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Assistant Professor

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RESEARCH INTEREST

Time-series Analysis, Deep Learning, Feature Engineering, eXplainable Artificial Intelligence, Multi-modal Learning, LLM

EDUCATION

Mar. 2019 ~ Feb. 2024	Pusan National University (GPA 4.2 / 4.5) <i>Ph.D. in Industrial Engineering</i> <i>Thesis: Deep Learning Models for Short-term and Long-term Time Series Forecasting (Advisor: Hyerim Bae)</i>	Busan, Korea
Mar. 2012 ~ Feb. 2019	Pusan National University <i>B.S. in Industrial Engineering</i>	Busan, Korea

WORK EXPERIENCE

Dec. 2025 ~ Present	Department of Artificial Intelligence Convergence Engineering, Changwon National University Assistant Professor
Oct. 2024 ~ Nov. 2025	Safe & Clean Supply Chain Research Center, Pusan National University Research Professor
Sep. 2024 ~ Dec. 2024	College of Computing, Georgia Institute of Technology Visiting Scholar
Mar. 2024 ~ Sep. 2024	Safe & Clean Supply Chain Research Center, Pusan National University Postdoctoral Researcher
Mar. 2024 ~ Sep. 2024	Department of Industrial Engineering, Pusan National University Instructor

TEACHING EXPERIENCE

Fall, 2025	Pusan National University Instructor, Graduate class – Shipping & Port Application (DS9700019) - All tasks such as Lecturing, Grading, Practical class, and Proctoring.
Spring, 2024	Pusan National University Instructor, Undergraduate class - Database (IE3400078-066)

- All tasks such as Lecturing, Grading, Practical class, and Proctoring.

Spring, 2024	Pusan National University Instructor (Team teaching with Prof. Hyerim Bae), Undergraduate class - Data Structure and Algorithm (IE1600795-066) - Practical class, Grading, Proctoring.
Fall, 2022	Pusan National University Teaching Assistant, Undergraduate class – Industrial Data Science (IE3500627-066) - Practical class, Grading, Proctoring. - Instructor: Hyerim Bae

AWARDS AND HONORS

Jul. 2025	Certificate of Commendation from the Mayor of Busan , Busan Metropolitan City
Jan. 2024	BK21's Best Paper Award , 2023 BK21's Graduate Student Outstanding Papers Award, Pusan National University
Feb. 2019	3rd Prize , Undergraduate Capstone Design Term Project in Industrial Engineering, Pusan National University

ACADEMIC AND PROFESSIONAL SERVICES

Session Chair, ‘Sustainable Maritime Logistics: Innovations for Safety, Efficiency, and Clean Port’, ICICIC2025

Session Chair, ‘Sustainable Maritime Logistics: Innovations for Safety, Efficiency, and Clean Port’, ICICIC2024

Committee (Main Assistant), The 11th International Conference on Logistics and Maritime Systems (LOGMS 2023)

Editorial Board Member, JUTI: Jurnal Ilmiah Teknologi Informasi (Scientific Journal of Information technology), ITS, Indonesia

Peer Reviewer, IEEE Transactions on Big Data, Pattern Recognition, Scientific Reports, etc.

PUBLICATIONS

*co-first authors

[International]

Jo, S., Lee, G., Park, S., Heo, J., Kim, D., Sim, S., & Bae, H. (2026). Deep learning framework for regional maritime collision risk assessment using CNN and Grad-CAM. *Ocean Engineering*, 343, 123452.

Kim, D., Lee, E., Kamal, I. M., & Bae, H. (2025). Long-term Forecasting of Maritime Economics Index using Time-series Decomposition and Two-stage Attention. *Journal of forecasting*, 1-20.

Lee, J.*, Kim, D.*, & Sim, S. (2024) Temporal Multi-Features Representation Learning based Clustering for Time Series Data. *IEEE ACCESS*

Iman, A. N., Kamal, I. M., Ramadhan, M. H., Kim, D., Lee, Y., & Bae, H. (2024). Predictive Process Monitoring for Remaining Time Prediction with Transfer Learning. *ICIC Express Letters*, 18(8), 851-858.

Kim, D., Lee, S., Sim, S., & Bae, H. (2024). A Robust eXplainable Feature Selection Method Based on Order Statistics. *ICIC Express Letters*, 18(3), 255-262.

Sim, S.*, Kim, D.*, & Bae, H. (2023). Correlation recurrent units: A novel neural architecture for improving the predictive performance of time-series data. *IEEE Transactions on Pattern Analysis and Machine Intelligence (JCR Top 0.85%)*.

