# Seunghan Lee

- Date of Birth: July 29, 1996
- Country: Republic of Korea
- Military Service: Completed
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# Education

## Undergraduate

**Yonsei University, Seoul** (March 2015 – August 2020)

- Majors: Business Administration / Applied Statistics
- GPA (4.5 scale): Overall 4.19 (Business 4.31, Applied Statistics 4.35)
- Additional Information:
    - Early graduation (7 semesters)
    - Summa Cum Laude (Top 1% of the cohort)

## Integrated Master's & PhD Program

**Yonsei University, Seoul** (September 2020 – (Expected) August 2025)

- Major: Statistics and Data Science
- GPA (4.5 scale): 4.29
- Co-advisors:
    - Prof. Taeyoung Park (DSLab)
    - Prof. Kibok Lee (ML Lab)

# Research Interests

- Deep Learning with Time Series (TS) Data
- Representation Learning, Foundation Models, Diffusion Models
- Also interested in …
    - Multimodal Learning, Vision-Language Model, Audio Deep Learning

# Publications (*Equally Contributed, †Co-corresponding Authors, )

## 10. Channel Normalization for Time Series Channel Identification (2025)
- **Seunghan Lee**, Taeyoung Park†, Kibok Lee†
- Under review

## 9. Soft Contrastive Learning for Irregular Time Series (2025)
- Junghoon Lim, **Seunghan Lee**, Taeyoung Park
- Under review

## 8. Sequential Order-Robust Mamba for Time Series Forecasting (2024)
- **Seunghan Lee***, Juri Hong*, Kibok Lee†, Taeyoung Park†
- In *NeurIPSW (Time Series in the Age of Large Models)* , 2024. [arxiv:2410.23356]

## 7. Partial Channel Dependence with Channel Masks for Time Series Foundation Models (2024)
- **Seunghan Lee**, Taeyoung Park†, Kibok Lee†
- In *NeurIPSW (Time Series in the Age of Large Models)*, 2024. Oral Presentation (Top 5) [arxiv:2410.23222]

## 6. Adaptive Noise Schedule for Time Series Diffusion Models (2024)
- **Seunghan Lee**, Kibok Lee†, Taeyoung Park†
- In *NeurIPS*, 2024. [arxiv:2410.14488]
- Outstanding Paper Award from the **Journal of Korean Artificial Intelligence Association**

## 5. Learning to Embed Time Series Patches Independently (2024)
- **Seunghan Lee**, Taeyoung Park, Kibok Lee
- In *ICLR*, 2024. [arxiv:2312.16427]
- Preliminary version: *NeurIPSW (Self-Supervised Learning: Theory and Practice)*, 2023. Oral Presentation (Top 4)

## 4. Soft Contrastive Learning for Time Series (2024)
- **Seunghan Lee**, Taeyoung Park, Kibok Lee
- In *ICLR*, 2024. Spotlight (366/7262=5%) [arxiv:2312.16424]
- Preliminary version: *NeurIPSW (Self-Supervised Learning: Theory and Practice)*, 2023.

### 3. Hierarchical Multi-Task Learning with Self-Supervised Auxiliary Task (2024)

- <u>Seunghan Lee</u>, Taeyoung Park
- In *The Korean Journal of Applied Statistics 37(5): 631-641*, 2024.

### 2. MAD-GL2: Multimodal Adaptive Dynamic Graph Learning with Global and Local Features for Multivariate Time Series Forecasting (2025+)

- <u>Seunghan Lee</u>[*], Kibok Lee[*], Taeyoung Park
- Under review

### 1. Improving Gibbs Sampler (2022)

- Taeyoung Park, <u>Seunghan Lee</u>
- In *Wiley Interdisciplinary Reviews: Computational Statistics 14(2): e1546*, 2022.
- Number of Citations (Google Scholar, 2025.02.16): 11

# Intellectual Property

- 2023.10: Review evaluation method using review quality metrics
- 2024.12: Universal time series analysis method and system for irregular multivariate time series

# Invited Talks

- 2024.08. Korean Artificial Intelligence Association (2024 Summer Conference)

# Programming Languages

- Proficient: Python (Pytorch, Tensorflow, Numpy, Sklearn)
- Intermediate: SQL, R
- Basic: Docker, Kubernetes

# Certifications & Awards

## Certifications

| Field | Certifications | Score | Date |
|---|---|---|---|
| CS/Data | ADSP (Associate Data Science Professional) | – | 2018.09 |
| | Computer Proficiency Level 1 | | 2019.03 |
| | SQLD (SQL Developer) | | 2020.06 |
| | Big Data Analyst | | 2021.07 |
| | AWS Cloud Practitioner | | 2021.08 |
| Linguistics | TOEIC | 965/990 | 2020.08 |
| Etc. | Korean History Proficiency Test | Level 1 | 2012.08 |
| | TESAT (Korean Economic Newspaper) | S-Level | 2013.05 |

