Sunmook Choi, 최선묵

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https://smfelixchoi.github.io

EDUCATION	**M.S. student in Mathematics**, Korea University	Mar. 2022 – Present
	• Advisor: Professor Seungsang Oh	
	• GPA: 4.5 / 4.5	
	B.S. in Mathematics, Korea University	Mar. 2016 – Feb. 2022
	• Overall GPA: 4.3 / 4.5, Major GPA: 4.36 / 4.5	
	• Mandatory Military Service (Auxiliary Police)	Jun. 2017 – Feb. 2019

1. Research in Mathematics

RESEARCH INTERESTS

• **Enumerative Combinatorics**

PUBLICATIONS

[1] *Augmented Aztec Bipyramid and Dicube Tilings.*
S. Choi, S. Lee, and S. Oh, Discrete Mathematics **347** (2024) 113735 [link]

PRESENTATIONS **Aztec Bipyramid and Dicube Tilings**

• In *Knots and Spatial Graphs 2023*. KAIST, Daejeon Korea.

• In *2022 Global KMS International Conference*. Korean Mathematical Society (KMS), Seoul Korea.

RESEARCH EXPERIENCE	**Three-dimensional Tessellation**	Feb. 2022 – Present
	• Joint Research with Dr. Sangyop Lee at Chung-Ang University	
	Veritas Program (REU), Korea University	
	• Introduction to Deep Learning, supervised by Professor Seungsang Oh	May. 2020 – Jan. 2021
	• Introduction to Mathematica, supervised by Professor Seong-Deog Yang	Jan. 2017 – Feb. 2017
	• Introduction to Group theory, supervised by Professor Sangjib Kim	Jul. 2016 – Aug. 2016

PREPARATIONS

• Vertical Chain of Aztec Bipyramids and Dicube Tilings (Working Title)

2. Research in Deep Learning

RESEARCH INTERESTS

• **Theoretical Aspects of Data Science and Machine Learning**
• **Deep Learning and Deep Reinforcement Learning**
• **Bayesian Machine Learning**

PUBLICATIONS

[2] *CAU KU deep fake detection system for ADD 2023 challenge.*
S. Han, T. Kang, **S. Choi**, J. Seo, S. Chung, S. Lee, S. Oh, and I.-Y. Kwak. (IJCAI 2023) [link]

[3] *Low-quality Fake Audio Detection through Frequency Feature Masking.*
I.-Y. Kwak, **S. Choi**, J. Yang, Y. Lee, S. Han, and S. Oh. (DDAM 2022) [link]

[4] *Overlapped Frequency-Distributed Network: Frequency-Aware Voice Spoofing Countermeasure.*
S. Choi, I.-Y. Kwak, and S. Oh. (Interspeech 2022) [link]

[5] *Light-weight Frequency Information Aware Neural Network Architecture for Voice Spoofing Detection.*
S. Choi, J. Yang, Y. Lee, S. Oh, and I.-Y. Kwak. (ICPR 2022) [link]

PRESENTATIONS	• Overlapped Frequency-Distributed Network: Frequency-Aware Voice Spoofing Countermeasure. (Interspeech 2022, Incheon Korea) • Light-weight Frequency Information Aware Neural Network Architecture for Voice Spoofing Detection. (ICPR 2022, Montreal Quebec Canada)

CHALLENGE AWARDS

IJCAI 2023 Competition and Challenge Award   Aug. 2023
- Ranked in the 3rd place of Track 1.2 (Audio Fake Game - Detection, FG-D) from the Second Audio Deepfake Detection Challenge (ADD 2023)

ICASSP 2022 Grand Challenge Award   Mar. 2022
- Ranked in the 3rd place of Track 1 (Low-quality Fake Audio Detection, LF) from the 1st Audio Deep Synthesis Detection Challenge (ADD 2022)

RESEARCH EXPERIENCE

Joint DRL Research with Dr. Hyun-Kil Shin at Korea Institute of Toxicology
- Designing Potent and Safe Drug candidates through DRL algorithms   Jan. 2023 – Present

