JUNHYUK HYUN

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PERSONAL INFORMATION

Birth: August 6, 1992, in Republic of Korea **Nationality:** Korea **Language:** Korean(Native), English

RESEARCH EXPERIENCES

Yonsei University Research Assistant at Computational Intelligence Lab.

Yonsei University Intern at Computational Intelligence Lab.

EDUCATION

Yonsei University Ph.D. student Advisor: Prof. Euntai Kim School of Electrical & Electronic Engineering

Yonsei University

Bachelor of Electrical & Electronic Engineering School of Electrical & Electronic Engineering

Gyeonggi Science High School

March 2014 - Present

March 2013 - February 2014

March 2014 - Present

March 2010 - February 2014

March 2008 - February 2010

INTERESTS

Computer vision, neural network architecture, real-time object detection, real-time semantic segmentation

PUBLICATIONS - JOURNAL

Junhyuk Hyun, Hongje Seong, Sangki Kim, and Euntai Kim, "Adjacent Feature Propagation Network (AFPNet) for Real-Time Semantic Segmentation." *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, Accepted, 2022. (IF: 13.451 in JCR2020)

Junhyuk Hyun, Hongje Seong, and Euntai Kim, "Universal pooling–a new pooling method for convolutional neural networks." *Expert Systems with Applications*, vol. 180, pp. 115084, October, 2021. (IF: *6.954* in JCR2020)

Wonje Jang, **Junhyuk Hyun**, Jhonghyun An, and Euntai Kim, "A Lane-Level Road Marking Map Using a Monocular Camera." *IEEE-CAA Journal of Automatica Sinica*, vol. 9, no. 1, pp. 187-204, Jaunuary, 2022. (IF: *6.171* in JCR2020)

Hongje Seong, **Junhyuk Hyun**, and Euntai Kim, "FOSNet: An End-to-End Trainable Deep Neural Network for Scene Recognition." *IEEE Access*, vol. 8, no. 1, pp. 82066-82077, December, 2020. (IF: *3.367* in JCR2020)

Jeonghyun Baek, **Junhyuk Hyun**, and Euntai Kim, "A pedestrian detection system accelerated by kernelized proposals." *IEEE transactions on intelligent transportation systems*, vol. 21, no. 3, pp. 1216-1228, March, 2019. (IF: 6.492 in JCR2020)

PUBLICATIONS - INTERNATIONAL CONFERENCE

Junhyuk Hyun, and Euntai Kim, "Positional Weighted Memory Module for Semantic Segmentation." Proc. of the 18th International Conference on Ubiquitous Robots (UR 2021), Gangneung, Korea, July, 2021.

Junhyuk Hyun, Hongje Seong, Suhyeon Lee, Suhan Woo, and Euntai Kim, "Weakly Supervised Temporal Localization in Video Scene Recognition." *Proc. of the 18th International Conference on Control, Automation and Systems* (*ICCAS 2018*), GangWon, Korea, October, 2018. Junhyuk Hyun, Jeonghyun Baek, Jisu Kim, Peyman Hosseinzadeh Kassani, and Euntai Kim, "Vehicle detection and classification in the Scala sensor by using binary classification." *Proc. of the 2015 15th International Conference on Control, Automation and Systems (ICCAS 2015)*, Busan, Korea, October, 2015.

Junhyuk Hyun, Jeonghyun Baek, Jisu Kim, Peyman Hosseinzajeh Kassani, and Euntai Kim, "Proposing a Fast Circular HOG Descriptor for Detecting Rotated Objects." *Proc. of The 2015 International Joint Conference on Neural Networks (IJCNN 2015)*, Killarney, Ireland, July, 2015.

Junhyuk Hyun, Jeonghyun Baek, Jisu Kim, Peyman Hosseinzadeh Kassani, and Euntai Kim, "Getting Higher Performance Using a Two-Layer Extreme Learning Machine." *Proc. of the 2016 International Workshop on Advanced Image Technology (IWAIT 2016)*, Busan, Korea, January, 2016.

Junhyuk Hyun, Jeonghyun Baek, Jisu Kim, Peyman Hosseinzajeh Kassani, and Euntai Kim, "Multimodel approach for pedestrian detection." *Proc. of 2014 International Conference on Fuzzy Theory and Its Applications (iFuzzy2014)*, Kaohsiung, Taiwan, November, 2014.

Suhyeon Lee, **Junhyuk Hyun**, Hongje Seong, and Euntai Kim, "Unsupervised Domain Adaptation for Semantic Segmentation by Content Transfer." *Proc. of the Thirty-Fifth AAAI Conference on Artificial Intelligence (AAAI 2021)*, Vancouver, Canada, February, 2021.

