Elias Firisa

github.com/EliasSf73 eliasfirsa@kaist.ac.kr eliassfirisa@gmail.com leetcode.com/u/Abdiisf/

Education

Korea Advanced Institute of Science and Technology (KAIST) **Feb 2022 – Feb 2026 (Expected)**
B.S. in Brain and Cognitive Science, Minor in AI *Daejeon, South Korea*

Completed coursework: Intro to Linear Algebra, Probability and Statistics, Statistical Machine Learning, Engineering Statistics, AI and the Brain, Signals and Systems, Data Science, Systems Neuroscience, Cognitive Neuroscience, Discrete Mathematics, Data Structures, Human Brain Anatomy and Physiology Lab, Biology of Neurons, Methods in Brain and Cognitive Sciences, General Physics I, General Physics II, Calculus

Current coursework(Spring 2025): Machine Learning, Experimental Data Analysis and Modeling, Bio-Signal Processing, Theoretical Neuroscience

Experience

Research Intern **Dec 2024 – Present**
KAIST Decision Brain Dynamics Lab *Daejeon, South Korea*

- Analyzing frontal lobe EEG patterns using power spectrum analysis and machine learning to measure stress and emotional states.
- Applied machine learning algorithms to classify Parkinson's disease datasets, yielding insights into disease patterns.
- Conducted a foundational study on the neurophysiological and clinical aspects of Parkinson's disease.

Undergraduate Researcher **Feb 2024 – Nov 2024**
KAIST Brain-Machine Intelligence Lab *Daejeon, South Korea*

- Developed and implemented Variational Autoencoders (VAEs) for facial image generation and latent space exploration using the CelebA dataset.
- Researched the integration of predictive coding concepts within deep learning frameworks to advance machine understanding of cognitive processes.

Research Intern **June 2024 – Aug 2024**
University of Leeds Worm Lab *Leeds, UK*

- Conducted research on time series forecasting of chaotic systems using Duffing oscillator dynamics and nonlinear dynamical models.
- Applied time series forecasting models (e.g., DLinear) to predict C. elegans neural activity from complex datasets.

Research Internship **Mar 2024 – May 2024**
KAIST Data Strategy Lab *Daejeon, South Korea*

- Reviewed and analyzed research papers on AI-driven metrics for text summarization, information retrieval, and sentiment analysis.

Tutor **Sep 2024 – Present**
KAIST *Daejeon, South Korea*

- Provide tutorials for foundational courses (e.g., General Biology) to freshman students.
- Coach advanced subjects including Linear Algebra, Probability, Statistics, and Neuroscience to non-freshman students.

Projects

Integrated Statistical and Survival Modeling of Glioblastoma Outcomes

- Identified significant glioblastoma treatment effects ($p \leq 0.05$, HR ≤ 0.8) by applying ANOVA with Tukey HSD and Kaplan-Meier/Cox survival modeling to 150+ preclinical experiments and 200+ clinical patient records.

Parameter Estimation: Optimization of Lotka–Volterra Dynamics

- Optimized predator-prey Ordinary Differential Equation (ODE) parameters to fit empirical data, minimizing model-data error using grid search, Nelder-Mead, and simulated annealing algorithms.

Variational Autoencoder with CelebA *[GitHub Link]*

- Developed a VAE using PyTorch on the CelebA dataset for high-quality facial image generation and latent space analysis.

RAG Pipeline for Financial Q&A

- Designed and implemented a Retrieval-Augmented Generation (RAG) pipeline tailored for a financial question-answering corpus, enhancing contextual accuracy.

Student Grade Classification *[GitHub Link]*

- Developed a machine learning model to classify student grades by analyzing academic and demographic data, achieving high predictive accuracy.

Web3-Based Freelance Marketplace *[Project Link]*

- Led the creation of a decentralized freelance marketplace using Web3 technologies; awarded 1st place in a competition.

Skills

- **Programming Languages:** Python, Java, MATLAB, HTML, CSS
- **ML & Data Science:** PyTorch, NumPy, Pandas, Scikit-learn, VAEs, RAG, Time Series Forecasting, Statistical Modeling, Data Visualization (Matplotlib, Seaborn)
- **Tools & Platforms:** Git, GitHub, LeetCode
- **Neuroscience Methods:** EEG Analysis, Power Spectrum Analysis, Computational Neuroscience Techniques

Awards and Achievements

- Top Project: Web3 and Blockchain Competition (Spring 2023)
- KAIST Alumni Scholarship (2024)
- INSEO Scholarship (2023)