences Conference* (April 2014). Belmont University, Nashville, TN. **First Place in Oral Presentations.**

Hoang, N., and English, C., "Significance of the GAPDH gene sequence in the endangered plant species Echinacea tennesseensis," *Middle Tennessee STEM Innovation Expo* (May 2013). Belmont University, Nashville, TN.

WORK EXPERIENCE

Graduate Teaching Assistant Aug 2019 – May 2020

Computer Science Department, Vanderbilt University

Foundations of Machine Learning (Fall 2019, class size: 40) — Presented two guest lectures on neural network architectures and topics in deep learning. Wrote coding assignments that guided students through the cross-validated model training process and subsequent evaluation of test results.

Projects in Artificial Intelligence (Spring 2020, class size: 40) — Assisted student teams on their semester-long projects involving "coopetition" (competition-cooperation) dynamics. Developed the framework for a coopetition-based AI game for this course.

Student Mentor and Tutor Jan 2017 – Dec 2017

Computer Science Department, Swarthmore College

Introduction to Computer Science (class size: 35) — Facilitated weekly help sessions for students seeking homework/lab assistance and exam review. Helped students with in-class Python coding activities. Delivered private tutoring sessions for students looking to improve their understanding of CS topics.

Student Mentor Aug 2016 – Dec 2016

Mathematics and Statistics Department, Swarthmore College

Single Variable Calculus (class size: 25) — Worked with small groups (10 students) during weekly homework sessions. Assisted the professor during course lectures and in-class activities.

Software Development Intern June 2016 – Aug 2016

Stratasan (Nashville, TN)

Statasan is a healthcare data analytics software company. Improved web app user experience by integrating customer feedback into front-end redesign. Expedited new project development by initiating product back-end using Django and PostgreSQL.

HONORS AND AWARDS

Honorable Mention for Best Short Paper, IEEE Visualization Conference	2020
Russell G. Hamilton Scholar, Vanderbilt University	2019
Provost's Graduate Fellowship, Vanderbilt University	2019
Best Poster Award, ISMMS Undergraduate Research Symposium	2018
Richard Rubin Scholar, Swarthmore College	2017
Swarthmore Summer Scholar, Swarthmore College	2015
U.S. Presidential Scholar, U.S. Department of Education	2015

TECHNICAL SKILLS

Languages: Python (Advanced); JavaScript, HTML, CSS, SQL, Java, C++ (Proficient)
Libraries and Tools: scikit-learn, Keras, TensorFlow, Observable, IntelliJ, Django, NumPy