English 日本語

Sho Sakai

PH.D. STUDENT IN MATHEMATICS
UNIVERSITY OF TSUKUBA

↗ BLOG ↗ CV

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linkedin.com/in/ssakai0403

Google Scholar

↗ Kaggle Profile

↗ Instagram

> **Actively seeking**: Research Assistant roles, internships during my Ph.D., and job placements after graduation!

Sho Sakai, a Ph.D. student in the Mathematics Degree Program, Degree Programs in Pure and Applied Sciences, Graduate School of Science and Technology, University of Tsukuba.

My research focuses on **high-dimensional statistical analysis**, with interests extending beyond theoretical development to applications involving real-world data and decision-making processes.

I host a **podcast** titled **"Data Science LG: Learning Together in Statistics and Data Science"**, where we explore topics such as statistics, machine learning, and academic careers from the perspective of students and researchers. The podcast is available on **Apple Podcast**, **Spotify**, **YouTube**, and **Amazon Music**. For more details, please see the Community / Podcast section below.

I am also involved in **advocacy to raise awareness about hematopoietic stem cell transplantation**, sharing my experience as a donor and promoting donor registration through talks and outreach activities. Through these efforts, I aim to help bridge the gap between healthcare and society.

I share **my research findings and code** on **GitHub**, and post about blood donation, hematopoietic stem cell transplantation, data science, education, and research on **note**.

INTERESTS

High-Dimensional Statistics HDLSS (High-Dimensional Low Sample Size)

Hypothesis Testing Dimensionality Reduction (PCA, PLS, CCA, ICA)

Representation Learning Statistical Causal Discovery

Embedding Techniques (e.g., Text Embedding, Bioinformatics) Machine Learning

Finance Materials Informatics Astronomy Open Science

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SKILL

See full profile on LinkedIn

SPEECH

Sho Sakai, Kazuyoshi Yata, and Makoto Aoshima, "Exploring Principal Component Regression in High-Dimensional Data: Hypothesis Testing for PCR Coefficients & Steps Toward Prediction-Error Minimisation", *Statistics Summer Seminar 2025*, Kagawa, Japan, Poster Presentation, August 4-6, 2025.
View Program

Sho Sakai, Kazuyoshi Yata, and Makoto Aoshima, "Hypothesis testing for PCR coefficients in high-dimensional data", *The Mathematical Society of Japan Annual Meeting*, Tokyo, Japan, Oral Presentation, March 21, 2025.
View Program

Sho Sakai, Kazuyoshi Yata, and Makoto Aoshima, "Hypothesis testing for PCR coefficients in high-dimensional data", *Seminars by Alumnae/Alumni of Kagoshima University on their Recent Achievements 2025*, Kagoshima, Japan, Oral Presentation, March 11, 2025.
View Program

EDUCATION

2025 – 2028 (expected) **University of Tsukuba**
Ph.D. in Mathematics, Graduate School of Science, Degree Programs in Pure and Applied Sciences
Advisor: Aoshima Laboratory

2023 – 2025 **University of Tsukuba**
M.Sc. in Mathematics, Graduate School of Science, Degree Programs in Pure and Applied Sciences
Advisor: Aoshima Laboratory

2019 – 2023 **Kagoshima University**

B.Sc. in Mathematics and Informatics, Faculty of Science, Mathematics and Informatics Program

Advisor: Yoshida Laboratory (2022–2023)

EXPERIENCE

Apr. 2025 – Mar. 2028

Next-Generation AI Human Resource Development Program Fellow — JST BOOST initiative, University of Tsukuba

Selected for the University of Tsukuba's Next-Generation AI Talent Development Program, "Project for Interdisciplinary Next-Generation AI Innovative Human Resource Development". This initiative, part of a national strategy to foster doctoral students, supports 600 students across Japan. The University of Tsukuba has a quota of 12 students, and I was chosen as one of them through a highly competitive internal selection process. Receiving support for living expenses and research funds, I am able to fully dedicate myself to theoretical and applied research in high-dimensional statistics. I plan to actively pursue collaborations with fields such as bioinformatics, materials science, and astronomy.

PDF

Apr. 2024 – (Chair: Apr. 2025 –)

Chair & Technical Assistant — User Committee, Department of Mathematics, University of Tsukuba

Appointed chair and technical assistant of the graduate student user committee for computing services, supporting computational infrastructure and student system administration.

