CURRICULUM VITAE

Kwang Myung Yu

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Education

Korea Advanced Institute of Science and Technology (KAIST), Mar. 2006 ~ Feb. 2008

M.S. in Electrical Engineering (Specialization: Optimal control), GPA : 3.83/ 4.3 (94/100%)

Pusan National University, Mar. 1999 ~ Feb. 2006

B.S. in Electrical Engineering, GPA : 4.09/ 4.5 (95/100%)

Technical Skills

- Programming : Python, C/ C++/ C#, Matlab, SQL
- Data analysis : pandas, numpy, Spark, MySQL/ MariaDB, matplotlib/ dash, OpenCV
- Machine learning : Scikit-learn, Pytorch, Tensorflow
  - (Advanced) Anomaly detection, Timeseries forecasting, Unsupervised learning,
  - (Intermediate) Computer vision
- Serving : Docker, Flask/FastAPI, Streamlit/Dash, AWS(EC2, S3, Lambda, Sagemaker), mlflow

Professional Experience

MakinaRocks, AI Project Team, Part leader/ Senior machine learning engineer, 2023 ~ 2024

- Machine Learning: Developed models for prediction, anomaly detection, and control optimization. Supported building of MLOps environments.
- Team management: Planed ML projects. Improved model tracking/reproducibility. Recruited talent.

Samsung Electro-Mechanics(SEM), Engineering Research Center, Principal Researcher, 2021 ~ 2022

- SW Platform: Developed platforms for predictive analysis and operations of deep learning models.
- Data Analysis: Analyzed manufacturing data, provided data analysis training for employees.

Korea Electric Power Corporation(KEPCO), Data Science lab., Senior data scientist, 2010 ~ 2020

- Machine learning: Anomaly detection, time series forecasting/ analysis, generative models
- Data analysis : Analyzed facility data, employee assessments, and decision-making data for executives.
- Strategy: Developed roadmaps, planned new projects, and established research infrastructure.

POSCO E&C Energy Business Division, Control engineer, 2008 ~ 2010

- Designed automation systems for power plants, developed data monitoring and control algorithm
- Supported the commissioning of automation systems and data monitoring infrastructure.

Projects (* as lead)

Machine Learning and Optimization for Ironworks Sintering Process*, MakinaRocks, 2023. 11 ~ 2024. 01

- Developed guidance models for process efficiency using Pytorch and Scikit-learn and supported the establishment of an On-premise based MLOps environment for model development and deployment.

Machine Learning for Life Prediction and Diagnosis of Chemical Process*, MakinaRocks, 2023. 05 ~ 2023. 11

- Developed model pipelines for predicting reactivity in reactors using Pytorch and Scikit-learn, constructed environments for MLOps incorporation and inference servers using AWS Sagemaker, and developed testing and template codes considering model tracking and reproducibility using mlflow.

Development of Lifestyle Guide Service Application*, GIVITA, 2022. 05 ~ 2022. 12

- Developed a physical activity guide using lifelog data: AWS SageMaker, EC2, S3, Python, and Scikit-learn.
- Developed a dietary guide using CGM sensors: AWS SageMaker, EC2, S3, Python, and Pytorch

Development of Inspection SW and MLOps for Manufacturing, SEM, Eng. Research Center, 2021. 3 ~ 2022. 5

- Designed a SW platform for machine vision and DL model operations: Utilized C++, C#, and Python.
- Built an On-Premise environment for MLOps: Utilized GitLab CI/CD and mlflow.

Development of Anomaly Detection model based on Transformer DGA Data *, KEPCO DSL, 2019. 11 ~ 2020. 6

- Developed automated data preprocessing and feature engineering pipeline code.
- Developed ML model for based on semi-supervised learning: Utilized Deep SVDD and Autoencoders.

Distribution Equipment Diagnosis Technology using Object Detection*, KEPCO DSL, 2019. 8 ~ 2020. 6

- Developed image data preprocessing programs and data labeling procedures for Object Detection.
- Implemented and trained a distribution equipment recognition model based on YOLOv3, and established a mobile deep learning operating environment (RaspberryPi, Jetson Nano).