Hongje Seong, **Junhyuk Hyun**, and Euntai Kim, "Kernelized Memory Network for Video Object Segmentation." *Proc. of the European Conference on Computer Vision (ECCV 2020)*, Glasgow, Scotland, August, 2020, vol. 12367, pp. 629-645.

Hongje Seong, **Junhyuk Hyun**, and Euntai Kim, "Is Whole Object Information Helpful for Scene Recognition?." *Proc. of the 17th International Conference on Ubiquitous Robots (UR 2020)*, Kyoto, Japan, June, 2020, pp. 149-152.

Hongje Seong, **Junhyuk Hyun**, and Euntai Kim, "A Kernel-based Approach for Video Object Segmentation." *The* 2020 DAVIS Challenge on Video Object Segmentation (DAVIS'20, CVPR Workshop), Seattle, United States, June, 2020.

Hongje Seong, **Junhyuk Hyun**, and Euntai Kim, "Video Multitask Transformer Network." *The 2nd Workshop and Challenge on Comprehensive Video Understanding in the Wild (CoVieW'19, ICCV Workshop)*, Seoul, Korea, October, 2019.

Hongje Seong, Junhyuk Hyun, and Euntai Kim, "Partial Convolution for Scene Recognition." *Proc. of the 19th International Conference on Control, Automation and Systems (ICCAS 2019)*, Jeju, Korea, October, 2019.

Hongje Seong, **Junhyuk Hyun**, Hyunbae Chang, Suhyeon Lee, Suhan Woo, and Euntai Kim, "Scene Recognition via Object-to-Scene Class Conversion: End-to-End Training." *Proc. of The International Joint Conference on Neural Networks (IJCNN 2019)*, Budapest, Hungary, July, 2019, pp. 1-6.

Suhyeon Lee, **Junhyuk Hyun**, and Euntai Kim, "Robust Object Detection and Tracking for Autonomous Driving." *Proc. of 2018 International Conference on Fuzzy Theory and Its Applications (iFuzzy2018)*, Daegu, Korea, November, 2018.

Hongje Seong, **Junhyuk Hyun**, Suhyeon Lee, Suhan Woo, Hyunbae Chang, and Euntai Kim, "New Feature-level Video Classification via Temporal Attention Model." *The 1st Workshop and Challenge on Comprehensive Video Understanding in the Wild (CoVieW'18, ACM MM Workshop)*, Seoul, Korea, October, 2018, pp. 31-34.

Peyman Hosseinzadeh Kassani, **Junhyuk Hyun**, and Euntai Kim, "Application of Soft Histogram of Oriented Gradient on Traffic Sign Detection." *Proc. of the 2017 14th International Conference on Ubiquitous Robots and Ambient Intelligence (URAI 2017)*, Jeju, Korea, June, 2017.

Peyman Hosseinzadeh Kassani, **Junhyuk Hyun**, and Euntai Kim, "Proposing a GPU Based Modified Fuzzy Nearest Neighbor Rule for Traffic Sign Detection." *Proc. of the 2015 15th International Conference on Control, Automation and Systems (ICCAS 2015)*, Busan, Korea, October, 2015.

Jeonghyun Baek, Jisu Kim, **Junhyuk Hyun**, and Euntai Kim, "New efficient speed-up scheme for cascade implementation of SVM classifier." *Proc. of The 2015 International Joint Conference on Neural Networks (IJCNN 2015)*, Killarney, Ireland, July, 2015.

PUBLICATIONS - DOMESTIC CONFERENCE

현준혁, 이수현, 우수한, 성홍제, 김은태, "스테레오 카메라와 레이더의 레이더의 센서 융합을 이용한 제안 영역 생성 방법." 제 33회 제어로봇시스템학회 학술대회(ICROS 2018), 전북 부안, 5월, 2018.

현준혁, 백정현, 김지수, 이수현, 김은태, "결정 트리의 에이다 부스트를 이용한 신호 인식 시스템." 대한전자공학회 하계종합학술대회, 부산, 6월, 2017.

현준혁, 백정현, 김지수, 이수현, 김은태, "효과적인 자율주행 차량용 차선 검출." *한국지능시스템학회 2017년도 춘계학술대회*, 제주, 4월, 2017.

현준혁, 백정현, 김지수, 김은태, "랜덤 활성화를 이용한 ELM 학습 방법." *제11회 한국로봇종합학술대회*, 평창, 1 월, 2016.

이영조, 성홍제, **현준혁**, 김은태, "Pyramid Pooling Module을 이용한 두드러진 객체 찾기." 제 35회 제어로봇시스템 학회 학술대회(ICROS 2020), 고성, 7월, 2020.

