

# Tuguldur Bayarsaikhan

Undergraduate Research Assistant | Machine Learning | Optimization

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## Research Interests

Passionate about AI and mathematics with nearly 2 years of research experience in control theory, continuous sign language translation and combinatorial optimization, alongside 4+ years of programming experience in industry. Engaged in ongoing self-directed study of real analysis, functional analysis, statistical learning, optimization and the theoretical foundations of neural networks, closely aligned with my current research. Regularly follow the corresponding courses on EdX and Coursera. Research interests include graph representation learning, network analysis, combinatorial optimization, reinforcement learning and large language models.

## Education

National University of Mongolia

Ulaanbaatar, Mongolia

Bachelor of Science in Computer Science | GPA: 3.5 / 4.0

2018 - 2025/12

- Relevant coursework: Data Structures, Quantum Information Science, Applied Probability, Algorithm Design and Analysis, Mathematical Statistics, Advanced Linear Algebra, Artificial Intelligence, Machine Learning, Principles of Computer Systems

## Experience

National University of Mongolia

Ulaanbaatar, Mongolia

Undergraduate Research Assistant - supervisor Ph.D Ch.Altannar

2025 - Present

- Conducted a literature review on combinatorial optimization focusing on Critical Node Detection Variants including stochastic, temporal, bilevel and Influence Maximization problems.
- Implemented and analyzed algorithms from recent papers in graph representation learning, reinforcement learning and classical heuristic approaches from Critical Node Detection and Influence Maximization problems.
- Collaborated with a team to explore the theoretical foundations of neural networks, focusing on Neural Network Approximation Theory.
- Currently engaged in research on the Stochastic Critical Node Detection Problem, integrating heuristic methods with learning-based algorithms for scalable solution design.

Mirai Technologies, Mongolia

Ulaanbaatar, Mongolia

A.I Research Engineer

2024 - Present

- Implemented a path planning algorithm from scratch based on a mathematically derived kinematic model, integrating controlling algorithms such as PID, Pure Pursuit with the extent of Kalman Filter and reinforcement-based controllers
- Contributed to a hybrid deep learning framework for anomaly detection, involving model implementation, literature review and evaluation of recent research.
- Developed the encoder-decoder architecture combining GNN-based ST-GCN and an RNN decoder for continuous sign language translation from video sequences
- Currently investigating the Job Shop Scheduling Problem, focusing on constraint programming, mixed-integer programming formulations and reinforcement learning-based methods to implement and evaluate solutions from recent academic literature

## Certification

6.431x: Probability - The Science of Uncertainty and data - EdX - MIT

6.86x Machine Learning - EdX - MIT

18.6501x: Fundamentals of Statistics - EdX - MIT

Deep Learning Specialization - Coursera

## Skills

Machine Learning · Discrete Optimization · Natural Language Processing · Graph Representation Learning · Reinforcement Learning · Algorithm Design and Analysis · Software Development · Infrastructure · Mathematical Programming

## Awards

NUM - Appathon - Team 2nd Place (2023 - 04)

NUM - Startup 3.0 - Team 3rd Place (2023 - 11)

PROCON - Programming Contest - 1st Place (2019)

Oyutolgoi Scholarship for Undergraduate Students (2022 - 2025)

## Languages

English Advanced ●●●○○

Japanese Intermediate ●●○○○

Languages

English Advanced ●●●○○

Japanese Intermediate ●●○○○