Dec. 2023 / Dec. 2024

International Symposium Staff — International Symposiums on Large Complex Data

Contributed to the 2023 International Symposium on Recent Advances in Theories and Methodologies for Large Complex Data and the 2024 International Symposium on Theories, Methodologies and Applications for Large Complex Data. Reported each activity on LinkedIn.

Jul. 2023 / Jul. 2024

Staff, Mathematics Trial Program — University of Tsukuba

Served as staff for the undergraduate mathematics experience program in July 2023 and July 2024.

INTERN

Mizuho Research & Technologies, Ltd.

2025

AI Field Internship as R&D Specialist. Participated in cutting-edge image recognition AI workshop focusing on manufacturing industry applications. Experienced real-world challenges in AI implementation such as limited anomaly data collection and unstable imaging environments. Gained hands-on experience with image recognition AI for verification and analysis, developing problem-solving skills and deepening understanding of AI technology in practical applications.

Nospare Inc.

Dec. 2024 –

Ongoing internship at a data science company.

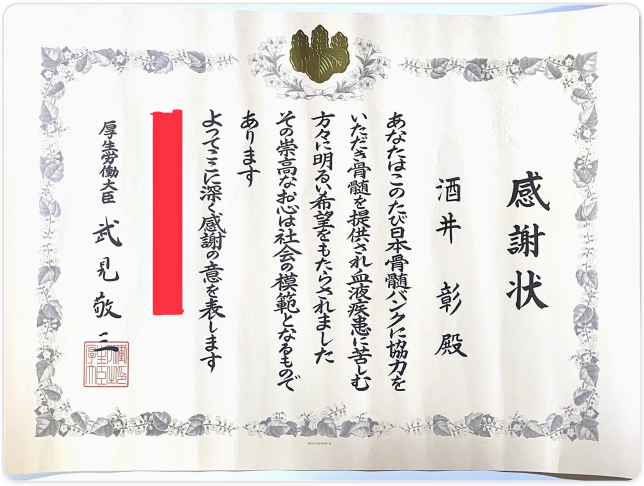
RESEARCH ASSISTANT

University laboratory

Oct. 2023 - Nov. 2024

AWARD

Bone Marrow Donation Certificate of Appreciation（Minister of Health, Labour and Welfare）


感謝状

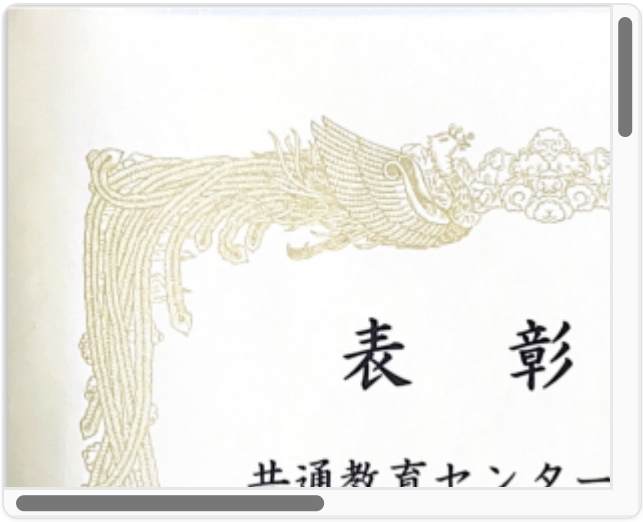
酒井 彰 殿

あなたはこのたび日本骨髄バンクに協力をいただき骨髄を提供され血液疾患に苦しむ方々に明るい希望をもたらされましたその崇高なお心は社会の模範となるものでありますよってここに深く感謝の意を表します

厚生労働大臣 武見敬三

Common Education Center Director's Award（Kagoshima University）

Oct. 2020



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COMMUNITY / PODCAST

Nospare Student Community

2024 -

I lead the design and management of study group templates, including topics such as multivariate analysis, reinforcement learning, Gaussian processes, and Bayesian deep learning. I also participate in the practical machine learning study group.

I host a podcast titled 'Data Science LG: Learning Together in Statistics and Data Science', where we explore topics such as statistics, machine learning, and academic careers from the perspective of students and researchers. The podcast is available on Spotify, Apple Podcast, YouTube, and Amazon Music.

For an overview of our podcast activities and related information, please visit the Notion page below:

Apple Podcast Spotify YouTube Amazon Music Community Website Podcast Activity Overview

News Audience Data Note Cast / Guest List Conference Reviews Podcast Reviews

Guest Information Conference Review Guidelines

Tsukuba Graduate Students' Network

2024 -

I am a general member of this graduate student community and started a podcast initiative within the group.

