

# Junghyun Lee

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Personal website: <https://nick-jhlee.netlify.app/>

## PARTICULARS

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### EDUCATION

Korea Advanced Institute of Science and Technology (KAIST)  
BSc in Mathematical Sciences, Computer Science(*Double Major*)

Daejeon, ROK  
*August 2021 (expected)*

Changwon Science High School (CSHS)  
*Early graduation*

Changwon, ROK  
*March 2017*

### CURRENT STATUS

Citizen of Republic of Korea (ROK).

### ACADEMIC INTERESTS

- Machine Learning
- Deep Learning
- Related mathematical theories (e.g. Probability Theory, Optimization, Statistics)
- Discrete Mathematics (Graph Theory, Algorithms, Combinatorics, Discrete Geometry)

### ACADEMIC HONORS

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- Spring Semester Freshmen Dean's List, 2017.

### RESEARCH EXPERIENCE

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- **[Alone] Undergrad Research: OSI Lab**, Spring 2020 - Present.  
**Supervisor:** Prof. Se-Young Yun (Graduate School of AI, KAIST)  
**Research topic:** *Toward a Better Understanding of Dynamics of Deep Neural Networks and SGD*
- **[With Matt Olfat\*] Undergrad Research: AIM Lab**, Winter 2019 - Present.  
**Supervisor:** Prof. Chang Dong Yoo, Prof. Gwangsu Kim (Dept. of Electrical Engineering, KAIST)  
**Research topic:** *Fair Sparse PCA via Constrained Manifold Optimization*  
(\* Citadel)
- **[Alone] Individual Study**, Summer 2019 - Fall 2019.  
**Supervisor:** Prof. Andreas Holmsen (Dept. of Mathematical Sciences, KAIST)  
**Research Seminar topic 1:** *Asymptotics for the number of  $C_4$ 's in a graph under certain condition,*  
**Research Seminar topic 2:** *Maximum number of columns in a 0-1  $2n \times n$  matrix with no induced  $2 \times 2$  identity matrix*
- **[With Seokmin Ha] MAS480(B): Introduction to Mathematical Biology**, Fall 2018.  
**Supervisor:** Prof. Jaekyung Kim (Dept. of Mathematical Sciences, KAIST)  
**Research topic:** *Reverse Analysis Problem of Two-gene System in the Perspective of Adaptation*

- **CSHS Mathematics Research and Education Program (R&E)**, Mar 2015 - Feb 2017.  
**Supervisor:** Mr. Seungkyun Cha (Mathematics Department, CSHS), Prof. Jisoo Byun (Dept. of Mathematics Education, Kyungnam University)  
**Research topic:** *Some Loci in the Animation of a Sangaku Diagram*

## PUBLICATIONS

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### WORKING/PENDING PAPERS

1. **Junghyun Lee**, Gwangsu Kim, Matt Olfat, Chang D. Yoo. "Fair Sparse PCA via Manifold Optimization" (Work in progress, Unpublished)

### PREPRINTS, TECHNICAL REPORTS

1. (to be filled in...)

### JOURNAL

1. **Junghyun Lee**, Minyoung Hwang, Cheolwon Bae. "Some Loci in the Animation of a Sangaku Diagram", *Forum Geometricorum*, 2016, vol. 16, pp. 187-191.

### PEER-REVIEWED CONFERENCE

1. (to be filled in)