## Awards

| Field | Awards | Rank | Date |
|---|---|---|---|
| Academic | Academic Excellence Awards | | 2018.12 / 2019.06 |
| | Summa Cum Laude Graduation | | 2020.08 |
| CS | Yonsei Data Science Competition | 2nd | 2019.11 |
| | Sony Pictures Audience Prediction | 4th | 2020.01 |
| | Yonsei Data Science Competition | 2nd | 2021.12 |
| | BK Winter Academic Conference | 4th | 2022.12 |
| | Yonsei Data Science Competition | 1st | 2023.02 |
| Economy | TESAT Team Excellence Award | 2nd | 2013.05 |

# Internship & Project

## 1. [Internship] SK Telecom

- **Period:** July 2019 – August 2019
- **Division:** ICT Infra Center > Data Science > Data Analytics (AI Home)
- **Tasks:** Data analysis and service planning for SKT's air quality info service.
    - ① Analyzed air quality data and addressed measurement errors.
    - ② Designed strategies based on data analysis of parents in their 30s.
    - ③ Planned air quality reports, including data visualization.
- **Key Algorithms:** Clustering, DNN
- **Programming Language:** Python

## 2. [Internship] Yonsei Univ. Department of Computational Science & Engineering

- **Period:** December 2019 – February 2020
- **Division:** Data Science & Deep Learning > Network Embedding
- **Tasks:** Implemented research papers and conducted related seminars.
- **Key Algorithms:** Graph Neural Network
- **Programming Language:** Python

## 3. [Industry-Academia Collaboration] Amore Pacific Project

- **Period:** February 2020 – December 2022
- **Programming Language:** Python, R
- **[2020 Project]** User and purchase behavior analysis for Amore Pacific.
    - ① Analyzed purchasing behavior and conducted customer segmentation.
    - ② Predicted sales of products.
    - ③ Analyzed web log data to understand online user behavior patterns.
    - **Key Algorithms:** Random Forest, Logistic Regression, Hierarchical Clustering
- **[2021-2022 Project]** Development of Context Brand Score (CBS).
    - Developed a brand index that considers consumer sentiment on cosmetic product attributes using text data (social buzz, reviews).
    - **Key Algorithms:** Hierarchical BERT, Aspect-Based Sentiment Analysis.

## 4. [Industry-Academia Collaboration] Hyundai Mobis Project

- **Period:** June 2022 – December 2022
- **Tasks:** Short- and long-term demand forecasting for low-circulation and eco-friendly parts of vehicles.
- **Key Algorithms:** GNN, GAN, Domain Adaptation, SSL with Tabular Data
- **Programming Language:** Python


## 5. [Instructor] Yonsei University Atmospheric Science Department – Data Analysis

- **Period:** November 2020 – February 2021
- **Tasks:** Provided statistical and clustering analysis training for graduate students and assisted with data analysis.
- **Key Algorithms:** Self-Organizing Map, Dimensionality Reduction, Clustering
- **Programming Language:** Python


## 6. [Teaching Assistant] SK Hynix – Bayesian Statistics & ML Course

- **Period:** April 2021 – June 2021
- **Tasks:** Conducted coding exercises for Bayesian Statistics and ML.
- **Key Algorithms:** Bayesian Statistics
- **Programming Language:** R


## 7. [Instructor] KB Bank – Computer Vision / GAN

- **Period:** July 2021
- **Tasks:** Provided a lecture on computer vision and generative models.
- **Key Algorithms:** CNN basics (e.g., VGG16, ResNet, DenseNet), GAN
- **Programming Language:** Python (TensorFlow 2, Pytorch)


## 8. [Teaching Assistant] Python Programming & Web Crawling

- **Period:** March, September 2021,2022,2023,2024
- **Tasks:** Teaching assistant for Python programming and web crawling
- **Programming Language:** Python

## 9. [Instructor] Hanwha Ocean – Data Analysis & Statistics

- **Period**: July 2023
- **Tasks**: Provided a lecture on below contents regarding statistical analysis:
- **Key Algorithms**: Correlation Analysis, Regression Analysis, Time Series Analysis.

# Academic Society & Club

| Name | Details | Period | Etc |
|---|---|---|---|
| ISSU | Yonsei Univ. IT Management Strategy Society | 2018.03 – 2018.12 | Industry-academia collaboration projects. Python mentor. |
| Bitamin | Big Data Analytics Club | 2018.07 – 2019.06 | |
| Data Science Lab | Yonsei Univ. Data Science Society | 2019.01 – 2020.06 | The 1st President |

## [Academic Society] ISSU (Yonsei University IT Management Strategy Society)

- **Period**: March 2018 – December 2018
- **Regular Sessions**: Conducted industry-academia collaboration projects with IT companies, including Naver Papago, Naver VIBE, Send Anywhere, and Amanda.
- **Study Sessions**:
  - **1st Semester**: Contributed an article on *AI in the Arts* to *IT Chosun* (Link).
  - **2nd Semester**: Served as a Python mentor, teaching fundamental Python concepts to society members.