Lee, H., Kim, D., Lee, S., Park, H., Bae, H., & Choi, G. (2023). Ensemble Method for Feature Selection in Time-Series Prediction Based on Image Similarity. *ICIC Express Letters Part B: Applications*, 14(07), 709.

- Ramadhan, M. H., Kamal, I. M., Kim, D., & Bae, H.** (2023). Solving the Inter-Terminal Truck Routing Problem for Delay Minimization Using Simulated Annealing with Normalized Exploration Rate. *Journal of Marine Science and Engineering*, 11(11), 2103.
- Utama, N. I., Kamal, I. M., Iman, A. N., Kim, D., Bae, H., & Hong, C.** (2022) COLORED PETRI NETS SIMULATION ON THE CLOUD WITH PYTHON: A FRAMEWORK OVERVIEW. *ICIC Express Letters, Part B: Applications*, 13(07), 725-733.
- Lee, E., Kim, D., & Bae, H.** (2021). Container volume prediction using time-series decomposition with a long short-term memory model. *Applied Sciences*, 11(19), 8995.
- Choi, Y., Kwun, H., Kim, D., Lee, E., & Bae, H.** (2021). Residual life prediction for induction furnace by sequential encoder with s-convolutional LSTM. *Processes*, 9(7), 1121.
- Lee, E., Park, K., Kim, D., Bae, H., & Hong, C.** (2021). Prediction of the quay crane's handling time with external handling factors. *ICIC express letters. Part B, Applications: an international journal of research and surveys*, 12(4), 351-358.
- Kamal, I. M., Bae, H., Sim, S., Kim, H., Kim, D., Choi, Y., & Yun, H.** (2019). Forecasting High-Dimensional Multivariate Regression of Baltic Dry Index (BDI) using Deep Neural Networks (DNN). *ICIC Express Letters*, 13(5), 427-434.

[Domestic]

- Lee, H., Kim, D., Choo, J., Jo, S., & Bae, H.** (2025). A Forecasting Framework of Ship Fuel Consumption using Temporal Patterns in Sensor Data. *Journal of the Korean Institute of Industrial Engineers*, 51(5), 425-438. 10.7232/JKIIIE.2025.51.5.425
- Kim, M., Heo, J., Kim, D., & Bae, H.** (2024). A Study on Text-Based Weight Extraction for Enhanced SCFI Index Prediction. *The Korean Journal of BigData*, 9(2), 123-134.
- Park, M., Park, H., Kim, M., Kim, D., Park, Y., & Bae, H.** (2024). Estimation Research for First Prediction Time in Condition-Based Maintenance. *The Journal of Society for e-Business Studies*, 29(1), 93-114.
- Kim, D., Lee, S., Jo, S., Park, S., Bae, H.** (2024). A Study on the Derivation of Sea Grid and Severity Indicators Based on Maritime Accident Data. *The Journal of Society for e-Business Studies*, 29(1), 57-72.
- Kim, D., Lee, S., & Bae, H.** (2023). A Study on Container Freight Forecasting Model Using eXplainable Artificial Intelligence. *The Asian Journal of Shipping and Logistics*, 39(2), 197-215.
- Park, D., Jo, S., Park, D., Lee, Y., Kim, D., & Bae, H.** (2023). LCL Cargo Loading Algorithm Considering Cargo Characteristics and Load Space. *Journal of Intelligence and Information Systems*, 29(4), 375-393.
- Yu, T., Lee, Y., Park, H., Kim, D., & Bae, H.** (2022). An Efficient Mixed-Integer Programming Model for Berth Allocation in Bulk Ports. *Journal of the Korea Industrial Information Systems Research*, 27(6), 105-114.
- Kim, D., Han, Y., Kim, H., Kang, S. P., Kim, K. H., & Bae, H.** (2022). Outlier detection and labeling of ship main engine using LSTM-AutoEncoder. *The Korea Journal of Bigdata*, 7(1), 125-137.
- Kwun, H., Kim, D., Park, C., Lee, L., Cho, G., & Bae, H.** (2020). A Direction of Politic Support for Infectious Disease in Busan Using Time-series Clustering: Focusing on COVID-19 Cases. *The Korea Journal of Bigdata*. 5. 125-138.
- Park, K., Kim, D., Kim, S., Choi, J., & Bae, H.** (2020). Budget Allocation for Emergency Support Funding System During Global Pandemic. *The Korea Journal of Bigdata*, 5(2), 97-110.
- Kim, D., Kim, H., Sim, S., Choi, Y., Bae, H., & Yun, H.** (2019). Prediction of dry bulk freight index using deep learning. *Journal of Korean Institute of Industrial Engineers*, 45(2), 111-116.

