Eunsom Jeon

Postdoctoral Researcher at Arizona State University

Email: ejeon6@asu.edu

Web: https://jeunsom.github.io/

RESEARCH INTERESTS

Multimodal data analysis, computer vision, time-series data analysis, deep learning, artificial intelligence, object detection, human detection and analysis, activity recognition, and knowledge distillation.

EDUCATION

2020/01 – 2023/10 **Ph.D. in Computer Engineering (Electrical Engineering)**

- Arizona State University, Tempe, Arizona, USA
- Thesis: "Knowledge Distillation with Geometric Approaches for Multimodal Data Analysis."
- Advisor: Pavan Turaga, Committee: Baoxin Li, Hyunglae Lee, Suren Jayasuriya
- Research Assistant – School of Art, Media, and Engineering
- GPA: 3.94/4.0 (98.7%)

2014/09 – 2016/02 **M.S. in Electronics and Electrical Engineering**

- Specialization: Multimedia contents and signal processing
- Dongguk University, Seoul, Korea
- Thesis: "Study on the Approach to Human Detection in Thermal Image." Advisor: Kang Ryoung Park, Digital Media Laboratory
- GPA: 4.4/4.5 (98.9%)

2011/03 – 2014/08 **B.S. in Electronics and Electrical Engineering**

- Dongguk University, Seoul, Korea
- Thesis: "Portable Braille Printer 'Do You' for the Visually Impaired." Mobile printer using OCR for the visually impaired
- GPA: 4.01/4.5 (94.4%), Early graduation with an Excellent Graduation Award

PROFESSIONAL EXPERIENCE

2023/10 – present **Arizona State University**

- Postdoctoral Researcher – Geometric Media Lab (with Prof. Pavan Turaga)
- Research on machine learning, artificial intelligence, multimodal data analysis (time series, image, video data analysis), and generative AI (Text-to-Image/Video/3D).

2021/05 – 2021/08 **SRI International, Princeton, NJ, USA**

- Research Intern - Center for Vision Technologies, Information & Computing Sciences Division
- Researched and developed modules for people detection (body, face, and gesture joint detection), tracking, and action recognition for an education assessment system.
- Developed and presented html page including UI/UX with statistical analysis with a live demo as a sample product for customers.

2016/01 – 2020/01 **Korea Telecom, Seoul, Korea**

- Research Engineer - Institute of Convergence Technology
- Developed a real-time system for people detection and license plate recognition by using a wearable 360-degree camera with 5G, which was presented at Hyundai Heavy Industries in Ulsan and Mobile World Congress 2019 in Barcelona
- Developed a real-time people counting and attribute analysis system based on AI models by using a surveillance camera and fisheye 360-degree camera for computer and embedded applications, which was commercialized as a product ‘GiGA Eyes Pro 2’
- Improved a real-time gesture recognition system based on adaptive boosting algorithms and AI models for computer and mobile applications, including gesture games, cursor control system, etc.
- Researched and tested real-time people and object detection systems based on light-weighted AI models for robots and home applications to detect and avoid obstacles during automatic driving
- Researched and developed a real-time motion recognition and matching systems for computer and mobile applications

PUBLICATIONS

SCI(E) Journal

- Hongjun Choi[1], **Eun Som Jeon**[1], Ankita Shukla, and Pavan Turaga, "Intra-class Patch Swap for Self-Distillation," IEEE Transactions on Neural Networks and Learning Systems (In Submission)

- **Eun Som Jeon**, Hongjun Choi, Matthew P. Buman, and Pavan Turaga, "Role of Mixup in Topological Persistence Based Knowledge Distillation for Wearable Sensor Data," IEEE Sensors Journal (In Submission)

- **Eun Som Jeon**, Hongjun Choi, Ankita Shukla, Yuan Wang, Matthew P. Buman, Hyunglae Lee, and Pavan Turaga, "Robustness of Topological Persistence in Knowledge Distillation for Wearable Sensor Data," EPJ Data Science (In Submission)

