

# NGOC-QUANG NGUYEN

Ph.D. Candidate in Computer Science

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## 🎓 EDUCATION

### Korea University

Ph.D, Computer Science and Engineering, GPA: 93.5%

*Sep 2020 - Present*

Advisor: Jaewoo Kang

### Gachon University

MSc, Computer Science and Engineering, GPA: 80.6%

*Sep 2017 - Jul 2019*

Advisor: Sangwoong Lee

### Vietnam National University, Hanoi

BEng, Mechanical Engineering, GPA: 75.5%

*Sep 2012 - Mar 2017*

## 🏢 EXPERIENCE

### DMIS lab

*Drug discovery*

Sep 2020 – Present

*Machine learning and AI researcher*

- May 2023 - Dec 2023: Collaborated with **AIGEN Sciences** on predicting compound-protein interactions utilizing multi-level features.
- Mar 2022 - Mar 2023: Collaborated with **SK-Nexilis** on predicting material properties and making recipe recommendation system.
- Analyzing large-scale datasets from various sources such as biochemical assays such as: BioLiP, PDBbind, DUD\_E, Davis, KIBA, Metz.
- Building deep learning models and algorithms predict protein-compound interactions mainly focusing on multimodal learning.
- Developing models to capture 3D geometric information with Equivariant neural networks.

### Voronoi Inc

*Drug discovery*

Aug 2019 - Jul 2020

*Machine learning and AI researcher*

- Developed and applied reinforcement learning techniques for small molecule generation with high binding affinity by ReLeaSE (Reinforcement Learning for Structural Evolution).
- Predicted compound properties by the deep directed message passing neural network.
- Predicted compound toxicity by a deep neural network with multitask learning technique.
- Collaborated with biologists, chemists, and other researchers to design experiments, validate predictions, and optimize experimental conditions.

### PRML lab

*Computer Vision*

Sep 2017 - Jul 2019

*Machine learning and AI researcher*

- Medical imaging analysis (image segmentation for seeking lung, colon, and breast tumors).
- Classified the breast cancer histology images using incremental boosting convolution networks.
- Face recognition: automatic door recognition (adopted Google Facenet to make output for Arduino kit to open the lab door) [Here].

### NTQ Solution

*Robotics*

Jun 2015 - Sep 2015

*Robotic engineering intern*

- Built a guidance robot using a Raspberry Pi kit, which is controlled by a gaming remote.
- Developed and programmed a quadcopter thesis using an Arduino kit, integrating a radio control system with a transmitter and receiver.

## 📖 PUBLICATIONS

### *Journal publications*

MulinforCPI: enhancing precision of compound-protein interaction prediction through novel perspectives on multi-level information integration

Ngoc-Quang Nguyen; Sejeong Park; Mogan Gim; Jaewoo Kang

**Briefings in Bioinformatics, 2023**

PerceiverCPI: A nested cross-attention network for compound-protein interaction prediction

Ngoc-Quang Nguyen; Gwanghoon Jang; Hajung Kim; Jaewoo Kang

Bioinformatics, 2022

Contour-aware Polyp Segmentation in Colonoscopy Images using Detailed Upsampling Encoder-Decoder Networks

Ngoc-Quang Nguyen; Duc My Vo; Sang-Woong Lee

IEEE Access, 2020

Robust Boundary Segmentation in Medical Images Using a Consecutive Deep Encoder-Decoder Network

Ngoc-Quang Nguyen; Sang-Woong Lee

IEEE Access, 2019

Classification of breast cancer histology images using incremental boosting convolution networks

Duc My Vo; Ngoc-Quang Nguyen; Sang-Woong Lee

Information Sciences, 2018

## Conference publications

Colorectal segmentation using multiple encoder-decoder network in colonoscopy images

Ngoc-Quang Nguyen; Sang-Woong Lee

AIKE, Laguna Hills, 2018

## SELECTED PROJECTS

**EquiCPI (3D)**, ongoing

Duration: Dec.2023-present

*Project size:* 2 members

*Project description:* Fully leveraging the 3D-generated structures derived from an existing sequence dataset with SE(3) neural networks enhances the accuracy of the CPI task.

*Responsibilities:*

- Researching and utilizing the Special Euclidean Group in three dimensions.
- Implementing SE(3) to effectively extract and learn information from 3D structures considering translation, rotation, reflection.

*Component neural networks:* Euclidean neural networks, multiplayer perceptron neural network.

**MulinforCPI (2,5D)**, [Github\_Here]

Duration: Jan.2023-Sep.2023

*Project size:* 3 members

*Project description:* Proposed a two-step deep learning strategy named MulinforCPI (utilizing multi-level information for compound-protein interaction prediction) that incorporates transfer learning techniques along with multi-level resolution features. The aim is to overcome the limitations associated with forecasting the interaction between compounds and proteins.

*Responsibilities:*

- Conducted an analysis of the impact of 3D information on the CPI task.
- Designed a cross-cluster validation strategy to comprehensively assess model performance, with a specific emphasis on evaluating its effectiveness in predicting interactions with novel scaffold compounds.

- Proposed and implemented a novel architecture to address the challenge of limited availability of comprehensive and well-structured datasets.

#### *Component neural networks:*

Principal neighborhood aggregation graph neural network, message passing neural network, multiplayer perceptron neural network, 1D convolutional neural network, 2D convolutional neural network

**PerceiverCPI (2D)**, [Github\_Here]

Duration: Sep.2021-Sep.2022

*Project size:* 3 members

*Project description:* Proposed the Perceiver CPI network, which adopts a cross-attention mechanism to improve the learning ability of the representation of drug and target interactions and exploits the information obtained from extended-connectivity fingerprints to improve the performance of predicting binding free energy.

#### *Responsibilities:*

- Proposed main ideas to overcome the representation's simplification of molecular fingerprints and the current integration methods.
- Implemented the proposed architecture with directed message passing neural network and 1DCNN network.
- Analyzed the importance of atom features and bond features.
- Designed the performance evaluation strategies.

#### *Component neural networks:*

Directed message passing neural network, multiplayer perceptron neural network, 1D convolutional neural network

## HONORS & AWARDS

**BK21 graduate innovation project scholarship (GAG-KU)**

Feb 2024, BK21FOUR

**Excellent paper award:** [Here]

Feb 2023, Korea University

**Research scholarship:** [Here]

Sep 2020 - Sep 2022, BK21FOUR

**Foreign natural sciences and engineering scholarship:** [Here]

Sep 2020 - Sep 2022, Korea University

**Full scholarship covering living expenses and tuition fees**

Sep 2017 - Jul 2019, Gachon University

## SKILLS AND CERTIFICATES

Exploratory Data Analysis, Statistics, Modeling, Communication.

**Certificates:** AWS Fundamentals [Here], IBM Data Analyst [Here], Google Advanced Data Analytics [Here]

**Technique Languages:** Python, Java, C#.

**Others:** Pytorch, Tensorflow, Geometric-pytorch, AWS Unix/Linux, working cross-functionally, GitHub, Gitlab.

**Languages:** English (advanced), Korean (beginner), Vietnamese (native).

## REFERENCES

**Prof. Jaewoo Kang, Ph.D.**

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Letter of recommendation: upon request

**Mujeen Sung, PhD.**

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Letter of recommendation: [Here]

**Prof. Sangwoong Lee, Ph.D.**

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Letter of recommendation: [Here]