Analysis of Power Usage Patterns at EV Charging Stations in Jeju*, KEPCO DSL, 2018. 12 ~ 2019. 12

- Implement code for preprocessing customer information and power usage data of charging stations.
- Analyzed the correlation between customer-specific power consumption and line load

Development of PV Energy forecasting Model on Distribution Lines *, KEPCO DSL, 2016. 5 ~ 2019. 12

- Implemented automation code for merging and preprocessing distribution line load and weather data.
- Developed a short-term forecasting model for photovoltaic power based on LSTM and XGBoost..

Development of Performance Evaluation System for ESS, KEPCO Research Institute, 2015. 6 ~ 2018. 12

- Implemented control algorithms for ESS and charging algorithms based on ML(SVM) (C, C++).
- Developed a simulation model for evaluating the grid impact of ESS for(Matlab Simulink/Simscape).

Research on Optimal Control Techniques for Boiler Systems, KEPCO Research Institute, 2013. 11 ~ 2014. 11

- Implemented Convex Optimization programs for ML model and optimal control algorithm(Gradient Decent, Quadratic Programming, Utilized Embedded C, Python, Lapack, CVX, etc.).
- Developed a Model Predictive Control(MPC) program operable on microcontrollers (ARM Cortex-M3).

Patents and Programs (Principal Inventor)

Patent Applications and Registrations

- "Power Facility Diagnostic Device and Method," App No. 2020-0014135, 2020. 2.
- "Hybrid Energy Storage Control System", App No. 2018-0075487, 2018. 6.
- "Frequency Control System", App No. 2017-0128140, 2017. 9.
- " Model-Based Predictive Control Device and Method", App No 10-2015-0053682, 2015. 4.
- "Steam Turbine Dynamic Characteristics Simulator, Gas Turbine Dynamic Characteristics Simulator, Turbine Generator Control Device and Method Using Them", App No10-2015-0060614, 2015. 4.
- "Control Device for Supercritical Brayton Cycle with Variable Heat", App No 10-2014-0064618, 2014. 5.
- "Lubricating Oil Supply Device", App No 10-2013-0099508, 2013. 8.
- "Main Steam Temperature Control Device and Method", Reg. No 10-2107853, 2020. 4.
- "Analysis Device for Networked Control System and Its Operating Method", Reg. No 10-1958295, 2019. 3.
- "Power Plant Simulator", Reg. No 10-1837653, 2018. 3.
- "Superheater Temperature Control Method", Reg. No 10-1804477, 2017. 11.
- "Operation Control Method for Oxy-fuel Combustion Boiler", Reg. No 10-1439883, 2014. 9.
- "Air Supply Device and Method for Combustion Equipment", Reg. No 10-140515, 2014. 6.
- "Interface Device for Process Control System", Reg. 10-1373473, 등록일자 2014. 3.

Programs (Registered with the Korea Copyright Commission)

- "Deep learning object detection Image Preprocessing Program", Under registration
- "Preprocessing Program for Anomaly Detection Machine Learning Model Training", Under registration
- "ESS Control Algorithm Simulation Program (Matlab Simulink)", Reg. No C-2018-029345, 2018. 10.
- "Simulator for Gas Turbine Combined Cycle Power Plant ", Reg. No C-2018-029332, 2018. 10.
- "PID Control Loop Frequency Analysis Program", Reg. No C-2015-019326, 2015. 8.
- "Automatic Tuning Program for PID Control Parameters", Reg. No C-2015-019311, 2015. 8.
- "Process Identification Program for Designing PID Controllers", Reg. No C-2015-019309, 2015. 8.
- "Dynamic Matrix Based Predictive Controller and Simulator (C, C++)", Reg. No C-2015-019308, 2015. 8.
- "PID Controller Tuning Parameter Calculation Program (Matlab GUI)", Reg.No C-2014-027714, 2014. 9.
- " Matrix Operation Program for MIMO Control (C, C++)", Reg. No C-2014-027696, 2014. 11.