- **Eun Som Jeon**, Matthew P. Buman, and Pavan Turaga, "Uncertainty-aware Topological Persistence Guided Knowledge Distillation on Wearable Sensor Data," IEEE Internet of Things Journal, June 2024, doi: 10.1109/JIOT.2024.3412980. (IF=10.6 [2022], JIF Ranking top 2.2% (COMPUTER SCIENCE, INFORMATION SYSTEMS)[2022])

- **Eun Som Jeon**, Hongjun Choi, Ankita Shukla, Yuan Wang, Hyunglae Lee, Matthew P. Buman, and Pavan Turaga, "Topological Persistence Guided Knowledge Distillation for Wearable Sensor Data," Engineering Applications of Artificial Intelligence, April 2024. (IF=8 [2022], JIF Ranking top 5% (ENGINEERING, MULTIDISCIPLINARY) [2022])

- **Eun Som Jeon**, Hongjun Choi, Ankita Shukla, Yuan Wang, Matthew P. Buman, and Pavan Turaga, "Constrained Adaptive Distillation Based on Topological Persistence for Wearable Sensor Data," IEEE Transactions on Instrumentation and Measurement, Vol. 72, pp. 1-14, November 2023. (IF=5.6 [2022], JCI Ranking top 9.87% (Instruments & Instrumentation) [2022], JIF Ranking top 13.5% (Instruments & Instrumentation) [2022])

- **Eun Som Jeon**, Hongjun Choi, Ankita Shukla, and Pavan Turaga, "Leveraging Angular Distributions for Improved Knowledge Distillation," Neurocomputing, Vol. 518 pp. 466-481, January 2023. (IF=5.779 [2021], JCI Ranking top 6.54% (Cognitive Neuroscience) [2021], JIF Ranking top 26.9% (COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE) [2021])

- **Eun Som Jeon**, Anirudh Som, Ankita Shukla, Kristina Hasanaj, Matthew P. Buman, and Pavan Turaga, "Role of Data Augmentation Strategies in Knowledge Distillation for Wearable Sensor Data," IEEE Internet of Things Journal, Vol. 9, No. 14, pp. 12848-12860, December 2021. (IF=10.238 [2021], JCI Ranking top 2.44% (COMPUTER SCIENCE,

[1] Equal contribution

INFORMATION SYSTEMS), JIF Ranking top 5.49% (COMPUTER SCIENCE, INFORMATION SYSTEMS) [2021])

- **Eun Som Jeon**, Jong Hyun Kim, Hyung Gil Hong, Ganbayar Batchuluun, and Kang Ryoung Park, "Human Detection Based on the Generation of a Background Image and Fuzzy System by Using a Thermal Camera," Sensors, Vol. 16, Issue 4(453), pp. 1–31, March 2016. (IF=2.677 [2016], JCR JIF Ranking top 16.38% (Instruments & Instrumentation) [2016])

- Ji Hoon Lee, Jong-Suk Choi, **Eun Som Jeon**, Yeong Gon Kim, Toan Thanh Le, Kwang Yong Shin, Hyeon Chang Lee, and Kang Ryoung Park, "Robust Pedestrian Detection by Combining Visible and Thermal Infrared Cameras," Sensors, Vol. 15, No. 5, pp. 10580-10615, May 2015. (IF=2.033 [2015], JCR JIF Ranking top 21.43% (Instruments & Instrumentation) [2015])

- **Eun Som Jeon**, Jong-Suk Choi, Ji Hoon Lee, Kwang Yong Shin, Yeong Gon Kim, Toan Thanh Le, and Kang Ryoung Park, "Human Detection Based on the Generation of a Background Image by Using a Far-Infrared Light Camera," Sensors, Vol. 15, No. 3, pp. 6763-6788, March 2015. (IF=2.033 [2015], JCR JIF Ranking top 21.43% (Instruments & Instrumentation) [2015])

