Taegyun **Jeon**

Research Scientist · Machine Learning and Computer Vision

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Summary

I'm a senior researcher at Satrec Initiative. Prior to that I completed PhD from Gwangju Institute of Science and Technology advised by Dr. Moongu Jeon. 9+ years specializing in machine learning, computer vision and biomedical engineering. I am currently working on designing deep learning models for satellite imagery and creating new business models on remote sensing and geospatial intelligence.

Work Experience

Satrec Initiative, R&D Center

Daejeon, South Korea

Senior Researcher for Deep Learning with Satellite Imagery — *Sep. 2016 - Present*

- Build and lead team for deep learning research and development from scratch
- Designed and implemented super-resolution method for satellite imagery.
- Designed and implemented semantic segmentation methods based on u-net architecture for satellite imagery.
- Designed dataset and algorithm for estimation of cloud coverage with satellite browsing imagery.
- Designed dataset and algorithm for detection and classification military and civil targets on satellite imagery.
- Designed dataset and implemented target classification system from 500k multi-sensor imagery.

Gwangju Institute of Science and Technology, Machine Learning and Vision Laboratory

Gwangju, South Korea

Graduate Research Assistant for Machine Learning and Computer Vision — *Mar. 2009 - Aug. 2016*

- Designed and implemented Deep Learning architecture for electricity price forecasting using recurrent neural networks which implemented by TensorFlow and Python based on real electricity market data from Energy Price Forecast Competition 2016.
- Improved robust heartbeat detection score by 6.89% by implementing association algorithm for multimodal physiological signals using C and MATLAB, presented in Computing in Cardiology / PhysioNet Challenge 2014.
- Designed hardware prototype based on AM335x ARM Cortex-A8 and implemented device driver and machine learning and signal processing programming for real-time ECG processing and analysis
- Designed and implemented semantic segmentation method of unknown regions with focus on military aspects of terrain using aerial electro-optical imaging system.
- Optimized the combination of features for ventricular tachycardia and fibrillation (VT/VF) using iterative feature selection with 95% of accuracy, sensitivity and specificity.

Gwangju Institute of Science and Technology, Applied Computing Laboratory

Gwangju, South Korea

Graduate Research Assistant for Machine Learning and Computer Vision — *Mar. 2007 - Feb. 2009*

- Developed level-set method with additive operator splitting. and accelerated with OpenMP and MPI.
- Implemented and conducted an integrated testing software for standard mobile imaging architecture (SMIA) with mobile camera hardware modules.
- Developed domain feature for classification of Atrial Fibrillation (AF) using clustering centroids from unstable ECG signal in ubiquitous environments.

Dong-A University, Intelligent Systems Laboratory

Busan, South Korea

Undergraduate Researcher for Natural Language Processing — *Jul. 2005 - Dec. 2006*

- Implemented opinion classifier by designing sentiment extraction with seed words from news and product reviews.
- Constructed lexical semantic hierarchy for general and IT hierarchical categories from about 40,000 words.

Education

Gwangju Institute of Science and Technology (GIST)

Gwangju, South Korea

PhD in Electrical Engineering and Computer Science — *Mar. 2009 - Aug. 2016*

- Thesis: "Robust Physiological Signal Analysis: Design and Applications with Machine Learning" advised by Prof. Moongu Jeon
- Courses: Fundamentals of Multiagent Systems, High-Level Image Understanding Processing, Numerical Optimization, Estimation and Detection, Advanced Design and Analysis of Algorithms, Introduction to Patents, Digital Image Processing.

Gwangju Institute of Science and Technology (GIST)

Gwangju, South Korea

M.S. in Information and Communications — *Mar. 2007 - Feb. 2009*

- Thesis: "Bio-Inspired Computing: Design and Applications" advised by Prof. Moongu Jeon
- Courses: Random Process, Design and Analysis of Algorithms, Applied Engineering Mathematics, Advanced Discrete Mathematics, Machine Learning Theories, Molecular Systems Biology, Pattern Recognition, Statistical Analysis of Dynamic Systems.

