

# 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

<b>Programming Language:</b>	Python, MATLAB, C, C++
<b>Deep Learning:</b>	TensorFlow, Keras, PyTorch, Caffe
<b>Parallel programming:</b>	CUDA, OpenMP, Cluster computing, MPI
<b>Software library:</b>	OpenCV, Pandas, Numpy, SciPy, QT, Weka
<b>Operating Systems:</b>	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

## INTERNATIONAL JOURNALS

### Robust Detection of Heart Beats using Association Models from BP and EEG signals

Taegyun Jeon, Jongmin Yu, Witold Pedrycz, Moongu Jeon, Boreom Lee and Byeongcheol Lee.

Vol. 15, No. 1, pp. 1-14

*BioMedical Engineering Online*

Dec. 2016

[link](#)

### Implementation of Portable Device for Real-time ECG Signal Analysis

Taegyun Jeon, Byoungcho Kim, Moongu Jeon and Byung-Geun Lee.

Vol. 13, No. 1, pp. 1-13

*BioMedical Engineering Online*

Dec. 2014

[link](#)

## INTERNATIONAL CONFERENCES

### Iterative Feature Selection Method for Shock Advice Algorithm with Artifact-Free ECG

Taegyun Jeon, Byeongcheol Lee and Moongu Jeon.

Proceedings of the International Conference on Computer Systems and Instrumentation (ICCSI)

*IACT*

2015

### Heart Beat Detection Method with Estimation of Regular Intervals Between ECG and Blood Pressure

Jongmin Yu, Taegyun Jeon and Moongu Jeon.

Proceedings of the International Conference on Computing in Cardiology (CinC)

*IEEE*

2014

[link](#)

### Heart Beat Detection Method using Estimated Regular Intervals from ECG and Blood Pressure

Jongmin Yu, Taegyun Jeon and Moongu Jeon.

Proceedings of the 18th IEEE International Symposium on Consumer Electronics (ISCE)

*IEEE*

2014

[link](#)

### Developing Detection Algorithms of Heart Diseases and Portable ECG

Taegyun Jeon, Jinho Park and Moongu Jeon.

Proceedings of the International Conference on Computational Biomedicine (ICCB)

*Center for Applied Optimization*

2013

### Fast Scale-Invariant Feature Transform using Niching Particle Swarm Optimization

Taegyun Jeon and Moongu Jeon.

Proceedings of the International Conference on Signal Processing, Pattern Recognition and Applications (SPPRA)

*ACTA Press*

2009

[link](#)

### A New GA-based Data Fusion Methodology for Detecting Harmful Algal Blooms

Taegyun Jeon, Sanghoun Oh and Moongu Jeon.

Proceedings of the International Conference on IWA Asia-Pacific Young Water Professionals (APYWP)

*IWA*

2008

## DOMESTIC CONFERENCES

### Heart Beat Detection Method using Heterogeneous Physiological Signal Analysis

Jongmin Yu, Taegyun Jeon and Moongu Jeon.

Proceedings of the Korean Information Processing Society (KIPS)

*KIPS*

2014

### Region based Scene Segmentation method for Topography Analysis

Taegyun Jeon and Moongu Jeon.

Proceedings of the Korean Information Processing Society (KIPS)

*KIPS*

2012

### Framework for Generating Obstacle Feature Map Using UAV Imaging

Taegyun Jeon, Yeongkwon Woo and Moongu Jeon.

Proceedings of the Korea Institute of Military Science and Technology (KIMST)

*KIMST*

2010

### A Study on The Development of Integrated Software for Testing SMIA Camera Module Systems

Taegyun Jeon, Ehwa Yang, Wonmin Byeon, Haekeun Lim and Moongu Jeon.

Proceedings of the Korean Institute of Communications and Information Sciences (KICS)

*KICS*

2008

### A Probability Model based Multicast Routing Algorithm with Multi-QoS Constraints

Sanghoun Oh, Yongsoo Hwang, Taegyun Jeon, Heecheol Jeong, Wonmin Byeon and Moongu Jeon.

Proceedings of the Korean Institute of Information Technology (KIIT)

*KIIT*

2008

## A Efficient Image Segmentation Method in Multi-Core Processor Environments

Taegyun Jeon and Moongu Jeon.

Proceedings of the Image Processing and Image Understanding (IPIU)

IPIU

2008

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

Jaewon Hwang, Taegyun Jeon and Youngjoong Ko.

Proceedings of the Human Computer Interaction (HCI)

KHCI

2007

## DOMESTIC PATENT

## Method for segmenting aerial images based region and Computer readable storage medium for storing program code executing the same

Hyunseung Song, Hyunguk Choi, Taegyun Jeon and Moongu Jeon

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

Agency for Defense Development

Mar. 2015

[link](#)

## Presentation

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### Tech Talk at Chungnam National University

PRESENTER FOR <TRENDS FOR SATELLITE IMAGERY ANALYSIS>

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

Daejeon, South Korea

Jun. 2017

### Research Society on Automatic Target Recognition at Agency for Defense Development

PRESENTER FOR <SPECIFIC DATA HANDLING AND PROCESSING>

- Reported prototyping results for specific data handling and processing.

