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 Computer 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