Papers and Reports

Papers

- **K. Yu,** I. Choi, and J. Woo, “Lessons Learned from Energy Storage System Demonstrations for Primary Frequency Control,” KEPCO Journal on Electric Power and Energy, vol. 4, no. 2, pp. 107–114, Dec. 2018.
- Y.S. Lee, **K. Yu**, "Development of a DMC Block for Use with an RCP System and its Application", J Inst Contr Robot Syst, pp. 827-835, ISSN: 1976-5622, 2015

Research Reports (Published more than 50 reports)

- **K.M. Yu**, "Transformers for LTFS(Long-term Timeseries Forecasting)", MakinaRocks, 2023
- **K.M. Yu**, "Designing a Dietary Habit Guide Using Lifelog and Machine Learning", GIVITA, 2022
- **K.M. Yu**, "Case Study of Personalized Diet Management Service Using CGM Data", GIVITA, 2022
- **K.M. Yu**, "Time Series Data Analysis Using CGM Data", GIVITA, 2022

- **K.M. Yu**, "Analysis of Smart phone Lifelog Data: When and How Much Do People Walk?", GIVITA, 2022
- **K.M. Yu**, "Deep learning for anomaly detection : unsupervised approach", KEPCO DSL, 2020
- **K.M. Yu**, "Analysis of EV Charging Station Data and Line Load Correlation in the Jeju", KEPCO DSL, 2019
- **K.M. Yu**, "Progress in Transformer Condition Diagnosis using Deep Learning ", KEPCO DSL, 2019
- **K.M. Yu**, "Developing Object Detection Models for Distribution Equipment", KEPCO DSL, 2019
- **K.M. Yu**, "Research on Environments for Deep Learning Models Using Docker and Spark", KEPCO DSL, 2018
- **K.M. Yu**, " ESS for Frequency Control Due to the Increase in Renewable Energy", KIEE, 2018
- **K.M. Yu**, " Data Analysis Report for Performance Evaluation of Substation ESS", KEPCO RI, 2017
- **K.M. Yu**, " Statistical-based Machine Learning Models Using Scikit-learn", KEPCO RI, 2016

Skills and Education

Skills Acquired

- Energy utilities(Power plant, Renewables, ESS), Manufacturing industries, Healthcare
- Optimal control, Automation system(PLC, DCS, PC Control), Robotics

Education

- Big Data Analytics, Global Knowledge(Boston, USA), 2019
- Practical Data Science Intermediate Course, KEPCO, 2019

Awards and Honors

Big Data AI Competition President's Award (Excellence), Korea East-West Power, 2020.

Merit Award (Research and Development), Korea Electric Power Corporation, 2018.

Graduated with Honors/Scholarship for Academic Excellence, Pusan National University, 2000, 2003-2006.

Activities

Visiting Researcher/Advisor, Department of Safety Engineering, Incheon National University, 2020-2023.

- Developed a combustion diagnosis model using flame image sequences: Resnet, Autoencoder, LSTM-CNN
- Developed/ deployed anomaly detection models for industrial boilers: Scikit-learn, LightGBM, FastAPI, AWS EC2.
- Developed anomaly detection models using dynamic pressure sensors in power generation combustion equipment: Supported the development of LSTM Autoencoder models.

Lecturer for Control Systems and Data Analysis Practical Course, KITI, 2014 ~ 2023

Big Data Analyst Training Course, SK planet Tacademy, 2023.

Software Version Control using Git, Github (Parts 1 & 2), KOSCOM, 2023.

Advisory Committee Member for Future Education, Incheon National University, 2023.

Data Science Lectures for New ICT Employees, KEPCO, 2019-2020.

Publication 1: "Learning Git & Github with Python Code" (Youngjin.com), 2022.

Publication 2: "Git for Visual Studio Users" (Wikidocs), 2021.