Dong-A University

Busan, South Korea

B.E. in Computer Engineering — *Mar. 2000 - Feb. 2007*

- Including two-year military service.

Technical Skills

Programming Language: Python, MATLAB, C, C++
Deep Learning: TensorFlow, Keras, PyTorch, Caffe
Parallel programming: CUDA, OpenMP, Cluster computing, MPI
Software library: OpenCV, Pandas, Numpy, SciPy, QT, Weka
Operating Systems: Unix and Linux variants, Embedded Linux, Windows, Mac OS

Extracurricular Activity

Google *USA*

Google Developer Experts – Machine Learning *Sep. 2017 - PRESENT*

- Continued activity in influential and recognized speaking at developer conferences.
- Provided meaningful advice to tech startups and companies.

Machine Learning Jeju Camp 2017 *South Korea*

Mentor *May. 2017 - Jul. 2017*

- Contributed for MLJejuCamp with screening for the applications.
- Conducted mentoring for Bingzhe Wu with project named "LR2HR: Single Image Super-Resolution with Learnable Perceptual Loss".

TensorFlow Korea User Group on Facebook *South Korea*

Co-Administrator *Apr. 2016 - PRESENT*

- Organized meetup events (CVPR paper day, TensorFlow-KR Meetup, .
- Participated on online paper reading group (PR12). And distribute recorded footage through YouTube and Facebook.

Daejeon Center for Creative Economy & Innovation *South Korea*

Lead Organizer for "Daejeon AI Forum" *Mar. 2017 - PRESENT*

- Contributed for sharing the research and development experience from the top companies, research institutes, and academics related with artificial intelligence and machine learning.
- Contributed for offering publicity opportunities for startups that are not well known for the public.

Gwangju Institute of Science and Technology (GIST) *South Korea*

Mentor for Research and Education Program by Gwangju Science Academy For the Gifted *Apr. 2015 - Nov. 2015*

- Conducted tutorials for the high school students about basic of computer vision.
- Contributed for the project advisor with "Recognition of Objects and Automated Driving Using Template matching". The result was presented at the domestic conference (hosted by the Korean Institute of Communication and Information Sciences).

Tutorials and Lectures

Gachon University *Sungnam, South Korea*

Invited Lecturer for "Deep learning and TensorFlow (3 weeks course)" *Jun. 2017*

- Introduced basic concepts of deep learning, convolutional neural networks, and recurrent neural networks.
- Provided the practice for implementations using TensorFlow and Keras.

Tutorial in Korean Supercomputing Conferences 2016 *Seoul, South Korea*

Presenter for <Recurrent Neural Networks: Basic and Implementations> *Oct. 2016*

- Introduced basic concept of recurrent neural networks (RNNs).
- Provided the tutorial for implementations of RNNs using TensorFlow.

Program Committees

Academic Activity

2017 **Journal Reviewer,** Journal of the Korea Society Industrial Information System (ISSN: 1229 - 3741) *South Korea*
2015-16 **Journal Reviewer,** Information Science (Elsevier, ISSN: 0020-0255) *Netherlands*

Developer Activity

2018 **Chief Organizer,** TensorFlow Conference 2018 (Tentative) *South Korea*
2017 **Organizer,** [TensorFlow-KR] Paper Day for CVPR 2017 *South Korea*

Publication & Patent

International Journals

Robust Detection of Heart Beats using Association Models from BP and EEG signals — *BioMedical Engineering Online*
Taegyun Jeon, Jongmin Yu, Witold Pedrycz, Moongu Jeon, Boreom Lee and Byeongcheol Lee. — *Dec. 2016*
Vol. 15, No. 1, pp. 1-14 — *link*

Implementation of portable device for real-time ECG signal analysis — *BioMedical Engineering Online*
Taegyun Jeon, Byoungho Kim, Moongu Jeon and Byung-Geun Lee. — *Dec. 2014*
Vol. 13, No. 1, pp. 1-13 — *link*