## COURSEWORKS

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### PROJECTS

- **[With Chani Jung, Yoo Hwa Park, Dongmin Lee] CS454: A.I. based S.E.**, Fall Semester, 2020.  
Proposes a way to apply SWAY to SBSE problems whose decision space consists of permutations.
- **[With Minyoung Hwang, Junseok Choi] CS492: Deep Learning for Real-Life Problems**, Fall Semester, 2020.  
Proposes deep learning based solution for semi-supervised classification on Naver Fashion Dataset, and Korean Open-Domain QA task on Naver KorQuAD-Open dataset. (2nd, 1st place in leaderboard)
- **[With Youngjin Jin, Minsung Park, Hyunjin Kim] CS376: Machine Learning**, Fall Semester, 2018.  
Built a predictive model for given set of (training) data. (cf. Gotham city's apartment prices)
- **[With Youngjin Jin, Minsung Park] CS470: Intro. to A.I.**, Fall Semester, 2019.  
Implemented a model to solve music genre classification problem.
- **[Alone] CS300: Intro. to Algorithms**, Spring Semester, 2018.  
Implement a solver for the game 'Bloxorz'.
- **[With Seokmin Ha] MAS480(B): Intro. to Mathematical Biology**, Fall Semester, 2018.  
(See below for details)
- **[With Hyunjin Kim] CS330: Operating Systems and Lab**, Spring Semester, 2019.  
Built Pintos: a small operating system.

### REPORTS

1. **Junghyun Lee**, Chani Jung, Yoo Hwa Park, Dongmin Lee. "SWAY for Decision Space of Permutations with Case Study on Test Case Prioritisation", *CS454: Artificial Intelligence Based Software Engineering*, 2020 Fall. (Work in progress)
2. Seokmin Ha, **Junghyun Lee**. "Reverse Analysis Problem of Two-gene System in the Perspective of Adaptation", *MAS480(B): Topics in Mathematics <Introduction to Mathematical Biology>*, 2018 Fall.
3. **Junghyun Lee**. "Critical Review on Theoretical Aspects of Binary Decision Diagram, with a Focus in Variable Ordering", *CS402: Introduction to Logic for Computer Science*, 2020 Spring.
4. Junseok Choi, Minyoung Hwang, **Junghyun Lee** "Semi-Supervised Learning Task on Naver Fashion Dataset", *CS492(I): Special Topics in Computer Science <Deep Learning for Real-World Problems>*, 2020 Fall.

5. Minyoung Hwang, Junseok Choi, **Junghyun Lee** "Korean Open-Domain QA Task on Naver KorQuAD-Open Dataset", *CS492(I): Special Topics in Computer Science <Deep Learning for Real-World Problems>*, 2020 Fall. (Work in progress)

## TEACHING EXPERIENCE

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### TEACHING ASSISTANT

- **HSS302: Special Lectures on Linguistics <Language Register and English>**, Prof. Seonmin Park, Spring 2018, KAIST.
- **English Camp for Incoming Freshmen**, EFL Office, Jan 2019, KAIST.
- **English Camp for Incoming Freshmen**, EFL Office, Jan 2018, KAIST.

### FRESHMEN TUTORING

- **MAS102: Calculus 2**, Fall 2018, KAIST.
- **MAS101: Calculus 1**, Spring 2018, KAIST.

### UNOFFICIAL/VOLUNTARY TUTORING

- **MAS102, PH142, MAS109**, Fall 2017, KAIST.  
with 10~15 freshmen taking the courses
- **MAS101, PH141, CH101, MAS109**, Spring 2017, KAIST.  
with 10~15 freshmen taking the courses

## SKILLS

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### Computer Skills

- Languages: **Python**,
- Applications : **Matlab, LaTeX**

### LANGUAGE

- **Korean**: Native
- **English**: (Almost) Native  
Mock TOEFL iBT 118 (2017)

## MISC.

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### KAIST ORCHESTRA

- First Violinist, Mar 2017 - Present.
- **Principal First Violinist**, Jan 2018 - Dec 2018.

### ICISTS

- Division of Global Partnership, Sep 2018 - Aug 2019.
- **TF leader** of *Opening/Gala Night* (ICISTS-2019)
- TF member of *Science in a Nutshell* (ICISTS-2019)
- **Vice President**, Sep 2019 - Jul 2020.

### KAIST Mathematical Sciences Student Council

- Member of department student council, Mar 2018 - Present.
- In charge of *Mathematical Sciences Help-Desk* (Mar 2018 - June 2019)  
A short lecture series (given by selected math undergrad.) that takes place a week before the exam period to help all students with Basic Elective courses. (MAS109, MAS201, MAS250)