CONFERENCES

- Lee, Y., Kim, D., Kim, D., & Bae, H.** (2025). Multi-task trained Graph Neural Network for Business Process Anomaly Detection with a Limited Number of Labeled Anomalies. *23rd International Conference on Business Process Management (BPM 2025)- Main Track*. 2025.09.02
- Kim, D., Park, K., Kim, M., Kwon, J., & Bae, H.** (2025). Smart Ports for a Green Future: Integrating Spatiotemporal AI. *Infirms International Meeting*. 2025.07.21

- Lee, G., **Kim, D.**, Park, S., Sim, S., Liu, L., & Bae, H. (2024, October). Neural Bezier Interpolation with Manifold Learning for Reliable Vessel Trajectory Prediction. *In 2024 IEEE 6th International Conference on Cognitive Machine Intelligence (CogMI)* (pp. 189-196). IEEE.
- Park, H., **Kim, D.**, Kim, M., Park, M., Bae, H., & Park, Y. (2023, December). A novel training mechanism for health indicator construction and remaining useful lifetime (RUL) prediction. *In 2023 IEEE International Conference on Big Data (BigData)* (pp. 809-818). IEEE.
- Kim, M., Park, H., Park, M., Kwon, J., **Kim, D.**, Bae, H., & Park, Y. (2023). Data-driven degradation trend construction method for RUL prediction. *International Conference on Convergence Content (ICCC) 2023*, 43-44.
- Kim, D.**, Sim, S., Yoon, B., Liu, L., & Bae, H. (2023, November). Improving Time-Series Classification Accuracy Based on Temporal Feature Representation Learning Using CRU-LSTM Autoencoder. *In 2023 IEEE 5th International Conference on Cognitive Machine Intelligence (CogMI)* (pp. 175-183). IEEE.
- Kim, D.**, Park, K., Yu, T., & Bae, H. (2023). A Multi-Objective Reinforcement Learning for Berth Allocation Problem in Tidal Bulk Terminals. *The 11th International Conference on Logistics and Maritime Systems (LOGMS 2023)*. 2023.09.06
- Kim, D.**, Lee, S., Sim, S., & Bae, H. (2023). A Robust eXplainable Feature Selection Method Based on Order Statistics. *The 17th International Conference on Innovative Computing, Information and Control (ICICIC 2023)*. 2023.08.31
- Sim, S., **Kim, D.**, & Jeong, S. C. (2023, February). Temporal Attention Gate Network With Temporal Decomposition for Improved Prediction Accuracy of Univariate Time-Series Data. *In 2023 International Conference on Artificial Intelligence in Information and Communication (ICAIIIC)* (pp. 122-127). IEEE.
- Kim, D.**, & Bae, H. (2022, December). TDTA: A New Hybrid Framework for Long-term Forecasting of Container Volume. *In 2022 IEEE International Conference on Big Data (Big Data)* (pp. 6718-6720). IEEE.
- Choi, Y., Kwun, H., **Kim, D.**, Lee, E., & Bae, H. (2020, February). Method of predictive maintenance for induction furnace based on neural network. *In 2020 IEEE International Conference on Big Data and Smart Computing (BigComp)* (pp. 609-612). IEEE.

PATENTS

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|------------|---|
| Apr. 2025 | (US patent) Method and Device for Imputing Missing Values in Dual-directional AIS Data based on Deep Learning, No. 19/190,810, 2025.04.28
(KR patent) Imputation Method and Device for Missing Values in Dual-directional AIS Data based on Deep Learning, No. 10-2024-0057371, 2024.04.30 |
| Feb. 2025 | (KR patent) Continual Learning Method and Device with Adaptive Memory Mechanism for Predictive Process Monitoring, No. 10-2025-0026041, 2025.02.27 |
| Nov. 2024 | (KR patent) System and Method for Yard Congestion Prediction and Optimized Truck Arrival Time Guidance, No. 10-2024-0169982, 2024.11.25 |
| Nov. 2024 | (KR patent) System and Method for Optimizing Yard Operations based on Multi-agent Reinforcement Learning Including External Trucks, No. 10-2024-0169981, 2024.11.25 |
| Sep. 2024 | (KR patent) Method and Apparatus for Predicting Ship Operation Time, No. 10-2024-0126125, 2024.09.13 |
| June. 2024 | (KR patent) Method for Predicting Travel Path of a Vehicle on a Grid-type Road with Multiple Intersections and Computing Apparatus Thereof, No. 10-2024-0075306, 2024.06.10 |
| Mar. 2024 | (KR patent) Bayesian Network based Container Dwell-time Prediction Method and Device, No. 10-2024-0034577, 2024.03.12 |
| Sep. 2023 | (US patent) Text Data-Based Method and System Deducing Social Impact, No. 18/475,214, 2023.09.27
(KR patent) No. 10-2022-0132276, 2022.10.14 |
| Sep. 2023 | (US patent) Method and Apparatus for Predicting Recipe Property Reflecting Similarity between Chemical Materials, No. 18/475,206, 2023.09.27
(KR patent) No. 10-2022-013746, 2022.10.19 |

