

# KIJUNG JEON

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## EDUCATION

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### Korea Advanced Institute of Science and Technology (KAIST)

Daejeon, Republic of Korea

B.S in Electrical Engineering & Mathematical Science (Double major)

\*Mar. 2018 ~

GPA: 4.26/4.30 (Overall), Major GPA: 4.30/4.30 (EE & Math)

(\* Left for mandatory military service: Jan. 2020 ~ Aug. 2021)

### UC Berkeley (Summer Session)

Berkeley, CA, USA

GPA: 4.0/4.0

May. 2018 ~ Aug. 2018

### Selected courseworks

**EE** : Information theory, Signal processing, Linear system theory, Programming structure

**Math** : Statistical inference (Classical, Bayesian), Probability theory, Real analysis (+ Measure theory), Point-set topology, Linear algebra, Numerical analysis, Convex optimization, Differential geometry, Differential equations (PDE/ODE), Machine learning theory, Scientific machine learning (SciML)

## RESEARCH INTERESTS

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- High-dimensional statistics, Statistical learning theory, Bayesian inference, Sampling & Optimization, Information theory
- Theoretical aspects of machine learning and its applications to improve algorithm efficiency

## RESEARCH EXPERIENCE

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### Inference and Information for Data Science (IIDS) Lab

KAIST EE

Advisor : Prof. Hye won Chung

Dec. 2021 ~

#### (1) Efficient data crowdsourcing algorithms

- Studied matrix perturbation theory and efficient data crowdsourcing algorithms for multi-class labeling.

#### (2) Mix-up training based on data valuation scores [lead project]

- Studied various data valuation scores for efficient training of neural networks.
- Devised mix-up variant algorithm based on data valuation scores to accelerate mix-up training speed via feature learning perspective.
- Verified data-dependent characteristics of efficient mix-up samples to accelerate transfer learning.

### Algorithmic Intelligence Laboratory (ALIN-LAB)

KAIST AI

Advisor : Prof. Jinwoo Shin

Dec. 2022 ~ Aug. 2023

#### (1) Information theoretical views of contrastive losses

- Studied variational bounds of mutual information, Renyi-mutual information, and compared mutual information estimation performance of variational bounds via neural network under correlated Gaussian distribution.

#### (2) Analysis of mix-up in contrastive learning and its domain-agnostic application [lead project] [\[PDF\]](#)

- Proved mix-up in contrastive learning with InfoNCE loss regularizes input directional derivatives.
- Verified empirical effect of mix-up and theoretical generalization performance guarantee under supervised contrastive learning setting.

- Proposed domain-agnostic contrastive learning algorithm based on discrete patch mix-up exploiting transformer architecture.

## Statistical Inference and Machine Learning (SIML) Lab

Advisor : Prof. Juho Lee

KAIST AI

Jun. 2023 ~

### (1) Understanding the cold posterior effect in Bayesian deep learning [lead project]

- Studied theoretical framework of SGMCMC algorithms and their variations for efficient sampling.
- Verified under/over-damping behaviors of SGHMC with respect to hyperparameters and asymptotic behavior of SGHMC when decayed momentum is periodically re-sampled.
- Proved asymptotic weight norm behavior of SGHMC induces sampling from typical set under iso-tropic Gaussian posterior assumption via analysis of Fokker-Planck equations.

## IN-CLASS PROJECTS

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### Visualization of electric fields via PINNs (Physics-Informed Neural Networks) [PDF]

- Visualized two-dimensional electric field by solving differential form of Gauss's law via PINNs.
- Proposed effective method to stabilize training of PINNs based on data valuation scores.

### Efficient clustering algorithm for mixtures of high-dimensional iso-tropic Gaussians [PDF]

- Clustered mixtures of high-dimensional iso-tropic Gaussians using PCA followed by GM algorithm, verifying that iso-tropic Gaussian is invariant under PCA.

## ACTIVITIES & WORK EXPERIENCE

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### Freshman mentoring (Calculus 1) at KAIST

Mar. 2019 ~ Jun. 2019

### Republic of Korea Army (ROK)

Jan. 2020 ~ Aug. 2021

## SKILLS & LANGUAGE

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### Programming Languages and Frameworks

Python (+ Pytorch), Matlab, R, C, Latex, HTML

### Languages

Korean : Native, English : Fluent [TOEFL iBT MyBestScore™: 30/28/23/25 (R/L/S/W), Total:106/120]

## AWARDS AND SCHOLARSHIPS

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### KAIST Presidential award, KAIST

Feb. 2018

Awarded to students with high entrance scores

### KAIST Presidential Fellowship (KPF), KAIST

Feb. 2018 ~ Aug. 2024

### National Excellence Scholarship for Science & Engineering, KOSAF

Feb. 2018 ~ Aug. 2023

### Dean's List, School of Freshman, KAIST

Fall 2018

### Dean's List, College of Engineering, KAIST

Spring 2019, 2023, Fall 2020, 2021, 2022

### Department Honors Scholarship, KAIST

Fall 2019, Spring 2022, 2023

Awarded to Top 4 highest GPA students in EE department for each semester