

Sungtae An | Ph.D. Student

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“For the Benefit of All”

Education

Georgia Institute of Technology

Ph.D. in Computer Science

Advisor: Prof. Jimeng Sun

Atlanta, GA

Aug 2013–Present

KAIST

M.S. in Electrical Engineering

Advisor: Prof. Ju-Jang Lee

Daejeon, South Korea

Feb 2010–Feb 2012

Hanyang University

*B.S. in Electrical and Computer Engineering , **Cum Laude***

(2004–2006 Obligatory Military Service)

Seoul, South Korea

Mar 2003–Feb 2010

Patents

Method and System for Predicting Refractory Epilepsy Status

U.S. Patent Application 15/412,806

Patent Pending

Filed Jan 2017

Method and System for Predicting Optimal Epilepsy Treatment Regimes

U.S. Patent Application 15/415,758

Patent Pending

Filed Jan 2017

Skill Set

Languages: Python, Scala, C/C++, MATLAB, Lua, Java, R

Tools: PyTorch, TensorFlow, Spark, Hadoop, CUDA, PCL, OpenCV, ROS, Minitab, EViews

Microprocessor: Freescale HCS12, AVR, DSP

Platforms: Linux, OSX, Windows

Research Interests

Artificial Intelligence and Machine Learning: Deep Learning, Reinforcement Learning

Security and Privacy in Machine Learning: Adversarial Examples and Defenses

Awards and Honors

Study Abroad Scholarship

Kwanjeong Educational Foundation, South Korea

Aug 2013–Aug 2018

Best Paper Prize*2011 ICROS Daejeon-Chungcheong Chapter Annual Conference**Dec 2011***National Scholarship***KAIST**Jan 2010–May 2013***Merit-based Scholarship***Dept. of Electrical and Computer Engineering, Hanyang University**Spring/Fall 2008, Fall 2009***National Science and Engineering Undergraduate Scholarship***Korea Student Aid Foundation**Fall 2007*

Experience

Internship.....

Autonomous Driving Research Intern*Autonomous Driving Team, Bosch Research and Technology Center, Palo Alto Jun 2014–Aug 2014*

As a research intern in Autonomous Driving Team at Bosch Research and Technology Center, developed and evaluated graph optimization frameworks for SLAM by using GTSAM, g2o and Google Ceres Solver.

Supervisor: Dr. Elmar Mair

Research Projects.....

Security and Privacy in Machine Learning Based Healthcare Applications*Prof. Jimeng Sun**Aug 2017 – Present*

Deep Learning as well as traditional Machine Learning techniques are successfully being applied in many healthcare application such as personalized treatment recommendation and early prediction of diseases. On the other hand, it has been shown recently that Neural Network based classifiers as well as other algorithms such as Support Vector Machine and Logistic Regression are vulnerable to adversarial perturbations which is small to be detected by human but can lead classifiers to be fooled to give wrong results in testing time. Previous works have shown that the relatively simple methods such as *Fast Gradient Sign Method (FGSM)* and *Jacobian-based Saliency Map Approach (JSMA)* can craft very effective adversarial attacks either in white-box or black-box settings. We are currently investigating if these methods are still effective on healthcare domain and developing improved attacks as well as possible defensive methods. Also, we are developing an adversarial attack based on sequential data which are not studied well so far.

Predictive Modeling of Drug Resistant Epilepsy Patients*Prof. Jimeng Sun, funded by UCB, Inc.**Dec 2015 – Present*

Classification and predictive modeling of highly refractory, drug resistant, epilepsy patients from general epilepsy patients population using deep learning, especially Recurrent Neural Network is applied. Raw dataset of claim records for about 30 million patients are processed using big data analytics techniques on scalable systems such as Spark and Hadoop to construct qualified study cohort by using expert defined inclusion/exclusion criteria. Embedding for multi-level medical codes are learned and used as input to Recurrent Neural Network which utilize temporal information of medical history for each patient. Traditional classification algorithms such as Logistic Regression, SVM and Random Forest are also evaluated for performance comparison.

Personalized Treatment Recommendation for Epilepsy Patients

Prof. Jimeng Sun, funded by UCB, Inc.

Apr 2015 – Present

Approximately 2.2 million of people, about 1% of population, in the U.S. are suffered from epilepsy. However, there is no golden rule for clinicians to make a decision which medicine, among over two dozen of anti-epileptic drugs (AEDs), should be given to patient regardless of whether the patient is newly diagnosed with epilepsy or has failed to be seizure-free with the previous AED. We are studying a couple of possible approach toward clinical decision support system. First, we are developing a predictive model of drug stability of each AED for epilepsy patients using supervised learning algorithms. Moreover, we are developing a methodology of personalized treatment recommendation for epilepsy patients by using reinforcement learning algorithm.