International Conferences

Iterative Feature Selection Method for Shock Advice Algorithm with Artifact-Free ECG — *IACT*
Taegyun Jeon, Byeongcheol Lee and Moongu Jeon. — *2015*
Proceedings of the International Conference on Computer Systems and Instrumentation (ICCSI)

Heart beat detection method with estimation of regular intervals between ECG and blood pressure — *IEEE*
Jongmin Yu, **Taegyun Jeon** and Moongu Jeon. — *2014*
Proceedings of the International Conference on Computing in Cardiology (CinC) — *link*

Heart Beat Detection Method using Estimated Regular Intervals from ECG and Blood Pressure — *IEEE*
Jongmin Yu, **Taegyun Jeon** and Moongu Jeon. — *2014*
Proceedings of the 18th IEEE International Symposium on Consumer Electronics (ISCE) — *link*

Developing Detection Algorithms of Heart Diseases and Portable ECG — *Center for Applied Optimization*
Taegyun Jeon, Jinho Park and Moongu Jeon. — *2013*
Proceedings of the International Conference on Computational Biomedicine (ICCB)

Fast Scale-Invariant Feature Transform using Niching Particle Swarm Optimization. — *ACTA Press*
Taegyun Jeon and Moongu Jeon. — *2009*
Proceedings of the International Conference on Signal Processing, Pattern Recognition and Applications (SPPRA) — *link*

A New GA-based Data Fusion Methodology for Detecting Harmful Algal Blooms — *IWA*
Taegyun Jeon, Sanghoun Oh and Moongu Jeon. — *2008*
Proceedings of the International Conference on IWA Asia-Pacific Young Water Professionals (APYWP)

Domestic Conferences

Heart Beat Detection Method using Heterogeneous Physiological Signal Analysis — *KIPS*
Jongmin Yu, **Taegyun Jeon** and Moongu Jeon. — *2014*
Proceedings of the Korean Information Processing Society (KIPS)

Region based Scene Segmentation method for Topography Analysis — *KIPS*
Taegyun Jeon and Moongu Jeon. — *2012*
Proceedings of the Korean Information Processing Society (KIPS)

Framework for Generating Obstacle Feature Map Using UAV Imaging — *KIMST*
Taegyun Jeon, Yeongkwon Woo and Moongu Jeon. — *2010*
Proceedings of the Korea Institute of Military Science and Technology (KIMST)

A study on the development of integrated software for testing SMIA camera module systems — *KICS*
Taegyun Jeon, Ehwa Yang, Wonmin Byeon, Haekeun Lim and Moongu Jeon. — *2008*
Proceedings of the Korean Institute of Communications and Information Sciences (KICS)

A Probability Model based Multicast Routing Algorithm with Multi-QoS Constraints — *KIIT*
Sanghoun Oh, Yongsoo Hwang, **Taegyun Jeon**, Heecheol Jeong, Wonmin Byeon and Moongu Jeon. — *2008*
Proceedings of the Korean Institute of Information Technology (KIIT)

A Efficient Image Segmentation Method in Multi-Core Processor Environments *IPIU*

Taegyun Jeon and Moongu Jeon. *2008*

Proceedings of the Image Processing and Image Understanding (IPIU)

A Sentimental Classification System using Feature Extraction from Seed Word and Support Vector Machine *KHCI*

Jaewon Hwang, **Taegyun Jeon** and Youngjoong Ko. *2007*

Proceedings of the Human Computer Interaction (HCI)

Domestic Patent

Method for segmenting aerial images based region and Computer readable storage medium for storing program code executing the same *Agency for Defense Development*

Hyunseung Song, Hyunguk Choi, **Taegyun Jeon** and Moongu Jeon *Mar. 2015*

Patent Registration No. 10-1507732-0000, 2015 (KR) *link*

Presentation

Tech Talk at Chungnam National University *Daejeon, South Korea*

Presenter for <Trends for Satellite Imagery Analysis> *Jun. 2017*

- Introduced a summarized overview for satellite imagery analysis and our previous approaches for semantic segmentation and super-resolution.