- Dec. 2022 **(US patent)** Correlation Recurrent Unit for Improving Prediction Performance of Time-Series Data and Correlation Recurrent Neural Network, No. 18/086.646, 2022.12.22
(KR patent) No. 10-2022-0024013, 2022.02.24
- Aug. 2021 **(KR patent)** Apparatus and Method for Predicting IoT-Based Augmented Process, No. 10-2298452, 2021.08.31
(KR patent) No. 10-2020-0180145, 2020.12.21

PROJECTS

1. “Human-centered carbon-neutral global supply chain research center”, National Research Foundation of Korea (NRF), Korea, Project Manager (International Cooperation, Research), Jun. 2023 – Nov. 2025
2. “AI-based XPL methodology research”, National Research Foundation of Korea (NRF), Korea, Project Manager (Management, Research), Mar. 2023 – Nov. 2025
3. “Meta K-Port intelligent logistics platform”, National IT Industry Promotion Agency (NIPA), Korea, Project Manager, May. 2024 – Aug. 2025
4. “Development of CBM+ solution algorithms for key components of radar weapon systems”, LIG Nex1 Co., Ltd. Korea, Project Manager, Mar. 2023 – Dec. 2024
5. “Development of indicators for quantitative evaluation of maritime safety”, Korea Research Institute of Ships and Ocean Engineering (KRISO), Korea, Researcher, Mar. 2021 – Dec. 2024
6. “Analysis of Busan Port transshipment operations”, Goldilocks Shipping Co., Ltd., Korea, Project Manager, Dec. 2024 – Dec. 2024
7. “Block logistics optimization”, Samsung Heavy Industries, Korea, Project Manager, Oct. 2023 – Jul. 2024
8. “Analysis of welding defect rates”, Samsung Heavy Industries, Korea, Project Investigator, Jun. 2024 – Jul. 2024
9. “Development of big data/AI-based logistics linkage optimization technology”, Korea Institute of Marine Science & Technology Promotion (KIMST), Korea, Researcher, Apr. 2022 – Feb. 2024
10. “Establishment of marine and fisheries big data platform and center”, National Information Society Agency (NIA), Korea, Project Manager, Sep. 2020 – Dec. 2022
11. “Case analysis of vehicle gate reservation system application in overseas ports”, Busan Port Authority (BPA), Korea, Project Manager, Nov. 2022 – Dec. 2022
12. “Development of citrus price and shipment volume forecasting models”, Flexink Inc., Korea, Project Manager (Management, Research), Sep. 2022 – Nov. 2022
13. “Development of an AI-based container freight rate prediction model”, Korea Maritime Institute (KMI), Korea, Project Manager (Management, Research), Dec. 2021 – Aug. 2022
14. “Industry-academic collaborative research on bulk port operation optimization”, CyberLogitec, Korea, Project Manager (Management, Research), Sep. 2021 – Feb. 2022
15. “Design of a service integration framework for real-time interfacing of e-Navi information and port operational status using AI”, Korea Institute of Marine Science & Technology Promotion (KIMST), Korea, Researcher, Jan. 2020 – Dec. 2020
16. “Metadata analysis study for operational information display devices for control-based post-management”, Game Rating and Administration Committee, Researcher, Korea, Jun. 2020 – Nov. 2020
17. “Process-based simulation analytics for productivity innovation”, Korea Technology & Information Promotion Agency for SMEs (TIPA), Korea, Researcher, Dec. 2018 – Nov. 2020
18. “Development of smart port IoT infrastructure technology”, Korea Institute of Marine Science & Technology Promotion (KIMST), Korea, Project Manager (Management, Research), May. 2019 – Mar. 2022
19. “Data analysis and prediction model development for Busan Port operational plans (Ship ETA, RTA)”, Busan Port Authority (BPA), Korea, Researcher, Dec. 2018 – Aug. 2021
20. “Maritime market analysis using big data”, Korea Maritime Institute (KMI), Korea, Project Manager (Management, Research), Dec. 2018 – Aug. 2021