## [Club] BITAMIN (Big Data Analytics Club)

- **Period**: August 2018 – March 2019
- **Regular Sessions:** Focused on machine learning and text mining.
- **Study Sessions:** Conducted three machine learning projects.

## [Academic Society] Data Science Lab (Yonsei University Data Science Society)

- **Period**: February 2019 – June 2020
- **The 1st President**:
  - o Organized regular sessions and study groups on ML and DL.
- **Regular Sessions**:
  - o ① Studied the entire data science workflow, from data collection and preprocessing to modeling.
  - o ② Conducted training sessions for society members on:
    - ▪ Data Preprocessing, Association Analysis, SVM, Boosting, CNN
- **Study Sessions**: Group projects and data science competitions.

## [Study Group] OWOP (One Week One Paper)

- **Period**: January 2021 – June 2021
- **Tasks**: Conducted a research paper study group with five graduate students from the Department of Statistics and Data Science at Yonsei University.
- **Topics**: AI and statistics-related subjects, including CV, NLP, BNN, Recommender Systems, Deep Generative Models (VAE, Normalizing Flow).

## [Study Group] Deep Learning Paper Reading Study

- **Period**: May 2021 – September 2021
- **Tasks**: Conducted a research paper study group with five graduate students from the Department of Statistics and Data Science at Yonsei University.
- **Topics**: Meta Learning, Continual Learning, Interpretable/Reliable Learning

# Competitions and Projects

## 1. [Dacon] 2019 KBO Baseball Player Performance Prediction

- **Period:** January 2019 – February 2019
- **Tasks:** Predicting KBO baseball player performance for the first half of 2019.
- **Key Algorithms:** MA, ARIMA, Random Forest

## 2. [Yonsei Data Science Competition] Embrain

- **Period:** March 2019 – May 2019
- **Tasks:** Developing a marketing strategy for highly meticulous consumers.
- **Key Algorithms:** Random Forest, NN
- **Result:** 4th

## 3. [Yonsei Data Science Competition] PACKUS

- **Period:** September 2019 – November 2019
- **Tasks:**
  - ① Customer segmentation and personalized strategy development.
  - ② Future sales prediction for key products.
  - ③ Created a dashboard for CRM using R Shiny.
- **Key Algorithms:** RNN, XGBoost, LightGBM, SOM, Association Analysis
- **Result:** 2nd

## 4. [Sony Pictures] Movie Audience Prediction

- **Period:** November 2019 – January 2020
- **Tasks:** Predicting cumulative audience numbers for the first 14 days after a movie's release.
- **Key Algorithms:** Random Forest, XGBoost, Stacking, NN
- **Result:** 4th

## 5. [Kakao] Melon Playlist Continuation

- **Period**: May 2019 – July 2019
- **Tasks**: Predicting missing songs and tags in a given playlist.
- **Key Algorithms**: Collaborative Filtering, Spectrogram Analysis

## 6. [IGA Works] CTR Prediction

- **Period**: December 2019 – February 2020
- **Tasks**: Predicting click-through probability when a user is exposed to an ad.
- **Key Algorithm**: Deep CTR

## 7. [Dacon] AI Competition for Psychological Tendency Prediction

- **Period**: September 2020 – November 2020
- **Tasks**: Developing an algorithm for psychological test analysis and voter prediction.
- **Key Algorithms**: AutoML, Deep CTR

## 8. [BigCon Test] NS Home Shopping Schedule Optimization

- **Period**: July 2020 – October 2020
- **Tasks**: Optimizing home shopping schedules to maximize sales.
- **Key Algorithms**: CatBoost, LightGBM, Bayesian Optimization

## 9. [Hyundai Industries] Big Data/AI Competition

- **Period**: January 2021 – February 2021
- **Tasks**: Predicting manufacturing process task durations and optimizing task allocation.
- **Key Algorithms**: Bayesian Neural Network, LightGBM
- **Result**: Finalist (18th place out of 284 teams)

## 10. [Yonsei Data Science Competition] Hyodol

- **Period:** September 2021 – December 2021
- **Tasks:** Customer clustering and predicting optimal engagement times for personalized care.
- **Key Algorithms:** Multi-task Learning, Self-Organizing Map
- **Result:** 2nd


## 11. [Conference] 2022 Winter BK Academic Conference

- **Period:** December 2022
- **Tasks:** Multivariate time series forecasting using Spatio-Temporal GNN.
- **Key Algorithms:** Spatio-Temporal GNN
- **Result:** 4th


## 12. [Yonsei Data Science Competition] KCB

- **Period:** December 2022 – February 2023
- **Tasks:** Multi-task learning with self-supervised learning.
  - ① **Regression:** Credit score prediction
  - ② **Classification:** Credit rating prediction
  - ③ **Time Series Forecasting:** Future revenue prediction
  - ④ **Clustering:** Customer segmentation
- **Key Algorithms:** SSL with Tabular Data
- **Result:** 1st