Research Society on Automatic Target Recognition at Agency for Defense Development *Daejeon, South Korea*

Presenter for <Specific Data Handling and Processing> *May. 2017*

- Reported prototyping results for specific data handling and processing.

Tech Talk at Intekplus *Daejeon, South Korea*

Presenter for <Deep Learning: Basic Concepts and its applications> *May. 2017*

- Introduced a basic concept of deep learning, and various applications in computer vision.

Tech Talk at K-water *Daejeon, South Korea*

Presenter for <TensorFlow and Satellite Imagery Analysis> *Apr. 2017*

- Introduced a summarized overview for satellite imagery analysis and TensorFlow.

The 1st Daejeon AI Forum *Daejeon, South Korea*

Organizer and presenter for <Trends for Satellite Imagery Analysis> *Mar. 2017*

- Introduced a summarized overview for satellite imagery analysis and our previous approaches for semantic segmentation and super-resolution.

Research Society on Automatic Target Recognition at Agency for Defense Development *Daejeon, South Korea*

Presenter for <Deep Learning and Data Augmentation> *Mar. 2017*

- Introduced a basic concept of deep learning and data augmentation. Proposed new idea for generative adversarial networks for enhancing dataset using camouflage patterns.

Tech Talk at IMU Korea *Seoul, South Korea*

Presenter for <Machine Learning Use Cases in Spatial Information Analysis> *Feb. 2017*

- Introduced a various applications in remote sensing and spatial information analysis using machine learning.

TensorFlow Dev Summit Extended Seoul *Seoul, South Korea*

Presenter for <TensorFlow: TensorBoard & Keras> *Feb. 2017*

- Introduced 'integrating Keras & TensorFlow' and 'Hands-on TensorBoard'.

Tech Talk at Logosbio *Anyang, South Korea*

Presenter for <Deep Learning: Basic Concepts and Semantic Segmentation> *Feb. 2017*

- Introduced a basic concept of deep learning, and tutorial of semantic segmentation.

Tech Talk at Dong-A University *Busan, South Korea*

Presenter for <Deep Learning: Basic Concepts and TensorFlow> *Jan. 2017*

- Introduced a basic concept of deep learning, and tutorial of TensorFlow and Keras.

The 2nd TensorFlow-KR Meetup *Seoul, South Korea*

Presenter for <Introduction to Satrec Initiative, R&D Center> *Jan. 2017*

- Introduced overview, recent applications, and future roadmap of Satrec Initiative R&D Center.

The 74th Policy Forum for Human Resource Development *Seoul, South Korea*

Presenter for <Artificial Intelligence: Trend and Competence Improvement> *Dec. 2016*

- Introduced a various applications in satellite imagery. And summarized trends of AI and proposed way to develop job competence.

Tech Talk at National Institute of Agricultural Sciences *Wanju, South Korea*

Presenter for <Deep Learning: Basic Concepts and its applications> *Dec. 2016*

- Introduced a basic concept of deep learning, and various applications in computer vision and agricultural sector.

Tech Talk at National Meteorological Satellite Center *Jincheon, South Korea*

Presenter for <Deep Learning: Basic Concepts and its applications> *Nov. 2016*

- Introduced a basic concept of deep learning, and various applications in computer vision and satellite imagery.

Tech Talk at Korea Institute of Science and Technology Information (KISTI) *Daejeon, South Korea*

Presenter for <Time Series Forecasting with Recurrent Neural Networks> *Sep. 2016*

- Introduced recurrent neural networks model for time series forecasting.

Tech Talk at SK C&C *Sungnam, South Korea*

Presenter for <Electricity Price Forecasting with Recurrent Neural Networks> *Aug. 2016*

- Introduced recurrent neural networks model for time series forecasting.

Tech Talk at Satrec Initiative *Daejeon, South Korea*

Presenter for <Deep Learning for Satellite Imaging Super-Resolution> *Aug. 2016*

- Introduced a basic concept of deep learning, and two applications: i) electricity price forecasting and ii) single image super-resolution.