Community Website Spotify

OUTREACH / PUBLIC ENGAGEMENT

Blood donation

2018 –

Achieved 70 blood donations and received the silver merit badge.

(August 13, 2025) **Blood Donation RTA: Silver Merit Badge Achievement (70 donations reached) Report**

Bone Marrow Bank Youth Ambassador

2024 –

I engage in activities to share information about hematopoietic stem cell transplantation and promote donor registration. If you're interested in inviting a speaker or organizing a promotional booth about the Japan Marrow Donor Program at your school, university, or organization, please reach out. We can coordinate with the Japan Marrow Donor Program directly. To increase the number of young bone marrow donors, I believe it is important to share the voices of those who have actually donated and their families.

(July 7, 2025) **Gave a lecture as a bone marrow donor at a nursing school.**

(May 28, 2025) **Published a summary of bone marrow transplant / bone marrow bank / blood donation related podcasts**

(May 11, 2025) **Participated in Health Festival to promote awareness of hematopoietic stem cell transplantation**

(Apr. 23, 2025) **"Voices of Donor Families" featured**

(Dec. 15, 2024) **Gave a lecture as a bone marrow donor at the 'Egao Japan Marrow Donor Program Student Seminar'**

(Dec. 2024) **Interviewed by the Japan Marrow Donor Program on my donation experience and featured in their newsletter**

(Nov. 27, 2024) **The Japan Marrow Donor Program was registered as a T-ACT community group at the University of Tsukuba**

(Nov. 6, 2023) **Published a report on bone marrow donation experience and related information**

TEACHING ASSISTANT

Statistical Exercise
Fall 2023, Fall 2024

Computer Exercise

Fall 2023, Fall 2024

Computer Mathematics I
Spring 2024

Linear Algebra I
Spring 2024

QUALIFICATION / TEST SCORE

Japanese High School Teacher's License (Information & Mathematics)
Mar. 2023

Japanese Junior High School Teacher's License (Mathematics)
Mar. 2023

TOEIC L&R score 735
Mar. 2022

ACADEMIC SOCIETY

The Japan Statistical Society
2023 –

The Mathematical Society of Japan
2023 –

The Japanese Society for Artificial Intelligence
2025 –

PORTFOLIO

Master's Thesis / Hypothesis testing for PCR coefficients in high-dimensional data (JSS NEWS) ↗

Introduced in JAPAN STATISTICAL SOCIETY NEWS (April 20, 2025, No.203, Section 9: p.15).

Master's Thesis / Hypothesis testing for PCR coefficients in high-dimensional data (Mathematics Communication) ↗

Featured in Mathematical Society of Japan's 'Mathematics Communication' (Volume 30, No.1, May 2025) in the section '2024 Master's and Doctoral Theses'.

Graduation Thesis / Asymptotic Theory of Principal Component Analysis ↗

Related repository link available above.

Updated on Nov 23, 2024

Asymptotic Theory of PCA ↗

R

R code and mathematical notes on asymptotic properties of PCA under large-sample settings.

Updated on Nov 23, 2024

T.W. Anderson (2003) PCA Confirmatory Analysis ↗

R

Reimplementation of confirmatory PCA methods from Anderson's 2003 paper.

Updated on Nov 23, 2024

T.W. Anderson (2003) Hypothesis Testing ↗

R

Reproduction of hypothesis testing framework for PCA from Anderson (2003).

Updated on Nov 23, 2024

Principal Component Analysis ↗

Jupyter Notebook R

Notebooks to demonstrate PCA using both synthetic and real-world data. Implementations are available in Jupyter (Python) and R.

Updated on Nov 23, 2024

Conditional Probability and Multiplication Theorem ↗

LaTeX

A TeX document that explains the relationship between conditional probability and multiplication rule.

Updated on Nov 23, 2024

PRML with Python ↗

Jupyter Notebook

Selected implementations and exercises based on 'Pattern Recognition and Machine Learning' (Bishop).

Updated on Nov 1, 2023

Causal Inference ↗

Python Jupyter Notebook

Jupyter notebooks exploring potential outcome frameworks and causal graphs.

Updated on Jul 26, 2023

Programming with R, C, and Python ↗

R C Python

Introductory examples in multiple languages for basic computational logic and syntax.

Updated on Apr 19, 2023

Transformation of Matrix ↗

Utility scripts and explanations for matrix operations and transformations.

Updated on Feb 2, 2023

HP Last updated: October 21, 2025
CV Last updated: October 21, 2025