MYOUNGCHUL KIM

Data Scientist

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PROJECTS

Search for Ultra-high Energy Neutrinos from Askaryan Radio Array (ARA) by Template Method

International Center for Hadron Astrophysics (ICEHAP)

March 2017 – December 2023 | Chiba University

- Classified astronomical signal by **statistical-oriented Principal Component Analysis (PCA)**, after obtaining features from **2 billion amounts (∼200 TB)** of radio-frequency data that measured below the South Pole.
- Implemented automation solutions for utilizing **large CPU & GPU clusters** by building **Python & C++ packages** to streamline data analysis workflows and enhance productivity.
- Implemented physics techniques, such as the **Fast Fourier Transform (FFT)**, **Interferometry**, and the **Matched Filter**, into the package for **feature extraction**.
- Optimized the PCA based on **Frequentist Statistics** and **Pseudo Experiment**.
- Analyzed & quantified results by calculating **statistical significance**, including **systematic uncertainty**, and **Monte Carlo simulation**.

Sound to Symphony (AI Music Generation)

Le Wagon Data Science & AI Bootcamp

January 2024 – March 2024 | Le Wagon, Tokyo

- Generates completely new music by **Recurrent Neural Network (RNN)** that can be easily customizable by musical software
- **Architectures RNN model for learning musical patterns** from large classical music datasets that are expressed in numerical format.
- Deployed the project into the **Streamlit** by utilizing **FastAPI**
- Built the connection between generated music and musical software Abelton

EXPERIENCE

Graduate Research Assistant

Chiba & SungKyunKwan University

2015 – 2023 | Japan & South Korea

- Performed **high-precision calibration for the radio-frequency antenna** for an advanced research instrument.
- Established **scientific Python & C++ hybrid package**, inspired by C++-based code, that extracts physics results from raw data, leading to **wide use by international collaborators**.
- Learned **large database management**, including optimization of data sourcing and efficient connection to supercomputer by using solid analysis pipeline.
- Practiced a thorough way to **evaluate the project results by using statistical techniques** and the **back-of-the-envelope calculation**.

ABOUT ME

I'm an Astrophysicist used to analyzing large datasets to find astronomical signals and recently graduated from Le Wagon Data Scientist & AI boot camp. Seeking to utilize programming skills backed by my scientific background and data science knowledge.

TECHNICAL SKILLS

Coding Tools

Python | C++ | ROOT | Vim | HTCondor | CVMFS | Latex | G-Collab & Jupyter

Data Analytics

NumPy | SciPy | Scikit-learn | Pandas | SQL | Matplotlib | Seaborn

Modelling

TensorFlow | Deep Learning | Unsupervised Leaning | NLP | CNN | Time series | Ensemble Methods | Statsmodels

Deployment

GCP | Docker | FastAPI | Streamlit

Hardware Experience

Electronics | Optics

LANGUAGES

English	Fluent
Japanese	JLPT N1, Fluent
Korean	Native

INTERESTS

Classical Music | Orchestra | Contrabass | Universe | Fourier Transform

Teaching & Operating Assistant

Chiba & SungKyunKwan University

2015 – 2018 Japan & South Korea

- Guided Korean students are transitioning to undergraduate studies at Japanese universities by **teaching freshman-level physics and mathematics courses in Japanese**.
- Provided mentorship to students, aiding them in achieving academic success in challenging physics courses. Conducted hands-on physics experiments with students, enhancing their practical knowledge and skills. **Managed scientific equipment** to ensure smooth and successful experiment execution.

Japanese to English & Korean Translator

Wovn.io

2018 Tokyo

- Provided translation services and real-time deployment for the client company website written in Japanese, incorporating cultural nuances to enhance readability and accessibility.

EDUCATION

Data Science & AI Bootcamp

Le Wagon

January 2024 – March 2024 Japan

- Thorough study in Python for Data Science, with expertise in data extraction, manipulation, and visualization, backed by a strong foundation in statistics and linear algebra.
- Delving into Machine Learning and Deep Learning, with practical application in building comprehensive workflows utilizing Scikit-Learn and designing neural network architectures.
- Proficiency in ML Engineering, involving the development of Python packages for large-scale data tasks in GCP, and a deep awareness of the ethical considerations surrounding AI deployment.

Completion of Ph.D. program (ABD), Physics

Chiba University

April 2017 – December 2023 Japan

- Research topic: Search for Ultra-high Energy Neutrinos Using Eight Years of Data from Two ARA Stations by the Neutrino Template Method

Master of Science, Physics

SungKyunKwan University

March 2015 – February 2017 South Korea

- Thesis title: Performance study of camera system for the IceCube-Gen2 detector

Bachelor in Science, Physics

SungKyunKwan University

March 2011 – February 2015 South Korea

AWARDS

Japanese Government Monbukagakusho Scholarship (MEXT)
Graduate Research Assistant in Ph.D., 2017 – 2020

Teaching Assistant (T.A.) of Korea & Japan Joint Government Scholarship
Teaching Assistant for a freshman Korean students, 2017 – 2018

BK21+ Research student scholarship
Graduate Research Assistant in Msc., 2015 – 2017

Operating Assistant scholarship
Physics Experiment Assistant, 2016 – 2017

CK Research student scholarship
Research Assistant in Bsc., 2014

SELECTED PUBLICATIONS

Journal Articles

- P. Dasgupta, M. S. Muzio, *et al.*, "Progress Towards a Diffuse Neutrino Search in the Full Livetime of the Askaryan Radio Array," *PoS*, vol. ICRC, p. 1226, 2023.
- M. Kim *et al.*, "Enhanced Ultra-High Energy Neutrino Search at the Askaryan Radio Array using Template-based Techniques," *PoS*, vol. ICRC, p. 1148, 2023.