

# Uiwon Hwang

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## Education

- Ph.D. Candidate - Electrical and Computer Engineering** Mar 2017 – Present
- Seoul National University, Seoul, Korea
  - Research interests: Deep generative models, Biomedical data science, Secure AI
- Bachelor of Engineering - Biomedical Engineering** Mar 2013 – Aug 2016
- Korea University, Seoul, Korea
  - Early graduation, with 2nd place in the year (Major GPA: 4.43/4.50, Overall GPA: 4.35/4.50)
  - Thesis title: 3D convolution networks for classification: Studies on Attention Deficit Hyperactivity Disorder and Alzheimer's diseases

## Experience

- Undergraduate Researcher** Mar 2015 – Aug 2016
- Brain Reverse Engineering by Intelligent Neuroimaging (BREIN) Lab., Korea University — Seoul, Korea
    - Analyzed Magnetic Resonance Imaging (MRI) for Attention Deficit Hyperactivity Disorder (ADHD).
    - Studied machine learning, deep learning, bioinformatics, and medical imaging.
- Research Internship** Sep 2016 – Feb 2017
- Data Science & Artificial Intelligence Lab., Seoul National University — Seoul, Korea
    - Studied machine learning, deep generative models.
    - Analyzed medical data to predict a recurrence of breast cancer.

## Projects

- ADHD Diagnosis** Dec 2015 – Aug 2016
- Developed 3D convolutional neural networks to classify brain MRIs of ADHD subtypes.
- Watchrone** May 2016 – Jul 2016
- Collaborated with industrial designers.
  - Devised an idea of a smartwatch combined with a drone for a sudden attack situation.
- Intelligent Tutoring System** Jun 2017 – Dec 2017
- Studied Deep Knowledge Tracing (DKT) used in Intelligence Tutoring System (ITS) to maximize learning effect of a student.
  - Developed a trustworthy knowledge tracing model to trace a real learning process of a student.
- Personalized Healthcare System** Sep 2016 – Nov 2018
- Developed machine learning and deep learning models to predict an occurrence, recurrence, and mortality of breast cancer using electronic health records.
- Real World Classification** Jun 2018 - Jun 2019
- Interpreted three problems in real world data (missing data, class imbalance, and missing label problems) from a single perspective.
  - Developed Generative Adversarial Networks (GANs) to achieve the best classification performance.
- Secure & Private AI** Jan 2019 - Present
- Studied adversarial attacks, membership inference attacks, and differential privacy.
  - Developed a Variational Autoencoder (VAE) to defend adversarial attacks.

## Publications

- [1] **Uiwon Hwang**, Dahuin Jung, Sungroh Yoon. "HexaGAN: Generative Adversarial Nets for Real World Classification." in *Proceedings of International Conference on Machine Learning (ICML)*, 2019.

- [2] **Uiwon Hwang**, Jaewoo Park, Hyemi Jang, Sungroh Yoon, Nam Ik Cho. “PuVAE: A Variational Autoencoder to Purify Adversarial Examples.” *IEEE Access*, 2019.
- [3] Yongjun Hong, **Uiwon Hwang**, Jaeyoon Yoo, Sungroh Yoon. “How Generative Adversarial Networks and Their Variants Work: An Overview.” *ACM Computing Surveys (CSUR)*, 2019.
- [4] Heonseok Ha, **Uiwon Hwang**, Yongjun Hong, Sungroh Yoon. “Deep Trustworthy Knowledge Tracing.” *arXiv*, 2018. (under review)
- [5] Sungwoon Choi, Heonseok Ha, **Uiwon Hwang**, Chanju Kim, Jung-Woo Ha, Sungroh Yoon. “Reinforcement Learning based Recommender System using Biclustering Technique.” in *Proceedings of WSDM Workshop on Multi-dimensional Information Fusion for User Modeling and Personalization (IFUP)*, 2018.
- [6] **Uiwon Hwang**, Sungroh Yoon. “A Trend of Generative Adversarial Networks for Electronic Health Records.”, *Proceedings of Symposium of the Korean Institute of communications and Information Sciences*, 2018.
- [7] **Uiwon Hwang**, Sungwoon Choi, Han-Byoel Lee, Sungroh Yoon. “Adversarial Training for Disease Prediction from Electronic Health Records with Missing Data.” *arXiv*, 2017.
- [8] Sang-gil Lee, **Uiwon Hwang**, Seonwoo Min, Sungroh Yoon. “Polyphonic Music Generation with Sequence Generative Adversarial Networks.” *arXiv*, 2017.
- [9] **Uiwon Hwang**, Sungwoon Choi, Heonseok Ha, Sungroh Yoon. “Disease Prediction from Electronic Health Record Data Using Generative Adversarial Networks.” *Korea Software Congress*, 2017, Best Presentation Award.
- [10] Heonseok Ha, **Uiwon Hwang**, Sungwoon Choi, Sungroh Yoon. “Characteristic analysis of distributed analysis algorithms for data silos with missing data.” *한국정보과학회 동계학술대회*, 2016.

#### Activities

**Invited Paper: HexaGAN** @ Korea Software Congress 2019  
**Reviewer for IEEE Access** 2019

#### Awards

**Semester High Honors** for Fall 2013, Spring 2014, Fall 2014, Spring 2015, Fall 2015, and Spring 2016  
**Semester Highest Honors** for Fall 2014 and Spring 2015  
**President’s List** for Fall 2015  
**Finalist**, Spark Design Awards: Spring Concept, 2016  
**Best Presentation Award**, Korea Software Congress, 2017  
**Excellent Paper Award**, Hyundai AIR Lab, 2019  
**Poster Session Award**, Samsung AI Forum, 2019