이수현, **현준혁**, 성홍제, 이상용, 김은태, "가상 데이터셋을 사용하여 의미론적 분할 네트워크를 학습하기 위한 도메인 적응 방법." 제 35회 제어로봇시스템학회 학술대회(ICROS 2020), 고성, 7월, 2020.

장현배, 성홍제, **현준혁**, 김은태, "Partial Convolution을 이용한 장소 이미지에서의 Class Activation Map 추출 개선." 제 50회 대한전기학회 하계학술대회, 고성, 7월, 2019.

우수한, **현준혁**, 김은태, "딥러닝 네트워크를 이용한 도로 주행상황에서의 객체 인식." 제 34회 제어로봇시스템학회 학술대회(ICROS 2019), 경주, 5월, 2019.

이수현, **현준혁**, 우수한, 성홍제, 김은태, "레이더 센서를 사용한 차량 검출 방법." 한국지능시스템학회 2018년도 춘계학술대회, 서울, 4월, 2018.

우수한, 이상윤, **현준혁**, 이수현, 이성원, 백정현, 홍성준, 김은태, "YOLOv2 객체 검출 성능 향상을 위한 네트워크 구조 개선." 제13회 한국로봇종합학술대회, 횡성, 1월, 2018.

김지수, 이상윤, **현준혁**, 백정현, 홍성준, 조형기, 김은태, "실내 환경에서 Superpixel merging을 이용한 객체 분할." *제12회 한국로봇종합학술대회*, 평창, 2월, 2017.

이수현, **현준혁**, 김은태, "엣지와 색 정보를 이용한 비디오 기반의 실시간 신호등 검출." 제12회 한국로봇종합학술 대회, 평창, 2월, 2017.

이성원, **현준혁**, 이수현, 조형기, 조해민, 김은태, "딥 러닝을 이용한 강인하고 빠른 교통 표지판 검출 및 분류." 제12 회 한국로봇종합학술대회, 평창, 2월, 2017.

이수현, 백정현, 김지수, **현준혁**, 김은태, "Hough Transform과 HOG SVM을 이용한 최고 속도 제한 표지판 검출." 한국지능시스템학회 2016년도 추계학술대회, 서울, 10월, 2016.

김지수, 백정현, **현준혁**, 김은태, "스테레오 환경에서 ACF를 이용한 보행자 검출 시스템 개발." 제 28회 영상처리 및이해에 관한 워크샵 (IPIU2016), 제주, 2월, 2016.

김지수, 백정현, **현준혁**, 김은태, "효과적인 후보군 추출을 이용한 레이더 센서 기반 자동차 검출." 제11회 한국로 봇종합학술대회, 평창, 1월, 2016.

김지수, 백정현, **현준혁**, 김은태, "파트 기반 모델을 이용한 자동차 검출 시스템 개발." 2015 정보 및 제어 심포지엄 (ICS), 강릉, 4월, 2015.

Peyman Hosseinzadeh Kassani, 현준혁, 김은태, "Developing a Modified Fuzzy Nearest Neighbor Rule for Pattern Classification." 한국 지능 시스템 학회 2015년도 춘계 학술대회, 안산, 4월, 2015.

PROJECTS

Development of deep learning technology to mount vision technology on small ships

October 1, 2021 - March 31, 2022

- Funded by Avikus

- Development of real-time object detection and semantic segmentation technology in the marine environment

Development of artificial intelligence robot autonomous navigation technology for agile movement in crowded space

April 1, 2019 - December 31, 2022

- Funded by Ministry of Trade, Industry and Energy

- Development of real-time traversability estimation technology based on semantic segmentation in various environments (season, day and night)

Scene parsing and static local map generation using RGBD image in outdoor environment

March 18, 2019 - October 31, 2019

- Funded by LG Electronics
- Development of real-time semantic segmentation algorithm using RGB and RGBD sensors

Development of robust detection and tracking system for accident prevention in autonomous vehicle

March 1, 2019 - February 28, 2022

- Funded by National Research Foundation of Korea
- Corner case data augmentation algorithm research for robust object detection

Research on fundamental technology for deep learning-based semantic state understanding

- August 1, 2017 December 31, 2020
- Funded by National Research Foundation of Korea
- Deep learning algorithm research using video data

Development of real-time object recognition technology based on deep learning for autonomous vehicles

August 1, 2017 - September 30, 2018

- Funded by Hyundai MNSoft
- Development of real-time traffic signs, traffic lights, and lane detection algorithms in driving vehicles

Development of part-based pedestrian detection and tracking system for autonomous vehicle