The 1st TensorFlow-KR Meetup *Seoul, South Korea*

Presenter for <Electricity Price Forecasting with Recurrent Neural Networks> *Jun. 2016*

- Introduced recurrent neural networks model for time series forecasting.

Projects

Machine Learning & Data Mining

Living Energy: distributed-intelligence management and operation for smart energy *GIST*

Taegyun Jeon. *Jan. 2016 – Aug. 2016*

Designed and implemented Power usage pattern analysis and prediction model based on deep learning technology for forecasting electric market price.

Framework for data analysis and decision support system in distributed sensor networks *Distributed Sensor Network Center*

Taegyun Jeon, Sanghoun Oh, Moongu Jeon. *Mar. 2007 – Dec. 2010*

Implemented algorithms on data fusion, data clustering, and data classification of heterogeneous sensed data properties for decision support framework.

Development of process optimization to support localization of desalination plant *KICTEP*

Taegyun Jeon, Ehwa Yang, Sanghoun Oh, Moongu Jeon. *Mar. 2007 – Feb. 2008*

Developed the algorithms on processing constrained optimization for desalination plant facilities with genetic algorithms.

Water System Management Platform for Youngsan River and Sumjin River *Ministry of Environment*

Taegyun Jeon, Ehwa Yang, Sanghoun Oh, Moongu Jeon. *Mar. 2007 – Dec. 2007*

Developed the framework for web-miner and real-time analyzer from public water quality database.

Computer Vision

Research on Obstacle Characterization Map *Agency for Defense Development*

Taegyun Jeon, Youngkwon Woo and Moongu Jeon. *Mar. 2010 – Feb. 2013*

Developed algorithms on semantic segmentation of unknown regions with focus on military aspects of terrain.

Development of Object Recognition Algorithms using Stereo Camera *Samsung Electronics*

Taegyun Jeon, Heechul Jung, Wonmin Byeon, Ehwa Yang and Moongu Jeon. *Jan. 2009 – Dec. 2009*

Developed algorithms on object recognition for non-texture object.

A Basic Study on Foliage Penetration Radar *Agency for Defense Development*

Taegyun Jeon, Kangwook Kim and Moongu Jeon. *Jan. 2008 – Dec. 2008*

Developed framework for classifier on detected penetration radar imaging.

Development of integrated software for testing SMIA camera module systems *LG Innotek*

Taegyun Jeon, Ehwa Yang, Wonmin Byeon, Haekeun Lim and Moongu Jeon. *Aug. 2007 – Jul. 2008*

Developed the framework for testing Standard Mobile Imaging Architecture (SMIA) camera module systems with characteristic and functional test methods.

Biomedical Engineering

Research on Robust Detection of Heart Beats in Multimodal Physiological Data *System Biology Research Center*

Taegyun Jeon, Jongmin Yu and Moongu Jeon. *Jan. 2014 – Dec. 2015*

Designed and implemented frequency analysis methods using EEG, EMG, EOG, and ECG and combining multicue detector for detecting heart beats.

Research on Diagnosis Algorithm for Myocardial Ischemia and Heart Signals *System Biology Research Center*

Taegyun Jeon, Jinho Park and Moongu Jeon. *Jan. 2012 – Dec. 2013*

Designed and implemented new portable device for real-time cardiac signal analysis and symptom detection methods.

Data Mining Methods for Diagnosis of Atrial Fibrillation *System Biology Research Center*

Taegyun Jeon, Jinho Park and Moongu Jeon. *Jan. 2009 – Dec. 2009*

Designed and implemented algorithms on stabilization preprocessing with wavelet analysis.

Improved Diagnosis of Atrial Fibrillation for U-Healthcare *GIST*

Taegyun Jeon, Jinho Park and Moongu Jeon. *Jan. 2008 – Dec. 2008*

Designed and implemented feature extraction method with respect to variant ECG signal shapes.