Junichiro Iwasawa
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Overview

As a researcher at Preferred Networks, Inc., I primarily engage with clients in the healthcare and life sciences sectors. Currently, I serve as the tech lead for two projects aimed at customizing Large Language Models (LLMs) through finetuning methods such as continued pretraining, instruction tuning, and DPO for clients in the public sector.
I spearheaded a research project to build a medical domain-specialized LLM, resulting in **Llama3-Preferred-MedSwallow-70B, the first open LLM that surpasses GPT-4 in the Japanese Medical Licensing Exam (JMLE)**. Over the past few years, I have led a project for developing a deep learning based solution aimed at enhancing the diagnosis of endometriosis through the analysis of MRIs, in collaboration with a leading pharmaceutical company.
I have experience formulating problems through consultations with clients and providing solutions based on deep learning / machine learning. Additionally, I have mentored four research interns and one part-time engineer.
During my PhD, I have been working on the development of machine learning methods for gene expression/mutation data to tackle the problem of antibiotic resistance of bacteria.

Affiliation

- **Researcher, Preferred Networks, Inc.** Tokyo, Japan
  Developing machine learning based solutions with clients mainly in the healthcare sector *Apr. 2021 - present*
  - Current: Developing domain specialized Large Language Models based on PLaMo-100b using continued pretraining with multiple clients (Tech. lead, Oct. 2024 – present).
  - Led the development of Large Language Models (LLMs) for medical domains, (project lead, Apr. 2024 – Sep. 2024).
    - Led and conducted main experiments for building Llama3-Preferred-MedSwallow-70B, the first open LLM exceeding GPT-4 in the Japanese Medical Licensing Exam: Blog link
    - Comparison of RAG and continued pretraining for medical domains: Blog link
  - Developed a deep learning based solution for medical image analysis in collaboration with a pharmaceutical company, (project lead, Apr. 2021 – Sep. 2024).
  - Main mentor for four interns and one part-time engineer on R&D tasks. Related research blogs: 2022, 2023

Experience

- **Part-time Engineer and Intern @ Preferred Networks, Inc.** Tokyo, Japan
  Label efficient segmentation for 3D brain MRIs. Paper published at MICCAI 2021 (workshop) *Aug. 2019 - Mar. 2020*
- **Research Intern, Princeton University** NJ, USA
  Investigation of 1D core-collapse supernovae models, advised by Prof. Adam Burrows *Sep. 2016 - Nov. 2016*

Education

- **Dept. of Physics, The University of Tokyo** Tokyo, Japan
  Ph.D. in Physics *Apr. 2018 - Mar. 2021*
  - **Research field**: Biophysics, Machine Learning w/ biological data, Drug resistance of bacteria
- **Dept. of Physics, The University of Tokyo** Tokyo, Japan
  M.S. in Physics *Apr. 2016 - Mar. 2018*
  - **Research field**: Non-equilibrium statistical physics, Soft active matter physics
- **The University of Tokyo** Tokyo, Japan
  B.S. in Physics *Apr. 2012 - Mar. 2016*

Selected Publications

Google Scholar Profile

1. **Junichiro Iwasawa**, Tomoya Maeda, Atsushi Shibai, Hazuki Kotani, Masako Kawada, Chikara Furusawa. "Analysis of the evolution of resistance to multiple antibiotics enables prediction of the Escherichia coli phenotype-based fitness landscape", *PLoS Biology* **20**, 12 e3001920 (2022). Press release.

2. Tomoya Maeda*, **Junichiro Iwasawa***, Hazuki Kotani, Natsue Sakata, Masako Kawada, Takaaki Horinouchi, Aki Sakai, Kumi Tanabe, and Chikara Furusawa (*co-first authors), "High-throughput laboratory evolution reveals evolutionary constraints in *Escherichia coli*", *Nature Communications* **11**, 5970 (2020). Press Release & Recommended in Faculty Opinions as an exceptional paper.

3. **Junichiro Iwasawa**, Yuichiro Hirano, Yohei Sugawara, "Label-Efficient Segmentation using Semi-Supervised Multi-Task Learning", In Brain Lesion (BrainLes) Workshop at *Medical Image Computing & Computer Assisted Intervention (MICCAI)* 2020. arXiv:2009.11160.

Awards and Grants

- **Dissertation Award, Graduate School of Science, The University of Tokyo** Dissertation: "Deciphering evolutionary constraints through laboratory evolution and machine learning", Mar. 2021
- **Research Fellowship for Young Scientists (DC1), Japan Society for the Promotion of Science**: Research of "Spontaneous Patterns and Order in Active Matter", ¥2,800,000, Apr. 2018 - Mar. 2021

Technical Skills

- Expert: Python (PyTorch, transformers, trl, NumPy, Pandas, scikit-learn, etc.)
- Proficient: Kubernetes, Docker, Argo Workflows, git, LaTeX
- Familiar C++, R, FORTRAN

Other Skills

- **English**: TOEFL iBT 104, English instructor at SEG (Cram school for Japanese high school students) (2012–2016).

Links

- Twitter: @jiwasawa, GitHub: jiwasawa, LinkedIn: junichiro-iwasawa-875b37130, ORCID: 0000-0002-2560-5650