

# PHUC 'JERRY' NGO

(+1) 248-759-0828 ◊ ngohongphuc2001@gmail.com  
Beloit College, Box 812, 700 College St., Beloit, WI 53511  
[LinkedIn](#) ◊ [GitHub](#) ◊ [jerryngo.com](#)

## EDUCATION

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### Beloit College

Computer Science and Mathematics Major  
Major GPA (both majors): 4.0/4.0  
Cumulative GPA: 3.987/4.0  
Expected Graduation Date: June 2022  
Presidential Scholarship - \$32,000 annually  
Beloit College Grant - \$10,300 annually

*Beloit, WI*  
August 2019 - Present

## RESEARCH

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### CLIP Research Project - MIT CSAIL

Massachusetts Institute of Technology  
Mentor: Dr. Phillip Isola, Dr. Swami Sankaranarayanan

- Design a pipeline to test how CLIP performs as a visual system.
- Generate images of shape and color using GAN and Matplotlib to compute CLIP's response to those stimuli.
- Discover that CLIP's understanding of cognitive concepts like color-emotion association or shape language is correlated with psycho-visual experiments from the cognitive science literature.

*Cambridge, MA*  
August 2021 - Present 2021

### Data Augmentation Research Project - MIT CSAIL

Massachusetts Institute of Technology Summer Research Program  
Mentor: Dr. Aleksander Mądry, Dr. Dimitris Tsipras, Saachi Jain

- Studied the effect of data augmentation on deep representations.
- Trained ResNet18 models on CIFAR-10 dataset with augmentation like grayscale, rotation and adversarial attack.
- Analyzed the accuracy, correlation, and nearest neighbor diagram from models' predictions and representations on standard and augmented data.

*Cambridge, MA*  
June 2021 - August 2021

### Leaf Recognition Research Project - Beloit College

Mentor: Dr. Donghoon Kwon

- Deployed machine learning models to classify leaves.
- Performed a deep comparative analysis on machine learning models such as KNN, SVM, ANN.
- Achieved an accuracy of 76.18% with ANN.

*Beloit, WI*  
January 2021 - March 2021

### Predicting Amphibian Occurrence Research Project - Beloit College

Mentor: Dr. Eyad Haj Said

- Processed data derived from satellite and natural inventories on amphibian occurrence and sites' attributes.
- Implemented machine learning models such as CART, SVM, ANN, kNN with techniques like AdaBoost or stacking to predict the amphibian appearance based on a set of attributes.
- Achieved the peak accuracy of 72% with a small sample size of 189 instances.

*Beloit, WI*  
October 2020 - January 2021

### Graph Iterator Research Project - Beloit College

Mentor: Dr. Darrah Chavey

- Coded module for the graph iterator that produces a stream of all possible graphs with specific attributes.
- Derived a bitmanipulation code to exchange row and column of a compressed adjacency matrix.
- Doubled the speed and performance of executing the task compared to using naive brute force.

*Beloit, WI*  
January 2020 - Present

### The Hasse-Minkowski Theorem Research Project - Beloit College

Mentor: Dr. Mehmet Dik

- Explored the applications of the Hasse-Minkowski theorem to homogeneous quadratic forms.
- Introduced computer programs implementing the Hasse-Minkowski theorems and Legendre theorem with some supporting functions like the Eratosthenes sieve.

*Beloit, WI*  
October 2019 - November 2020

## PUBLICATION

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P. H. Ngo and D. Kwon, "A Study on Comparative Analysis of Machine Learning Algorithms Using the Leaf Dataset," Journal of Industrial Information Technology and Application (JIITA), Vol. 5, Number 4, 2021.

## TALKS

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**Midstates Consortium Undergraduate Research Symposium**, *How Data Augmentation Affects What Neural Networks Learn*, November 2021.

**IEEE MIT Undergraduate Research Technology Conference**, *The Effect Of Data Augmentation on Deep Representations*, October 2021.

**MIT Summer Research Program Poster Session**, *How Data Augmentation Affects What Neural Networks Learn*, August 2021.

**International Symposium on Innovation in Information Technology and Application**, *A Study on Comparative Analysis of Machine Learning Algorithms Using the Leaf Dataset*, February 2021.

