NIRAI HAYAKAWA

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PROFESSIONAL SUMMARY

First-year Master's student in Computer Science at University of Colorado Boulder(Online so I'm living in Japan) with extensive research experience in AI/ML applications for esports and gaming. Published researcher with expertise in computer vision, video analysis, and large language models. Demonstrated ability to develop innovative solutions that bridge academic research with practical applications, achieving significant improvements in prediction accuracy through novel approaches to temporal data analysis.

EDUCATION

Master of Science in Computer Science

March 2025 - Present

University of Colorado Boulder, Colorado

RESEARCH EXPERIENCE

Current Research: LLM-Based Algorithm Optimization for NP-Hard Problems

Conducting research on LLM-driven algorithm optimization frameworks for NP-hard problems such as AHC (AtCoder Heuristic Contest) challenges, focusing on automated algorithm evolution and optimization.

- Researching cutting-edge frameworks including ShikaEvolve, OpenEvolve, and AlphaEvolve for algorithmic optimization
- Developing methodologies for applying Large Language Models to automatically improve heuristic algorithms
- Investigating automated code generation and optimization techniques for complex combinatorial optimization problems
- Exploring the intersection of LLMs and competitive programming for algorithmic problem-solving

VALORANT Round Outcome Prediction Research (with NAIST)

Collaborated with Nara Institute of Science and Technology to develop transformer-based deep learning approach for predicting round outcomes in VALORANT using minimap video analysis and tactical event recognition.

- Designed novel methodology combining TimeSformer architecture with tactical event detection from minimap footage
- Achieved 80.55% overall prediction accuracy with Model B (8.27% improvement over baseline Model A using only minimap data)
- Developed innovative tactical event labeling using OpenCV-based template matching for skill usage and enemy detection
- Constructed datasets from 1,376 official tournament videos containing 29,506 rounds for model training
- Published research accepted at IEEE Conference on Games 2025 (IEEE CoG 2025)
- DOI: https://doi.org/10.1109/CoG64752.2025.11114177

PROFESSIONAL EXPERIENCE

Research Engineer Intern *Present*

Not A Hotel Inc.

AI Agent Evaluation Framework Research

- Researching and implementing standard methodologies for AI agent evaluation frameworks
- Focus on LLM as a Judge approach for automated AI system assessment
- Designing comprehensive evaluation frameworks for AI agents across multiple domains
- Developing standardized benchmarking protocols for AI agent performance measurement

Software Developer (Part-time) *Until Last Month*
CLINKS Corporation

PoC Development & Feature Innovation

- Worked under the direct supervision of the Executive Managing Director on strategic projects
- Independently developed a comprehensive Proof of Concept (PoC) from initial design to implementation
- Proposed and developed innovative features that received positive feedback from stakeholders
- Demo release scheduled for public launch in the near future

Texture Platform Automation Project

- Solved critical productivity bottleneck where designers required average of 8 revisions to pass reviews
- Developed automated texture packaging system through close collaboration with design teams using Python and LLM integration
- Reduced review failures to nearly zero, significantly improving team productivity
- Implemented LLM-powered automatic proofreading and English translation for product descriptions
- Collaborated with management to implement secure LLM integration protocols

TECHNICAL SKILLS

Programming Languages

- **Python (3+ years):** Primary development language
- **C++ (1.5 years):** Competitive programming
- **C# (1 year):** Unity development
- **Swift (6 months):** iOS development with ARKit

Cloud & Infrastructure

- **Google Cloud Platform (1.5 years):** VM management, deployment
- **AWS:** Cloud solution architecture
- **BigQuery:** Data analytics and management

AI/ML & Research

- **Deep Learning (2 years):** Computer vision, NLP
- **Video Analysis:** TimeSformer, tactical feature extraction
- **Large Language Models:** Integration and application development
- **AR/VR:** ARKit, motion tracking, spatial computing

Development Tools

- **Game Engines:** Unity, Unreal Engine
- **Web Frontend (2 years):** UI development
- **Hardware:** Arduino, embedded systems
- **Security:** Cryptography implementation

KEY ACHIEVEMENTS

Publications

- "Round Outcome Prediction in VALORANT Using Tactical Features from Video Analysis" - IEEE Conference on Games 2025 (Co-authored with NAIST researchers)
- Collaborative research with Graduate School of Science and Technology, NAIST

Competitive Programming

- **AtCoder Rating:** 1252 (Light Blue)
- **Japanese Olympiad in Informatics:** Perfect score (First Round), 2nd place (Second Round), Rank B (Final)

CERTIFICATIONS

Major Cloud Certifications

- AWS Cloud Solutions Architect Professional
- Google Cloud Cybersecurity Professional
- Google Data Analytics Specialization

AI/ML & Development

- DeepLearning.ai Deep Learning Specialization
- IBM Generative AI Engineering Professional
- Microsoft AI & ML Engineering Professional

Japanese National Qualifications

- IPA Fundamental Information Technology Engineer
- IPA Applied Information Technology Engineer

Additional Specializations

- IBM Full Stack Software Developer Professional
- Google Cybersecurity Specialization
- University of London Data Science Foundations

LANGUAGE PROFICIENCY

Japanese: Native | **English:** Advanced (EIKEN Grade Pre-1)