Smart Bundle Adjustment with PCG Solver in GTSAM

Prof. Frank Dellaert, IRIM@GT

Aug 2014–Dec 2014

Developed Fast Bundle Adjustment using improved preconditioned conjugate gradient solver in GTSAM

Integrating Kinect and IMU for SLAM using Dense Point Cloud

Prof. Henrik I. Christensen, IRIM@GT

Aug 2013–Dec 2014

Developed a feature points registration method with a higher accuracy for RGB-D Simultaneous Localization and Mapping (SLAM) using prior information estimated by an Inertial Measurement Unit (IMU)

Tactical System of Unmanned Networked Airborne Autonomy and Multi-role Intelligence

Agency for Defense Development, South Korea

Aug 2012–Jul 2013

Developed a task allocation method using the consensus-based bundle algorithm (CBBA) for multi-agent missions.

Guidance of Anti-ASM(Anti-Ship-Missile)-Missile using a Dual-Mode (RF/SDIIR) Seeker

Agency for Defense Development, South Korea

Jan 2012–Jul 2013

Implemented a track-before-detection algorithm using a particle filter for an early detection of a missile

Fast Detection and Tracking of Pedestrian using Particle Swarm Optimization

KAIST, South Korea

Jan 2011–Dec 2011

Developed a faster unified algorithm for detection and tracking of pedestrians using a Gaussian particle swarm optimization

Teaching Assistance.....

CSE6250 Big Data Analytics for Healthcare, Head TA

Prof. Jimeng Sun

School of Computational Science and Engineering, Georgia Tech

Fall 2017

Conducting lab sessions on Deep Learning for Healthcare [[webpage](#)][[github](#)]

CSE8803 Big Data Analytics for Healthcare, Head TA

Prof. Jimeng Sun

School of Computational Science and Engineering, Georgia Tech

Spring/Fall 2016

Managing homeworks and projects

MAE285 Software Application in Aerospace Engineering

Prof. Han-Lim Choi

Dept. of Aerospace Engineering, KAIST

Fall 2012

MAE260 Elementary Mathematics for Aerospace Mechanics

Prof. Han-Lim Choi

Dept. of Aerospace Engineering, KAIST

Spring 2012

EE405 Electronics Design Lab.

Prof. Byung-Kook Kim

Dept. of Electrical Engineering, KAIST

Spring 2011

Topics: Image Processing, Linux Programming, Motor Control

Publications

Journals.....

Sungtae An, K. Malhotra, C. Dilley, E. Han-Burgess, J. Robertson, C. Clark, M. B. Westover, and J. Sun, "Big data analytics of medical claims data for early prediction of drug resistant epilepsy," *Neurology*. Submitted.

Sung-Tae An, J.-J. Kim, and J.-J. Lee, "Unified detection and tracking of humans using gaussian particle swarm optimization," *Journal of Institute of Control, Robotics and Systems*, vol. 18, pp. 353–358, Apr 2012.

Conferences.....

S.-H. Kim, **Sung-Tae An**, and H.-L. Choi, "Decentralized task re-planning approaches with *en Route* information rewards," in *Proc. Int' Conf. Robot Intelligence Technology and Applications (RiTA)*, IROC, Dec 2012.

S.-H. Moon, **Sung-Tae An**, S.-H. Kim, H.-L. Choi, B.-G. Park, and M.-J. Tahk, "A track before detect approach for strap-down image ir seekers in dual-mode-guided interceptors," in *Proc. Asia-Pacific Int'l Symp. Aerospace Technology (APISAT)*, KSAS, JSASS, CSAA, RAeS Australian Division, Nov 2012.

Sung-Tae An, J.-J. Kim, and J.-J. Lee, "Detection and tracking of humans using particle swarm optimization," in *Proc. 2011 ICROS Daejeon-Choongchung Chapter Annual Conference*, pp. 40–44, Dec 2011. **Best Paper Prize**.

Sung-Tae An, J.-J. Kim, and J.-J. Lee, "SDAT: Simultaneous detection and tracking of humans using particle swarm optimization," in *Proc. IEEE Int'l Conf. Mechatronics and Automation (ICMA)*, pp. 483–488, IEEE, Aug 2011.

Sung-Tae An, J.-J. Kim, and J.-J. Lee, "Fast human detection using gaussian particle swarm optimization," in *Proc. IEEE 5th Int'l Conf. Digital Ecosystems and Technologies (DEST)*, pp. 143–146, IEEE, May 2011.

Academic and Extracurricular Activities

Student Member

Association for the Advancement of Artificial Intelligence (AAAI)

Professional Affiliation

Jul 2012–Present

Stanford Artificial Intelligence Class (Advanced Track)

Sebastian Thrun & Peter Norvig, Top 5% among 23,000 students

Online Class

2011

Stanford Machine Learning Class

Andrew Ng, Perfect Score

Online Class

2011

Official Academic Club for Economic Research

Hanyang University, Leader for the 2004 academic year

Club Activity

Mar 2003–Feb 2010

Free Tutoring for Low Income Children

Hanyang University and Seongdong District Office

Community Service

2007–2009