

# 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), 4.30/4.30 (EE/Math major)  
(\* Left for mandatory military service: Jan. 2020 ~ Aug. 2021)

**UC Berkeley** (Exchange program) Berkeley, CA, USA  
GPA: 4.0/4.0, Period: May. 2018 ~ Aug. 2018 (Summer Session)

### Selected courseworks

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

**Math** : Statistical inference (Classical, Bayesian), Probability theory, Real analysis, Linear algebra, Numerical analysis, Convex optimization, Differential geometry, Machine learning theory, Differential equations (PDE/ODE)

## RESEARCH INTERESTS

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- High-dimensional statistics, probability theory (including stochastic process), information theory and statistical learning theory
- Theoretical aspects of machine learning and its applications to improve algorithm efficiency
- Bayesian deep learning

## RESEARCH EXPERIENCE

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**Inference and Information for Data Science (IIDS) Lab** Dec. 2021 ~  
Advisor : Prof. Hye won Chung

- Efficient crowdsourcing algorithms
  - Studied spectral methods for data science via a statistical perspective and efficient crowdsourcing algorithms for multi-class labeling.
- Mix-up training based on data valuation scores [**Project lead**]
  - Studied various data valuation scores for efficient training of neural networks.
  - Implemented mix-up based on data-valuation scores and verified the characteristics of efficient mixup samples during training.
- Gradient norm based data valuation score via contrastive losses (without labels) [**Project lead**]
  - Devised a heuristical score using InfoNCE loss to filter noisy, irregular data without labels

**Algorithmic Intelligence Laboratory (ALIN-LAB)** Dec. 2022 ~ Aug. 2023  
Advisor : Prof. Jinwoo Shin

- Information theory views of contrastive losses
  - Studied variational bounds of mutual information, Renyi-mutual information
  - Compared mutual information estimation performance via neural network under correlated gaussian distribution

- Analysis of mix-up in contrastive learning and its application on domain-agnostic environment [**Project lead**]
  - Proved mix-up contrastive learning with InfoNCE loss contributes to regularization of input directional derivatives and verified its empirical evidence under supervised contrastive learning (SupCon)
  - Proposed domain-agnostic contrastive learning algorithm based on discrete patch mix-up exploiting transformer architecture.

## Statistical Inference and Machine Learning (SIML) Lab

*Jun. 2023 ~*

*Advisor : Prof. Juho Lee*

- Understanding the Cold posterior effect in Bayesian deep learning [**Project lead**]
  - Studied the theoretical framework of SGMCMC algorithms and their variations for an efficient sampling.
  - Proved the constant weight norm behavior during training as a sampling from the typical set in SGHMC with iso-tropic gaussian prior assumption.
  - Verified the approximation error of SGHMC compared to HMC under an overparametrized bayesian linear regression.

## IN-CLASS PROJECTS

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

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

### An efficient clustering algorithm for mixtures of high-dimensional iso-tropic gaussians

- 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*

- Work place : 102nd Signal Brigade - ROK II Corps

## SKILLS

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### Programming Languages and Frameworks

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

### Languages

Korean : Native, English : Fluent

## 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 ~*

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

*Feb. 2018 ~*

**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