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Jaeyoung Lee | Resume

Updated on 2024.04.05

➥ Research Keywords: Reinforcement Learning with/for

1. User-Modelling · AI-Assistant · Bayesian Inference · Explainable AI
2. Safety-Critical Systems · Continuous Space · Autonomous Driving
3. Optimal/Nonlinear Planning and Control · Multi-Agent/Power Systems
4. Imitation/Transfer/Deep/Constrained/Inverse Learning

➥ Affilations

2024.01 – present **Research Fellow** at Centre for AI-Fundamentals co-led by Prof. Samuel Kaski
Computer Science, University of Manchester, UK.

2021.02 – 2022.03 **Research Associate**
2018.01 – 2021.01 **Postdoctoral Fellow** at WISE Lab. led by Prof. Krzysztof Czarnecki
(excl. 2020.01) Electrical and Computer Engineering, University of Waterloo, ON, Canada.

2015.08 – 2017.12 **Postdoctoral Fellow** at RLAI Lab. led by Prof. Richard S. Sutton
Computing Science, University of Alberta, AB, Canada.

➥ Education

2007.09 – 2015.08 **Ph.D.** in Electrical and Electronics Eng., Yonsei University, Seoul, South Korea. GPA 4.0/4.3
Ranked in Top 5 Universities in South Korea (2022 QS ranking #79)
Main Research: Reinforcement Learning and Multi-Agent Adaptive Optimal Control (see dissertation)

2002.03 – 2006.08 **B.E.** in Information and Control Eng., Kwangwoon University, Seoul, South Korea. GPA 4.0/4.5
Minor: Electronics Engineering

➥ Programming, Software and Hardware Skills

· Python (w/ TensorFlow and Keras; Numba) · C · C++ · MatLab · Simulink · Object-Oriented Programming (OOP)
· Micro-Controllers (e.g., DSP) · LaTeX · HTML · Office tools (e.g., Microsoft Office · Photoshop · Illustrator)

➥ Selected Projects (see CV for details)

2018.01 – 2022.03 ERATO: HASUO Metamathematics for Systems Design Project – *Japan Sci. & Tech. Agency (JST)*

2017.09 – 2017.12 Alberta-Mitsubishi Joint Study on Robotic Cable Connection Task – *Mitsubishi Electric Co.*

2015.05 – 2015.08 Semantic-Information-Aided Map Matching and Ground Vehicle Localization – *D2 Innovation*

2013.06 – 2015.05 A Study on the Development of a Model-free Adaptive Optimal Cooperative Formation Protocol for Multiple Heterogeneous Unmanned Vehicles – *National Research Foundation of Korea*

2010.07 – 2011.06 Development of 1.5 kW High-Efficiency DC-DC Converter for Auxiliary Battery Charging in Electric Vehicles – *LS Industrial Systems*

➥ Professional Service Activities

Member of FormaliSE 2022 Artifact Evaluation Committee (2022)

Reviewer of Various Journal and Conf. Articles, e.g., Automatica · IEEE Trans. Cybernetics/NNLS/AC · ACC · IEEE CDC

Member of Mathematics Stack Exchange (top 27% overall — see profile).

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➥ Selected Publications (see CV for more; *equally contributed)

Constrained Reinforcement Learning for Safety-Critical Systems

Uniformly Constrained Reinforcement Learning
(2023). **Lee, J.***, Sedwards, S.* & Czarnecki, K. *JAAMAS, 31*(1). Part of a collection MODeM.

Recursive Constraints to Prevent Instability in Constrained Reinforcement Learning video | slides
(2021). **Lee, J.***, Sedwards, S.* & Czarnecki, K. In: *Proc. 1st MODeM 2021, Hayes, Mannion, Vamplew (eds.)*. Virtual. (cited: 1).

Distillation and Imitation of Deep Q-Network by Decision Tree, for Formal Verification

Non-Divergent Imitation for Verification of Complex Learned Controllers video | slides
(2021). Abdelzad, V.*, **Lee, J.***, Sedwards, S.*, Soltani S.* & Czarnecki, K. In: *2021 IJCNN*. Virtual. (cited: 1).