**Midstates Consortium Undergraduate Research Symposium**, *An Implementation on Hasse-Minkowski and Legendre's Theorems*, Washington University in St. Louis, November 2020.

**Sigma Xi Virtual Annual Meeting & Student Research Conference**, *The Hasse-Minkowski Theorem and Legendre's Theorem for Quadratic Forms In Two And Three Variables*, November 2020.

**Spring Research Symposium**, *The Hasse-Minkowski Theorem and Legendre's Theorem for Quadratic Forms In Two And Three Variables*, Beloit College, April 2020.

## MERITS

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- **Google Computer Science Research Mentorship Program Recipient** September 2021
  - **Ferwerda Merit Scholars** June 2021
- Awards 16 students at Beloit College with academic excellence in natural science.
- **Jackson J. Bushnell Mathematics Prize** June 2020
- Recognizes excellence in mathematics during a student's first year.
- **Consolation prize in the National Olympiad in Informatics Top 100, Vietnam** January 2018

## EXPERIENCE

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- CSAIL - MIT** Cambridge, MA  
*Visiting Student* Jan 3 - Present
- Got invited to continue working on the CLIP research project at MIT during the winter semester
- Learning Enrichment & Disability Services - Beloit College** Beloit, WI  
*Tutor* November 2021 - Present
- Courses: Discrete Structures, Calculus I.
- Mathematics and Computer Science Department - Beloit College** Beloit, WI  
*Teaching Assistant* August 2020 - Present
- Courses: Intro to Object Oriented Programming, Data Structures and Algorithms.
- Organize office hours each week to help students understand programming concepts and approach the projects.
- Create JUnit tests for weekly course projects.
- Information Technology Department - Beloit College** Beloit, WI  
*IT Programmer* October 2020 - June 2021
- Wrote automated scripts that process raw student data.
- Managed users in Active Directory and Google servers.

## RELEVANT COURSEWORK

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**Computer Science:** Algorithm Design & Analysis, Data Structures and Algorithms, Threads & Operating Systems, Computer Architecture, Computer Models & Languages, Intro to Object-Oriented Programming, Database Capstone, Convolutional Neural Networks for Visual Recognition.

**Math:** Linear Algebra, Mathematical Statistics I, Mathematical Statistics II, Discrete Structures, Vector Calculus, Calculus I, Calculus II, Real Analysis, Abstract Algebra.

**Other Courses:** Principles of Economics, General Physics I.

## RELATED SKILLS

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**Key Skills:** Machine Learning Algorithms, Deep Learning, Data Visualization, Data Analysis, Data Mining.

**Programming Tools:** Python, C++, Java, PHP, Javascript, Git.

**Packages:** PyTorch Scikit-Learn, Matplotlib, NumPy, Pandas, Jupyter Notebook.

**Platform:** Linux, Windows, MacOS.

**Languages:** Vietnamese (Native), English (Full professional proficiency), Chinese (Elementary proficiency).

**Others:** Familiar with 3D printing, laser cutting, soldering.

## LEADERSHIP AND COMMUNITY INVOLVEMENT

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**MakerLab** *President, Supervisor*

*February 2020 - Present*

- Oversee and instruct students how to use the 3D scanner, soldering iron, laser cutter, heat gun, and etc.
- Coordinate and prepare the material for monthly events.

**Beloit College Minecraft Server** *Administrator*

*November 2020 - Present*

- Get funded by Beloit College to maintain a school Minecraft server.
- Code and install plugins, mods for the server.
- Manage the player base using database and Discord.

**Putnam Practice Group** *Member*

*September 2020 - June 2021*

- Meet weekly to practice solving mathematical problems from the Putnam competition.

**Students Who Code Project** *President*

*July 2017 - September 2020*

- Founded the first programming organization for high school students in Can Tho City.
- Developed simplified guides on modern languages, such as XML, Python, C++, with many real-life projects and even mobile applications.
- Introduced programming language to more than 200 students and held five events at school.
- Worked as a program planner, editor, manager and speaker.