Game Programmer, Data Scientist, AI Engineer
MIOTO TAKAHASHI

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Game programmer, data scientist, and AI engineer with years of experience in conducting research, developing softwares, and mentoring students in machine learning, AI, game development, computational simulation models, and statistical models. I have a proven track record of achieving high pass rates in classes that I have tutored and producing significant results in various projects using Python, C#, game engines, etc. Additionally, my background in conducting sound design for theatrical plays demonstrates my ability to collaborate with teams and enhance overall experiences. With a focus on research, software development, and education, I bring a unique blend of technical skills and creative expertise to the table.

EDUCATION

University of Vermont, Burlington, VT   Graduated: May 2025
Master of Science in Complex Systems and Data Science   *GPA: 3.44*
- Evolutionary computation
- Bayesian statistics
- Computational and mathematical modeling
- Data science and decision theory

Keio University, Kanagawa, Japan   Graduated: March 2022
Bachelor of Arts in Environment and Information Science   *GPA: 3.31*
- Machine learning / deep learning
- Statistical analysis
- Optimization problems and algorithms
- Nonlinear dynamics and chaos
- Database management (Pandas, SQL, Hadoop)
- Software and computer architectures: CISC (x86), RISC (MIPS), memory allocation/management, etc.
- Programming: Python, C, C++, C#, Java, R, Haskell, Javascript
- Graphical programming: OpenGL, GLUT, OpenFrameworks, Processing
- Unity game development

TECHNICAL SKILLS

- Python development (NumPy, Pandas, PyTorch, Tensorflow, Matplotlib, Flask, scikit-learn)
- Mathematical / numerical / computational modeling (ex. agent-based modeling)
- Machine learning / deep learning (esp. robotic control using deep reinforcement learning)
- C# performance optimization
- Unity 3D game development
- (Bayesian) statistical analysis / data science
- C / C++ Memory management
- Web development (React.js, HTML5, CSS, Javascript)
- Version control (Git, Github)
- Remote Linux Development (ssh, Ubuntu)
- Containerization (Docker, Anaconda)

ACADEMIC RESEARCH

MASTER'S THESIS, University of Vermont   May 2024 – April 2025
Morphology, Evolution, and Cognition Laboratory (Dr. Josh Bongard, Computer Science)
- Refined the prior understanding of population dynamics in predator-prey ecosystems by conducting computational biological research
- Research question: "in theory, would armor evolution in predators lower the average evolutionary time until extinction in different predator-prey ecosystems?"
- Discovered that evolution of defensive weaponry in predators generally reduces their time until extinction, by developing agent-based models of predator-prey ecosystems and evaluating them using Kolmogorov-Smirnov test and Mann-Whitney-Wilcoxon U-test

- Strengthened the findings by validating the results with prior field studies on defensive weaponry and population dynamics in biology

Dirichlet DIAYN, Keio University   April 2018 – March 2020
Jin Nakazawa Laboratory (Computer Science) in conjunction with Masashi Aono Laboratory (Complex Systems)
- Upgraded an existing PyTorch deep reinforcement learning library RLKit by implementing 2 state-of-the-art algorithms
  - Diversity Is All You Need (DIAYN), a hierarchical reinforcement learning algorithm that can learn multiple diverse tasks during training
  - Proximal policy optimization (PPO), a policy gradient algorithm
- Introduced novel insight into distribution sampling in reinforcement learning by analyzing the effect of sampling dirichlet distribution as opposed to a categorical distribution for DIAYN

RELEVANT PROJECTS

Bayesian Inference of Convergent Evolution in Quadruped / Data Science   January 2024 – May 2024
CSYS 6990A: Data Science 2, University of Vermont
- Uncovered a divergence in evolution between extant quadrupedal animals and (extinct) ceratopsians in body proportions using Bayesian inference
- Solved the issue of disorganized data by conducting data imputation using linear, hyperbolic, and cubic regression and feature extraction using principal component analysis
- Clarified the results in a digestible medium by visualizing the distributions of the body proportions for the 2 clades using a Bayesian linear regression model
- Strengthened the validity of the results by conducting prior-predictive check, posterior-predictive check, and r-hat calculation to evaluate the model performance and parameter convergence

Unity Crowd AI / Game Development, Performance Optimization, Data Processing   June 2025 – August 2025
Personal Project
- Proposed a novel method for utilizing Kohonen's self organizing map (KSOM) for enabling a group of NPC AI agents to automatically organize themselves in user-specified formations
- Drastically boosted the performance of 2 computationally expensive crowd AI in Unity using C# optimization techniques
  - Improved the frame rate per second (FPS) of an implementation of a herding algorithm, with 5000 NavMeshAgents, from 15 FPS to 100 FPS using Unity coroutines, or main thread time slicing
  - Improved the FPS of KSOM with 10 groups consisting of 6 NavMeshAgents per group from 3 FPS to 100 FPS using the Unity parallel job system, or multithreading
- Efficiently customized an imported 3D model and animation asset by analyzing a (JSON-formatted) glTF file using Python and a network analysis software NetworkX
  - Analyzed the inner tree structure of a (JSON-formatted) glTF file containing multiple 3D models using NetworkX
  - Separated the 3 models and their animations into 3 separate self-contained glTF files using Python

RELATED EXPERIENCES

Keio University, Kanagawa, Japan   September 2018 – March 2019
Research Assistant / Undergraduate Teaching Assistant
- Achieved 95% pass rate in a programming class by coaching and mentoring 30+ novice students in learning how to write HTML, CSS, and Javascript code, obtaining the necessary basic programming knowledge, and developing their own custom websites from scratch
- Research experience on machine learning and AI in the Jin Nakazawa Lab (Dirichlet DIAYN)

ADDITIONAL EXPERIENCE

Theater Society in Keio University, Kanagawa, Japan   March 2018 – March 2019
Extracurricular Activity
- Succeeded in coordinating sound design in 12 showings of theatrical plays in a year by collaborating with different scriptwriters, directors, and the lighting department on methods for highlighting different scenes, characters, and themes