Improved Policy Extraction via Online Q-Value Distillation
(2020). Jhunjhunwala, A., **Lee, J.**, Sedwards S., Abdelzad V. & Czarnecki K. In: *2020 IJCNN (in IEEE WCCI)*. Virtual. (cited: 2).

Deep Reinforcement Learning (for Autonomous Driving)

WiseMove: a Framework to Investigate Safe Deep Reinforcement Learning for Autonomous Driving git | slides
(2019). **Lee, J.***, Balakrishnan, A.*, Gaurav, A.*, Czarnecki, K. & Sedwards, S.* In: *Parker D., Wolf V. (eds) QEST 2019*. Lecture Notes in Computer Science, vol. 11785. Glasgow, U.K. (cited: 20, including arXiv).

Transfer Reinforcement Learning for Autonomous Driving: From WiseMove to WiseSim git
(2021). Balakrishnan, A., **Lee, J.**, Gaurav A., Czarnecki, K. & Sedwards, S. *ACM TOMAC, 31*(3), Article No. 15. (cited: 1).

Predictive PER: Balancing Priority and Diversity Towards Stable Deep Reinforcement Learning video
(2020). Lee, S., **Lee, J.** & Hasuo I. *DRL Workshop in 2020 NeurIPS* (arXiv); also in *2021 IJCNN* (doi). Virtual. (cited: 4).

Reinforcement Learning, Dynamic Programming & (Multi-Agent) Optimal Control in Continuous Domain

Policy Iterations for Reinforcement Learning Problems in Continuous Time and Space: Fundamental Theory and Methods
(2021). **Lee, J.** & Sutton, R.S. *Automatica, 126*, 109421. (cited: 38, IF: 5.944; see also arXiv) git

Policy Iteration for Discounted Reinforcement Learning Problems in Continuous Time and Space poster | slides
(2017). **Lee, J.Y.** & Sutton, R.S. In: *2017 RLDM Extended Abstracts*, 148–152. Ann Arbor, MI, USA. (cited: 1).

Integral Q-Learning and Explorized Policy Iteration for Adaptive Optimal Control of Continuous-Time Linear Systems
(2012). **Lee, J.Y.**, Park, J.B. & Choi, Y.H. *Automatica, 48*(11), 2850–2859. (cited: 177, IF: 5.944; preprint). git

Integral Reinforcement Learning for a Class of Nonlinear Systems With Invariant Explorations git
(2014). **Lee, J.Y.**, Park, J.B. & Choi, Y.H. *IEEE Trans. NNLS, 26*(5), 916–932. (cited: 109, IF: 10.451; preprint).

On Integral Generalized Policy Iteration for Continuous-Time Linear Quadratic Regulations
(2014). **Lee, J.Y.**, Park, J.B. & Choi, Y.H. *Automatica, 50*(2), 475–489. (cited: 35, IF: 5.944; preprint).

Inverse Optimal Design of the Distributed Consensus Protocol for Formation Control of Multiple Mobile Robots
(2014). **Lee, J.Y.**, Choi, Y.H. & Park, J.B. In: *Proc. 53rd IEEE CDC*, 2222–2227. LA, CA, USA. (cited: 4; preprint)

On Stability and Inverse Optimality for a Class of Multi-Agent Linear Consensus Protocols
(2018). Lee, G.U., **Lee, J.Y.**, Park, J.B. & Choi, Y.H. *IJCAS, 16*(3), 1194–1206. (cited: 6).

➥ Selected Research Softwares

WiseMove: A Framework to Investigate Safe Deep Reinforcement Learning (Python using keras/keras-rl)

Uniformly-constrained Reinforcement Learning (C++) — currently private (available upon request)

Policy Iteration for Reinforcement Learning in Continuous Time and Space (MATLAB/Octave)

➥ Mathematical Writings

Notes on Folland, G.B. (2013). Real Analysis: Modern Techniques and Their Applications. John Wiley & Sons.

Lee, J. (2022). Real Analysis, Probability, and Random Processes with Measure Theory. In progress.