Conference

- **Eun Som Jeon**, Rahul Khurana, Aishani Pathak, Pavan Turaga, "Leveraging Topological Guidance for Improved Knowledge Distillation," ICML workshop (Accepted)

- Utkarsh Nath, Rajeev Goel, **Eun Som Jeon**, Changhoon Kim, Kyle Min, Shrinu Kushagra, Yezhou Yang, Yingzhen Yang, and Pavan Turaga, "MomentDreamer: Geometry based Text-to-3D Generation using Gaussian Splatting," Neurips. (In Submission)

- Jinyung Hong, **Eun Som Jeon**, Changhoon Kim, Keun Hee Park, Utkarsh Nath, Yezhou Yang, Pavan Turaga, and Theodore P Pavlic, "Debiasing Global Workspace: A Cognitive Neural Framework for Learning Debiased and Interpretable Representations," Neurips. (In Submission)

- Omik M. Save, Ankita Shukla, **Eun Som Jeon**, Niccolo Meniconi, Pavan Turaga, and Hyunglae Lee, "Ground Reaction Force and Center-of-Pressure Estimation Using Low-Cost Wearable Insoles and Deep Learning Algorithms," (In Submission)

- **Eun Som Jeon**, Suhas Lohit, Rushil Anirudh, and Pavan Turaga, "Robust Time Series Recovery and Classification Using Test-Time Noise Simulator Networks," IEEE International Conference on Acoustics, Speech, and Signal Processing, Rhodes Island, Greece, June 04-10, 2023, pp. 1-5.

- Hongjun Choi, **Eun Som Jeon**, Ankita Shukla, and Pavan Turaga, "Understanding the Role of Mixup in Knowledge Distillation: An Empirical Study," In Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision, Waikoloa, HI, USA, January 02-07, 2023, pp. 2319-2328.
- **Eun Som Jeon**, Hongjun Choi, Ankita Shukla, Yuan Wang, Matthew P. Buman, and Pavan Turaga, "Topological Knowledge Distillation for Wearable Sensor Data," In Proceedings of the Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, October 30-November 2, 2022, pp. 837-842.
- Kwang Jung Kim, Jin Wook Park, **Eun Som Jeon**, and Jae Chul Kwon, "Abnormal Event Detection for Intelligent CCTV Services," In Proceedings of the Conference on Korea Institute of Information and Telecommunication Facilities Engineering, Gangwondo, Korea, August 30-September 1, 2018.
- Hosung Park, **Eun Som Jeon**, Minkyu Lim, Donghyun Lee, Unsang Park, and Ji-hwan Kim, "Classification of Moving Vehicles based on Convolutional Neural Network," In Proceedings of the International Conference on Electronics, Electrical Engineering, Computer Science (EEECS), Okinawa, Japan, January 9-11, 2017.
- **Eun Som Jeon**, Jong-Suk Choi, Ji Hoon Lee, Yeong Gon Kim, Toan Thanh Le, Kwang Yong Shin, and Kang Ryoung Park, "A Survey on Human Detection Using Thermal Camera," In Proceedings of the Symposium of the Korean Institute of Communications and Information Sciences, Gangwondo, Korea, January 21-23, 2015.
- Ji Hoon Lee, Jong-Suk Choi, **Eun Som Jeon**, Yeong Gon Kim, Toan Thanh Le, Kwang Yong Shin, Hyeon Chang Lee, and Kang Ryoung Park, "A Survey on Object Detection Based on the Combination of Thermal and Visible Light Cameras," In Proceedings of the Symposium of the Korean Institute of Communications and Information Sciences, Gangwondo, Korea, January 21-23, 2015.