Joint DL Research with Dr. Il-Youp Kwak at Chung-Ang University
- Data Augmentation Methods for Audio Domain   Mar. 2022 – Present
- Automatic Speaker Verification (ASV) System   Mar. 2022 – Present
- Audio Spoof Countermeasure System   Feb. 2021 – Present

PREPARATIONS
- *TB-ResNet: Bridging the Gap from TDNN to ResNet in Speaker Verification with Temporal-Bottleneck Enhancement.* (preprint, submitted to ICASSP 2024)
- *Experimental Study: Enhancing Voice Spoofing Detection Models with wav2vec 2.0.* (preprint, submitted to ICASSP 2024)
- *Frequency Feature Masking Augmentation for Voice Spoofing Detection.* (preprint, Journal ver. of [3])

3. Experience

TEACHING EXPERIENCE

Teaching Fellow, Dept. of Mathematics, Korea University
- Linear Algebra II With LAB (MATH 222)   Fall 2023
- Linear Algebra I With LAB (MATH 221)   Spring 2023
- Linear Algebra II With LAB (MATH 222)   Fall 2022

Research Assistant, Dept. of Mathematics, Korea University
- Linear Algebra I With LAB (MATH 221)   Spring 2022

PRESENTATIONS
- *My Know-how of TF Tutorial based on Problem Solving*
  In *Autumn 2023 Tutorial TF Workshop*, Center for Teaching and Learning, Korea University

HONORS & AWARDS

Scholarships, Korea University
- Teaching Fellow Scholarship   Spring 2023, Fall (2022, 2023)
- Teaching Assistant Scholarship   Spring 2023, Fall 2023

- Research Scholarship   Fall 2022, Fall 2023
- Research Assistant Scholarship   Spring 2022, Fall 2022
- Special Scholarships   Spring (2019, 2020, 2021), Fall (2019, 2020, 2021)
- Special Scholarship   Spring (2020, 2021), Fall (2020, 2021)
- Veritas Program Scholarship   Spring 2016, Fall (2016, 2020)

Fund Scholarship
- Sigma (Dept. of Mathematics Alumni Association)   Fall 2021
- SAMSUNG Welfare Foundation Scholarship (Dream Class), SAMSUNG   Spring 2019

Honors, Korea University
- Dean's List, College of Science   Fall 2020
- Semester High Honors   Spring (2016, 2019, 2020, 2021), Fall (2019, 2020, 2021)

Awards
- Poster Encouragement Award, The Korea Statistical Society   6th Nov. 2021
  * Poster: Light-weight Spoofing Detection Model Using BC-ResNet

DL & DRL SEMINARS

Deep Learning Seminar Season 1 & 2 (Leader)
- https://github.com/smfelixchoi/MATH-DL-study-2   Jun. 2023 – Aug. 2023
- https://github.com/smfelixchoi/MATH-DL-study   Sep. 2022 – Feb. 2023
- Theoretical Review and Implementation of GD, MLP, CNN, RNN, AE, VAE, GAN.

Deep Reinforcement Learning Seminar (Leader)   Mar. 2023 – Sep. 2023
- https://github.com/smfelixchoi/MATH-DRL-study
- Theoretical Review and Implementation of MDP, DP, RL, DQN, PG, AC, PPO.

WRITING SAMPLES

Summary Writing
- Deep Learning (https://github.com/smfelixchoi/All-about-DL, in progress)
- Deep Reinforcement Learning (https://github.com/smfelixchoi/All-about-DRL, in progress)

COMPETENCES **Languages** Korean (*native*), English (**TOEFL iBT 106**, RC 29, LC 28, SPK 23, WRT 26)

Techniques LaTeX, Python, Deep Learning Frameworks (TensorFlow, PyTorch)

EXTRA-CURRICULAR

SAMSUNG Dream Class   Spring 2019
- Teaching Mathematics to middle school students as an after-school program.

REFERENCES
- Professor Seungsang Oh, Department of Mathematics, Korea University
- Associate Professor Il-Youp Kwak, Department of Applied Statistics, Chung-Ang University
- Assistant Professor Donghun Lee, Department of Mathematics, Korea University