Uiwon Hwang

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Research Interests

Artificial Intelligence & Machine Learning
- Generative adversarial networks
- Machine learning from limited data
- Representation learning

Biomedical Data Science
- Digital Healthcare
- Supervised, unsupervised, and semi-supervised learning for real-world data
- Source-free unsupervised domain adaptation

Education

Ph.D. in Electrical and Computer Engineering   Mar 2017 – Aug 2023
- Seoul National University, Seoul, Korea
- Advisor: Prof. Sungroh Yoon
- Thesis: "Learning from Limited Data: Deep Generative Models and Applications"

B.S. in Biomedical Engineering   Mar 2013 – Aug 2016
- Korea University, Seoul, Korea
- Early graduation with great honor (Major GPA: 4.43/4.50, Overall GPA: 4.35/4.50)

Publications (*: equal contribution)

Conference and Workshop (peer reviewed)

7. Jonghyun Lee, Dahuin Jung, Saehyung Lee, Junsung Park, Juhyeon Shin, **Uiwon Hwang***, Sungroh Yoon*, "Entropy is not Enough for Test-time Adaptation: From the Perspective of Disentangled Factors." *International Conference on Learning Representations (ICLR)*, **Spotlight**, 2024.

6. **Uiwon Hwang**, Jonghyun Lee, Juhyeon Shin, Sungroh Yoon, "SF(DA)^2: Source-free Domain Adaptation Through the Lens of Data Augmentation." *International Conference on Learning Representations (ICLR)*, 2024.

5. Heonseok Ha, **Uiwon Hwang**, Jaehee Jang, Ho Bae, Sungroh Yoon, "Membership Privacy-Preserving GAN." *British Machine Vision Conference (BMVC)*, 2022.

4. **Uiwon Hwang**, Euideuk Hwang, Minsoo Kang, Sungroh Yoon, "Prediction of Mortality and Intervention in COVID-19 Patients Using Generative Adversarial Networks." *ICML Workshop on Healthcare AI and COVID-19*, 2022.

3. **Uiwon Hwang**, Heeseung Kim, Dahuin Jung, Hyemi Jang, Hyungyu Lee, Sungroh Yoon, "Stein Latent Optimization for Generative Adversarial Networks." *International Conference on Learning Representations (ICLR)*, 2022.

2. **Uiwon Hwang**, Dahuin Jung, Sungroh Yoon. "HexaGAN: Generative Adversarial Nets for Real World Classification." *International Conference on Machine Learning (ICML)*, 2019.

1. Sungwoon Choi, Heonseok Ha, **Uiwon Hwang**, Chanju Kim, Jung-Woo Ha, Sungroh Yoon. "Reinforcement Learning based Recommender System using Biclustering Technique." *WSDM Workshop on Multi-dimensional Information Fusion for User Modeling and Personalization (IFUP)*, 2018.

Journal

6. Sang-gil Lee*, **Uiwon Hwang***, Seonwoo Min, Sungroh Yoon, "Polyphonic Music Generation with Sequence Generative Adversarial Networks." *Journal of KIISE*, 2024.

5. **Uiwon Hwang***, Sung-Woo Kim*, Dahuin Jung, SeungWook Kim, Hyejoo Lee, Sang Won Seo, Joon-Kyung Seong, Sungroh Yoon. "Real-world Prediction of Preclinical Alzheimer's Disease with a Deep Generative Model." *Artificial Intelligence in Medicine*, 2023.

4. Seonghun Im, Siwon Kim, Sunghwa Woo, Inman Jang, Taewoo Han, **Uiwon Hwang**, Won-Suk Ohm, Myunghan Lee. "Deep Learning-assisted Active Noise Control in a Time-varying Environment." *Journal of Mechanical Science and Technology*, 2023.

3. Ho Bae, Younghan Lee, Yohan Kim, **Uiwon Hwang**, Sungroh Yoon, Yunheung Paek. "Learn2Evade: Learning-based Generative Model for Evading PDF Malware Classifiers." *IEEE Transactions on Artificial Intelligence*, 2021.

2. **Uiwon Hwang***, Jaewoo Park*, Hyemi Jang*, Sungroh Yoon, Nam Ik Cho. "PuVAE: A Variational Autoencoder to Purify Adversarial Examples." *IEEE Access*, 2019.

1. Yongjun Hong, **Uiwon Hwang**, Jaeyoon Yoo, Sungroh Yoon. "How Generative Adversarial Networks and Their Variants Work: An Overview." *ACM Computing Surveys*, 2019.

Preprint 4. Youngtak Oh, Saehyung Lee, **Uiwon Hwang**, Sungroh Yoon, "On Mitigating Stability-Plasticity Dilemma in CLIP-Guided Image Morphing via Geodesic Distillation Loss." *arXiv*, 2024.

3. Heonseok Ha, **Uiwon Hwang**, Yongjun Hong, Sungroh Yoon. "Deep Trustworthy Knowledge Tracing." *arXiv*, 2018.

2. **Uiwon Hwang**, Sungwoon Choi, Han-Byoel Lee, Sungroh Yoon. "Adversarial Training for Disease Prediction from Electronic Health Records with Missing Data." *arXiv*, 2017.

1. Sang-gil Lee, **Uiwon Hwang**, Seonwoo Min, Sungroh Yoon. "Polyphonic Music Generation with Sequence Generative Adversarial Networks." *arXiv*, 2017.

Domestic Conference

4. **Uiwon Hwang**, Sungroh Yoon. "The Link Between Adversarial Learning and Adversarial Robustness.", *Korea Software Congress (KSC)*, 2020.