Daejeon, South Korea

May. 2017

### Tech Talk at Intekplus

PRESENTER FOR <DEEP LEARNING: BASIC CONCEPTS AND ITS APPLICATIONS>

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

Daejeon, South Korea

May. 2017

### Tech Talk at K-water

PRESENTER FOR <TENSORFLOW AND SATELLITE IMAGERY ANALYSIS>

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

Daejeon, South Korea

Apr. 2017

### The 1st Daejeon AI Forum

ORGANIZER AND PRESENTER FOR <TRENDS FOR SATELLITE IMAGERY ANALYSIS>

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

Daejeon, South Korea

Mar. 2017

### Research Society on Automatic Target Recognition at Agency for Defense Development

PRESENTER FOR <DEEP LEARNING AND DATA AUGMENTATION>

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

Daejeon, South Korea

Mar. 2017

### Tech Talk at IMU Korea

PRESENTER FOR <MACHINE LEARNING USE CASES IN SPATIAL INFORMATION ANALYSIS>

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

Seoul, South Korea

Feb. 2017

### TensorFlow Dev Summit Extended Seoul

PRESENTER FOR <TENSORFLOW: TENSORBOARD & KERAS>

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

Seoul, South Korea

Feb. 2017

### Tech Talk at Logosbio

PRESENTER FOR <DEEP LEARNING: BASIC CONCEPTS AND SEMANTIC SEGMENTATION>

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

Anyang, South Korea

Feb. 2017

### Tech Talk at Dong-A University

PRESENTER FOR <DEEP LEARNING: BASIC CONCEPTS AND TENSORFLOW>

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

Busan, South Korea

Jan. 2017

### The 2nd TensorFlow-KR Meetup

PRESENTER FOR <INTRODUCTION TO SATREC INITIATIVE, R&D CENTER>

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

Seoul, South Korea

Jan. 2017

### The 74th Policy Forum for Human Resource Development

PRESENTER FOR <ARTIFICIAL INTELLIGENCE: TREND AND COMPETENCE IMPROVEMENT>

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

Seoul, South Korea

Dec. 2016

### Tech Talk at National Institute of Agricultural Sciences

PRESENTER FOR <DEEP LEARNING: BASIC CONCEPTS AND ITS APPLICATIONS>

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

Wanju, South Korea

Dec. 2016

### Tech Talk at National Meteorological Satellite Center

PRESENTER FOR <DEEP LEARNING: BASIC CONCEPTS AND ITS APPLICATIONS>

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

Jincheon, South Korea

Nov. 2016

### Tech Talk at Korea Institute of Science and Technology Information (KISTI)

PRESENTER FOR <TIME SERIES FORECASTING WITH RECURRENT NEURAL NETWORKS>

- Introduced recurrent neural networks model for time series forecasting.

Daejeon, South Korea

Sep. 2016

### Tech Talk at SK C&C

PRESENTER FOR <ELECTRICITY PRICE FORECASTING WITH RECURRENT NEURAL NETWORKS>

- Introduced recurrent neural networks model for time series forecasting.

Sungnam, South Korea

Aug. 2016

### Tech Talk at Satrec Initiative

PRESENTER FOR <DEEP LEARNING FOR SATELLITE IMAGING SUPER-RESOLUTION>

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

Daejeon, South Korea

Aug. 2016

### The 1st TensorFlow-KR Meetup

PRESENTER FOR <ELECTRICITY PRICE FORECASTING WITH RECURRENT NEURAL NETWORKS>

- Introduced recurrent neural networks model for time series forecasting.

Seoul, South Korea

Jun. 2016

## Projects

### MACHINE LEARNING & DATA MINING

#### Living Energy: Distributed-Intelligence Management and Operation for Smart Energy

Taegyun Jeon.

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

GIST

Jan. 2016 – Aug. 2016

#### Framework for Data Analysis and Decision Support System in Distributed Sensor Networks

Taegyun Jeon, Sanghoun Oh, Moongu Jeon.

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

Distributed Sensor Network Center

Mar. 2007 – Dec. 2010

#### Development of Process Optimization to Support Localization of Desalination Plant

Taegyun Jeon, Ehwa Yang, Sanghoun Oh, Moongu Jeon.

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

KICTEP

Mar. 2007 – Feb. 2008

#### Water System Management Platform for Youngsan River and Sumjin River

Taegyun Jeon, Ehwa Yang, Sanghoun Oh, Moongu Jeon.

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

Ministry of Environment

Mar. 2007 – Dec. 2007

### COMPUTER VISION

#### Research on Obstacle Characterization Map

Taegyun Jeon, Youngkwon Woo and Moongu Jeon.

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

Agency for Defense Development

Mar. 2010 – Feb. 2013

#### Development of Object Recognition Algorithms using Stereo Camera

Taegyun Jeon, Heechul Jung, Wonmin Byeon, Ehwa Yang and Moongu Jeon.

Developed algorithms on object recognition for non-texture object.

Samsung Electronics

Jan. 2009 – Dec. 2009

#### A Basic Study on Foliage Penetration Radar

Taegyun Jeon, Kangwook Kim and Moongu Jeon.

Developed framework for classifier on detected penetration radar imaging.

Agency for Defense Development

Jan. 2008 – Dec. 2008

## **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.