Issei Saito

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Research Summary

Emergent communication, human behavior analysis using a probabilistic generative model.
I conduct research focused on modeling phenomena in the world using probabilistic approaches. My work involves developing models to uncover the processes behind emergent communication. I also collaborate with industry to create probabilistic models for application in worker behavior analysis.

Education

The University of Electro-Communications April 2023 - Present
M.S. in Mechanical and Intelligent Systems Engineering,
Advisor: Prof. Tomoaki Nakamura

The University of Electro-Communications April 2019 - March 2023
B.S. in Advanced Robotics Program, Cluster II (Emerging Multi-Interdisciplinary Engineering), School of Informatics and Engineering,
Advisor: Prof. Tomoaki Nakamura

Research Experience

Joint research with Advanced Technology R&D Center, Mitsubishi Electric Corporation as a researcher August 2022 - Present
- Research on an efficient work analysis system with our segmentation algorithms.
- The aim of developing the system is to automate work analysis that is currently done by hand and improve productivity.
- Our system automatically segments worker behavior and simplifies the understanding of any changes in behavior during repetitive tasks.
- I was in charge of improving and implementing the segmentation model.

Visiting researcher at SUNY Binghamton Sep.2023 - June.2024
- Collaborative research with AIR group advised by Prof. Shiqi Zhang
- Research on emergent communication (EC)
- The objective of this research is modeling the process of emergent symbol (language) between agents.
- We modeled how humans generate and recognize continuous signals (vocal language) using the Probabilistic Generative Model (PGM). (publication 4)

Work Experience

Contractor at Avanti R&D, Inc. June.2024 - Present
- Engaged in research and development, focusing on advanced technologies (details are confidential due to NDA).
- Developing tools for data analysis using Python to support project goals.
- Our system automatically segments worker behavior and simplifies the understanding of any changes in behavior during repetitive tasks.
- Communicating in English to drive the project forward.

Teaching Assistant at UEC Apr.2022 - Sep.2022
- Career Education, Prof. Toshinori Mathuki, Spring Semester 2022
- My duties involved assisting undergraduate students in learning.

Publications (domestic conference)

1. **Issei Saito**, Tomoaki Nakamura, Toshiyuki Hatta, Wataru Fujita, Shintaro Watanabe, and Shotaro Miwa. Improving the accuracy of 3D skeletal position estimation using the Viterbi algorithm. The 55th National Convention of IPSJ (Information Processing Society of Japan), Vol2, page 321 322, March 2023

2. **Issei Saito**, Tomoaki Nakamura, Toshiyuki Hatta, Wataru Fujita, Shintaro Watanabe, and Shotaro Miwa. Analysis of work behavior using GP-HSMM-based double articulation analyzer. The Annual Conference of JSAI (The Japanese Society for Artificial Intelligence), June 2023

Publications (International conference)

3. **Issei Saito**, Tomoaki Nakamura, Toshiyuki Hatta, Wataru Fujita, Shintaro Watanabe, and Shotaro Miwa, Unsupervised Work Behavior Analysis Using Hierarchical Probabilistic Segmentation, The 49th Annual Conference of the IEEE Industrial Electronics Society (IECON) October 16-19, 2023.

4. **Issei Saito**, Tomoaki Nakamura, Akira Taniguchi, Tadahiro Taniguchi, Yohei Hayamizu, and Shiqi Zhang, "Emergence of Continuous Signal as Shared Symbols Through Emergent Communication", The IEEE International Conference on Development and Learning (ICDL) conference, May 20-23, 2024.

Preprint

5. **Issei Saito**, Tomoaki Nakamura, Toshiyuki Hatta, Wataru Fujita, Shintaro Watanabe, and Shotaro Miwa, "Unsupervised Work Behavior Pattern Extraction Based on Hierarchical Probabilistic Model", arXiv: 2405.09838, 2024.

Skills

- Programming Languages: Python, C, Ruby
- English skill: IELTS 6.0

Others

Offensive leader and Vice-Captain on the college's American Football Team
- Act as a team leader, 2022
- Communicate well and act responsibly in a team
- Strong healthy body to work hard

Offensive coach on the college's American Football Team
- Team Leadership and Management: motivating and guiding team members towards a common goal.
- Communication Skills: providing clear and constructive feedback