Taisei Saida

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EDUCATION

Apr 2023 – present	University of Tsukuba, Japan
	Engineering Doctor's Program, Graduate School of Science and Technology
Apr 2021 – Mar 2023	University of Tsukuba, Japan
	Engineering Master's Program, Graduate School of Science and Technology
Apr 2017 - Mar 2021	University of Tsukuba, Japan
	Bachelor of Engineering, College of Engineering Systems
Apr 2016 – Mar 2017	Studying for university entrance exams
Apr 2013 – Mar 2013	Nanto Fukuno High School in Toyama Prefecture, Japan

RESERCH POSITION

Jun 2021 – present	Research Assistant, University of Tsukuba, Japan
May 2019 – Dec 2022	Research Assistant, National Agriculture and Food Research Organization (NARO), Japan
Sep 2021	Research Internship, Taisei Company Technology Center, Japan
Aug 2021 – Sep 2021	Research Internship, NTT Access Network Service Systems Laboratories, Japan

EXPERIENCE

➢ Research on the surrogate modeling as a graduate student in University or Tsukuba

- ✓ Developed some Gaussian process regression based surrogate models.
- ✓ Showed effectiveness of the transfer learning Gaussian process regression surrogate model (TL-GPRSM) to the stochastic performance analysis of a steel girder bridge with corrosion.
- ✓ Developed a deep kernel learning for surrogate modeling of earthquake fragility analysis of a highway bridge system considering high-dimensional uncertainties on structural properties

and input loads.

- ✓ Acquired machine learning programming skills in Python and PyTorch, and learned how to use various tools and frameworks for data processing, model training, and evaluation.

- ➢ Research on autonomous driving as a research assistant at NARO
  - ✓ Conducted research on autonomous driving of agricultural machines and developed algorithms for path planning and obstacle avoidance using point cloud data.
  - ✓ Created and tested a simulator for autonomous driving of agricultural machines using Unity game engine and C# programming language, and acquired point clouds of the farmland using UAVs. (Video: https://youtu.be/lGZbcu4cE18?t=4625).

- ➢ Research Internship at NTT
  - ✓ Worked on a project to develop and test a web-based system for visualizing the information of communication pipelines acquired by GNSS and ground penetrating radar.
  - ✓ Proposed a system for converting 2D drawings of manholes into 3D drawings using CNN, and demonstrated its feasibility.

- ➢ International Competition (https://sail.cive.uh.edu/ic-shm2021/)
  - ✓ Participated in ANCRiSST Competition on Damage Detection from VR Images Simulating UAV Images after Disasters and formed a team with other lab members and international students.
  - ✓ Wrote most of the programming part for segmentation using deep learning techniques, such as U-Net++ and Feature Pyramid Network (FPN), achieved high accuracy in predicting damage locations, received Honorable mention award, and published one paper in an international journal.

RESERCH INTERESTS

- ➢ Developing and applying surrogate modeling techniques using Gaussian process regression and deep neural networks to various engineering and scientific problems, and clarifying how they can capture the underlying physics and uncertainty of the systems.
- ➢ Ensuring the interpretability and explainability of the surrogate models, especially when using complex and nonlinear models such as deep neural networks, and understanding how they can be trusted and communicated to the stakeholders and decision makers.
- ➢ Exploring PhysicsInformed methods that incorporate equation information representing physical phenomena into surrogate models, and enhancing their data efficiency, prediction accuracy, and interpretability for complex systems.

PUBLICATIONS

Saida T, Nishio M. "Transfer learning Gaussian process regression surrogate model with

explainability for structural reliability analysis under variation in uncertainties." *Computers & Structures*. 2023. 281. 107014.

Saida T, Rashid M, Nemoto Y, Tsukamoto S, Asai T, Nishio M. "CNN-based segmentation frameworks for structural component and earthquake damage determinations using UAV images." *Earthquake Engineering and Engineering Vibration*. (Accepted)

Saida T, Nishio M. "CONSTRUCTION OF GAUSSIAN PROCESS REGRESSION SURROGATE MODEL FOR NONLINEAR SEISMIC RESPONSE ANALYSIS USING ARD KERNEL." *Journal of Japan Society of Civil Engineers (Applied Mechanics)*. 2021. 77. 2. I_93-I_104. (in Japanese)

CONFERENCE PRESENTATIONS (only INTERNATIONAL)

Saida T. Nishio M. "Gaussian process regression surrogate model for dynamic analysis to account for uncertainties in seismic loading." SPIE Smart Structures + NDE 2023. Mar 2023.

Okuda T, **Saida T**, Matono G, Nishio M. "Digital twin framework for real-time dynamic analysis visualization with detecting dynamic changes in structures properties using PINN." SPIE Smart Structures + NDE 2023. Mar 2023.

Saida T, Nishio M. "Gaussian Process Regression Surrogate Modeling with Transfer Learning for Low Computational Cost Structural Reliability Analysis." 15th World Congress on Computational Mechanics & 8th Asian Pacific Congress on Computational Mechanics. Aug 2022.

Awards

Saida T, Nemoto Y, Tsukamoto S, Rashid M. Honorable Mention. The 2nd International Competition for Structural Health Monitoring. ANCRiSST. 2022. https://sail.cive.uh.edu/ic-shm2021/

Saida T. Applied Mechanics Presentation Award. The 24th Symposium on Applied Mechanics. Japan Society of Civil Engineers. 2021.

Others

➢ Mobile Application
  ✓ Developed an online colored paper application that allows people to send messages to graduates etc. during the COVID-19 pandemic, raised development funds through crowdfunding, and wrote most of the programming code for the application.
  ✓ Developed a smartphone application that allows people to share their remote work status with others during the COVID-19 pandemic, and enables users to visualize the number of people working from home and raise awareness of remote work.
➢ Bardman Club at University
  ✓ Participated in the production of a human-powered aircraft, led the team that made the wings of the aircraft with a total length of about 30 m, and developed software to optimize the

locations of holes in the wing ribs to reduce their weight as much as possible.

✓ Developed software to automatically generate wing drawings and G-code for NC machines to automate wing fabrication, and received awards of competition after flying about 4km at a competition that was broadcasted on TV.

Skills

➢ Machine learning programming skills: Proficient in writing code for deep learning and other machine learning algorithms using Python and Matlab, with experience in applying them to various engineering and scientific problems.

➢ Numerical simulation skills: Proficient in performing numerical simulations and validating results using software such as Abaqus with experience in modeling and analyzing various physical phenomena and systems.

➢ Game development skills: Skilled in using game engines such as Unity to create interactive and immersive applications, with knowledge of graphics, physics, animation, and sound design.

➢ Code sharing skills: Familiar with using version control tools such as Git and GitHub to collaborate with other developers and manage code changes.

➢ Mobile application development skills: Able to develop native and cross-platform mobile applications.