3. **Uiwon Hwang**, Sungroh Yoon. "A Trend of Generative Adversarial Networks for Electronic Health Records.", *Symposium of the Korean Institute of Communications and Information Sciences (KICS)*, 2018.

2. **Uiwon Hwang**, Sungwoon Choi, Heonseok Ha, Sungroh Yoon. "Disease Prediction from Electronic Health Record Data Using Generative Adversarial Networks." *Korea Software Congress (KSC)*, 2017, Excellent Presentation Award.

1. Heonseok Ha, **Uiwon Hwang**, Sungwoon Choi, Sungroh Yoon. "Characteristic analysis of distributed analysis algorithms for data silos with missing data." *Winter Conference of Korean Institute of Information Scientists and Engineers (KIISE)*, 2016.

Patents

3. Sungroh Yoon, **Uiwon Hwang**, Heeseung Kim. "Method and Apparatus for Training Unsupervised Conditional Generative Model." US Patent Pending, Application No. 18204457.

2. Sungroh Yoon, **Uiwon Hwang**, Heeseung Kim. "Method and Apparatus for Training Unsupervised Conditional Generative Model." Korean Patent Pending, Application No. 10-2023-0060987.

1. Sungroh Yoon, **Uiwon Hwang**, Dahuin Jung. "Method and Apparatus for Data Classification Based on Generative Model." Korean Patent Pending, Application No. 10-2022-0068096.

Professional Experience
Assistant Professor   Sep 2023 – Present

- Division of Digital Healthcare, Yonsei University - Mirae Campus, Wonju, Korea
    - Ofice: Miare Hall, Room 503
    - Biomedical Data Science Laboratory (BDSL), Yonsei University - Mirae Campus, Wonju, Korea.

Research Internship   Sep 2016 – Feb 2017
- Data Science & Artificial Intelligence Lab., Seoul National University — Seoul, Korea
    - Adviser: Prof. Sungroh Yoon
    - Studied machine learning, deep generative models.
    - Analyzed medical data to predict a recurrence of breast cancer.

Undergraduate Researcher   Mar 2015 – Aug 2016
- Brain Reverse Engineering by Intelligent Neuroimaging (BREIN) Lab., Korea University — Seoul, Korea
    - Adviser: Prof. Joon-Kyung Seong
    - Analyzed Magnetic Resonance Imaging (MRI) for Attention Deficit Hyperactivity Disorder (ADHD).
    - Studied machine learning, deep learning, bioinformatics, and medical imaging.

Invited Talks
Poster presentation, SNU AIIS Autumn Retreat, 2022
Poster presentation, ICLR 2022 Social: ML in Korea, 2022
Oral presentation, SNU AIIS Spring Retreat, 2022
Oral presentation, Hyundai Motor Company, 2020
Oral presentation, Korea Software Congress, 2019
Poster presentation, Samsung AI Forum, 2019
Poster presentation, SNU AI Institute (AIIS) Retreat, 2019
Oral presentation, Hyundai AIR Lab, 2019

Awards and Honors
Awards
Excellent Paper Award, Hyundai Motors Company, 2022
Poster Session Award, Samsung AI Forum, 2019
Excellent Presentation Award, Hyundai AIR Lab, 2019
Excellent Paper Award, Hyundai AIR Lab, 2019
Excellent Presentation Award, Korea Software Congress, 2017
President's List, Fall 2015
Semester Highest Honors, Fall 2014 & Spring 2015
Semester High Honors, Fall 2013, 2014, 2015 & Spring 2014, 2015, 2016

Scholarships
Google Conference Scholarship, 2022
The Education and Research Foundation College of Engineering SNU Scholarship, 2019
Academic Excellence Scholarship, Korea University, 2014-2016

Teaching Experiences
Assistant professor at Div. of Digital Healthcare, Yonsei University - Mirae Campus
- Computational Thinking (Fall 2023)
- Fundamentals of Algorithm (Fall 2023)

Teaching assistant at Dept. of ECE, Seoul National University
- Deep Learning (Head TA, Fall 2021)
- Machine Learning Fundamentals and Applications in ECE (Head TA, Spring 2020)
- Theory and Practice of IoT, AI, and Big Data (Spring 2019)
- Topics in Computer and VLSI (AI: NUGU & Aibril with Watson) (Fall 2017)

Reviewer Experiences
Conferences: ICML, NeurIPS, ICLR, ICIBM
Journals: ACM CSUR, IEEE Access, Computational Intelligence and Neuroscience

Projects

Metaverse Agora 2022 - 2023
- Ministry of Science and ICT
- Developed deep generative models for metaverse communication space.

Explainable AI 2020 - 2023
- Hyundai Motor Company
- Developed explainable AI methods for time-series data.

Ingredient Discovery 2020 - 2021
- COSMAX
- Developed big data analysis software to discover cosmetic ingredient combinations.

Adversarial Robustness 2019 - 2020
- Samsung Electronics
- Developed a Variational Autoencoder (VAE) to defend against adversarial attacks.

Secure & Private AI 2018 - 2019
- SK Telecom (T-brain)
- Enhancing security and privacy of AI systems.

Intelligent Tutoring System 2017
- Ministry of Science and ICT, ETRI
- Developed a trustworthy knowledge tracing model to trace a real learning process of a student.

Personalized Healthcare System 2016 – 2019
- Ministry of Trade, Industry and Energy
- Developed machine learning and deep learning models to predict occurrence, recurrence, and mortality of breast cancer using electronic health records.

ADHD Diagnosis 2015 – 2016
- Collaborated with Seoul National University Hospital and MIDAS IT
- Developed 3D convolutional neural networks to classify brain MRIs of ADHD subtypes.