PATENTS

- Apparatus, Method and Computer Program for Determining whether Safety Equipment is worn (Patent Application No.: KR 1020190082694) **Eun Som Jeon**, Il Hyeon Mun, and Jae Hyup Jeong
- Method for Detecting Object and System Therefor (Patent Registration No.: KR 1025223990000 B1) **Eun Som Jeon**, Il Hyeon Mun, and Jae Hyup Jeong
- Server, Device and Method for Providing Augmented Reality Service (Patent Registration No.: KR 1026204770000 B1) **Eun Som Jeon** and Kwang Jung Kim

- Apparatus and Method for Classifying Gesture based on CNN (Patent Registration No.: KR 1026126020000 B1) **Eun Som Jeon**, Jin Wook Park, and Sang Min Park
- Apparatus and Method for Classifying Gesture based on CNN (Patent Registration No.: KR 1024594870000 B1) **Eun Som Jeon**, Jin Wook Park, and Sang Min Park
- CNN for Recognizing Hand Gesture, and Device Control System by Hand Gesture (Patent Registration No.: KR 1023439630000 B1) **Eun Som Jeon**, Il Hyeon Mun, and Jae Chul Kwon
- Head Region Detection Method and Head Region Detection Device (Patent Application No.: KR 1020180124314) **Eun Som Jeon** and Kwang Jung Kim
- Apparatus, Method and Computer Program for Detecting Hand from Video (Patent Application No.: KR 1020180057998) **Eun Som Jeon**, Sang Min Park, and Jae Chul Kwon
- Apparatus, Method and Computer Program for Detecting Hand from Video (Patent Application No.: KR 1020180002703) **Eun Som Jeon**, Jin Wook Park, and Jae Chul Kwon
- Apparatus and Method to Improve The Accuracy of Virtual Cursor (Patent Application No.: KR 102017060871) **Eun Som Jeon**, Sang Min Park, and Jong An Kim
- Server and Method for Analyzing Body Type and User Device (Patent Application No.: KR 1020160099389 A) **Eun Som Jeon**
- Device and Method for Action Recognition (Patent Registration No.: KR 101756916 B1) **Eun Som Jeon**, Ji Hoon Lee, Jong-Suk Choi, Yeong Gon Kim, Jong Hyun Kim, Ganbayar Batchuluun, Ulugbek Khusanov, and Kang Ryoung Park
- Apparatus and Method for Object Detection (Patent Registration No.: KR 101681282 B1) **Eun Som Jeon**, Ji Hoon Lee, Jong-Suk Choi, Yeong Gon Kim, Jong Hyun Kim, Ganbayar Batchuluun, Uluk Baek, and Kang Ryoung Park
- Apparatus, Method and Program for Object Detection (Patent Registration No.: KR 101583776 B1) **Eun Som Jeon**, Ji Hoon Lee, Jong-Suk Choi, Kwang Yong Shin, and Kang Ryoung Park
- Apparatus and Method for Object Detection (Patent Registration No.: KR 101583773 B1) Ji Hoon Lee, Jong-Suk Choi, **Eun Som Jeon**, Kwang Yong Shin, Eui Chul Lee, and Kang Ryoung Park (transfer to Ehoosys corporation)
- System and Method for Searching Missing Family Using Facial Information and Storage Medium of Executing The Program (Patent Registration No.: KR 101743169 B1) Eui Jong Hwang, **Eun Som Jeon**, Ho Sung Park, and Su Min Lee

TEACHING EXPERIENCE

Teaching Assistant

2015/09 – 2015/12 • Digital Signal Processing, INC4061 (Instructor: Chul Ryu)

2015/09 – 2015/12 • Mathematics for Information and Communication Engineering, INC2025 (Instructor: Chul Ryu)

2015/03 – 2015/06 • Digital Image Processing, INC4066 (Instructor: Chul Ryu)

2015/03 – 2015/06 • Signals and Systems, INC4055 (Instructor: Chul Ryu)

2015/03 – 2015/06 • Career Mentoring, DES4008 (Instructor: Chul Ryu)

ACTIVITIES

2019/02 **Mobile World Congress 2019 in Barcelona**

- 360 Live Security by Korea Telecom
- Developed a real-time system for people detection and license plate recognition by using a wearable 360-degree camera with 5G