June 1, 2016 - May 31, 2019

- Funded by National Research Foundation of Korea
- Pedestrian detection algorithm development research using a camera

Development of robot intelligence technology for mobility with learning capability toward robust and seamless indoor and outdoor autonomous navigation

May 1, 2016 - April 30, 2020

- Funded by Ministry of Trade, Industry and Energy
- Development of deep learning dynamic object detection algorithm

Low level convergence of video and radar processing system developed for improving pedestrian recognition

June 1, 2015 - May 31, 2018

- Funded by Ministry of Trade, Industry and Energy
- Real-time pedestrian, vehicle, and two-wheeled vehicle detection algorithm development

Development of part-based pedestrian detection and tracking system for autonomous vehicle

June 1, 2013 - May 31, 2016

- Funded by National Research Foundation of Korea
- Implementation of feature extraction algorithm for pedestrian detection

Development of image-based gesture recognition for indoor robots

April 1, 2013 - March 31, 2014

- Funded by LG Electronics

- Gathering data to train gesture recognition algorithm

PATENTS

Euntai Kim, Suhyeon Lee, **Junhyuk Hyun**, Hongje Seong, "Apparatus and Method for Domain Adaptation Using Zero Style Loss", Korea-Application No. 10-2021-0003078.

Euntai Kim, Suhyeon Lee, **Junhyuk Hyun**, Hongje Seong, "Apparatus and Method for Solving Class Imbalance Problem of Domain Adaptation Using Content Transfer", Korea-Application No. 10-2021-0003077.

Euntai Kim, Youngjo Lee, Hongje Seong, **Junhyuk Hyun**, "Apparatus for Predicting Traffic Line of Box-level Multiple Object Using Only Position Information of Box-level Multiple Object", Korea-Application No. 10-2020-0149533.

Euntai Kim, Hongje Seong, Youngjo Lee, **Junhyuk Hyun**, "Pixel Level Video Object Tracking Apparatus Using Box Level Object Position Information", Korea-Application No. 10-2020-0030214, International (PCT) - Application No. PCT/KR2020/005383.

Euntai Kim, Hongje Seong, **Junhyuk Hyun**, "Action Recognition Method and Apparatus in Untrimmed Videos Based on Artificial Neural Network", Korea-Application No. 10-2020-0029743.

Euntai Kim, Hongje Seong, **Junhyuk Hyun**, Suhyeon Lee, Suhan Woo, Hyunbae Chang, "Apparatus and Method for Recognizing a Place Based on Artificial Neural Network", Korea-Application No. 10-2019-0041544, Korea-registration No. 10-2211842, International (PCT) - Application No.PCT/KR2020/001018.

Euntai Kim, **Junhyuk Hyun**, Suhyeon Lee, Suhan Woo, Hongje Seong, "Apparatus and Method for Detecting Object Based on Heterogeneous Sensor", Korea-Application No. 10-2018-0055179, Korea-registration No. 10-2138681.

Euntai Kim, **Junhyuk Hyun**, Suhyeon Lee, Suhan Woo, Hongje Seong, "Method and Apparatus for Generating Scene Situation Information of Video Using Differentiation of Image Feature and Supervised Learning", Korea-Application No. 10-2018-0049520, Korea-registration No. 10-2120453.

Euntai Kim, Jeonghyun Baek, Jisu Kim, **Junhyuk Hyun**, Suhyeon Lee, "Method and Apparatus for Detecting Road Using Camera Model and Filter in Depth Image", Korea-Application No. 10-2017-0052739, Korea-registration No. 10-1911860.

Euntai Kim, Jeonghyun Baek, Jisu Kim, **Junhyuk Hyun**, "Appapratus and Method for Extracting Road Area", Korea-Application No. 10-2016-0061588, Korea-registration No. 10-1748675.

AWARDS

3rd Place Award

The 2020 DAVIS Challenge on Video Object Segmentation (CVPR Workshop)

2nd Place Award CoVieW'18 Challenge (ACM MM Workshop)

Best Student Paper Second Place iFUZZY 2014

LG전자 논문상 2017년 대한전자공학회 하계종합학술대회

우수학생논문상 2017년 대한전자공학회 하계종합학술대회

Bronze prize Korean Physics Olympiad 2008

입학전형성적우수 Gyeonggi Science High School

Gold prize Korean Physics Olympiad 2007

SKILLS AND TECHNIQUES

Machine learning and deep learning techniques using Python, MATLAB Various computer vision and deep learning packages (Pytorch, TensorRT)

ACTIVITIES

Reviewer

36th AAAI Conference on Artificial Intelligence 2022

Competition 13th Hyundai Motor Group Autonomous Vehicle Competition