2014/01 **International Volunteer Program**

- International Volunteer Program at Vietnam – UNESCO

2013/08 – 2014/06 **Microsoft Student Partners**

- 7th Korea Microsoft Student Partners
- Student Developer
- Developed Microsoft Windows Applications

2013 – 2014 **Visual Studio 2013 Post-Editing Project**

- Translated English words into Korean for Microsoft Visual Studio 2013 MSDN Library

HONORS AND AWARDS

2023/04 **Engineering Graduate Fellowship at ASU**

2018/07 **Korea Telecom CEO Award Certificate**

2014/03 **Microsoft Imagine Cup 2014 Korea Final 1st Prize**

- Won World Citizenship 1st Prize
- Team ImFact - Served as team leader
- Represented Korea in the world semi-final
- InFace Project: Parents-child matching solution for finding a missing child based on face recognition
- Gave a presentation at Microsoft Korea NGO day

2014/03 **Microsoft Imagine Cup 2014 Korea Final Naver D2 Award**

- Naver Corporation presented the award with the opportunity to join an internship program
- Gave a presentation and joined a seminar in Naver corporation

2011 – 2015 **Dongguk University Scholarship**

- 2nd semester of 2011 (Dean's list, 1st Rank)
- 1st semester of 2012 (Dean's list)
- 2nd semester of 2013 (A scholarship for young leaders)
- 1st semester of 2014 (The future talent scholarship)
- 1st semester of 2014 (The future talent scholarship 2)
- 1st semester of 2015 (A scholarship for research)
- 1st semester of 2015 (TA)
- 2nd semester of 2015 (TA)

2011/06 **Technical Report and Presentation 4th Prize**

- 2011 Competition for Dongguk University engineering students' technical report and presentation
- Title: "Analysis of 3D Video Industry"
- Served as team leader

2011/06 **Technical Report 1st Prize**

- 2011 Competition for Dongguk University engineering students Title: "Analysis of 3D Video Industry"
- Served as team leader

TECHNICAL SKILLS

- Computer Language: C, C++, Python, MATLAB, C#.
- Deep Learning Frameworks: Pytorch, Caffe, Tensorflow, Darknet, Darkflow, etc.

SERVICE

- Reviewer – IEEE IoT Journal(IEEE), IEEE Transactions on Knowledge and Data Engineering(IEEE), IEEE Sensors Journal(IEEE), IEEE TCAS(IEEE), CVIU(Elsevier), IMAVIS(Elsevier), PMC(Elsevier), ICVGIP2022, ICRA2024, ICASSP2024

PRESS AND MEDIA

Selected Press

- https://www.lightreading.com/mobile/5g/kt-hedges-5g-bets-with-innovation-splurge/d/d-id/749773 (accessed on March 19th 2019)

- http://www.seoulfn.com/news/articleView.html?idxno=335053 (accessed on March 19th 2019)
- http://news.kbs.co.kr/news/view.do?ref=A&ncd=2857991 (accessed on November 15th 2018)
- http://news.naver.com/main/read.nhn?mode=LPOD&mid=tvh&oid=056&aid=0010027870 (accessed on November 15th 2018)
- http://news.microsoft.com/ko-kr/2014/03/31/140313/ (accessed on November 15th 2018)

REFERENCE

- Pavan Turaga
    - Arizona State University, Director and Professor, School of Arts Media and Engineering, School of Electrical, Computer and Energy Engineering
    - STAUFFER B-259 950 S. Forest Mall, Tempe, AZ 85287, USA
    - pavan.turaga@asu.edu
- Suren Jayasuriya
    - Arizona State University, Assistant Professor, School of Arts Media and Engineering, School of Electrical, Computer and Energy Engineering
    - 950 S. Forest Mall Stauffer B, Room B252 Tempe, AZ 85281, USA
    - sjayasur@asu.edu