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RESEARCH INTEREST

Representation learning for low signal-to-noise data: discrete latent factor models, structure-informed learning, and interpretable, group-robust models, with financial markets as the main testbed.

EDUCATION

- Ph.D. in Industrial Engineering, Hanyang University, 2021.03 – 2026.02
 - Dissertation: *Representation Learning in Financial Markets for Portfolio Management*
 - Research Assistant, Financial Innovation & Decision Analytics Lab
 - Supervisor: Prof. Jae Wook Song
 - GPA: 4.31 / 4.50
- B.A. in Economics and Finance (Minor in Finance), Hanyang University, 2016.03 – 2020.02
 - Cum Laude
 - GPA: 4.00 / 4.50

RESEARCH & PROFESSIONAL EXPERIENCES

RISK X

Head of Research, Risk X tech Lab, 2026.03 – Present

Quantitative AI Researcher, Risk X tech Lab, 2025.07 – 2026.02

HANYANG UNIVERSITY

Research Assistant, Financial Innovation & Decision Analytics Lab, 2021.03 – 2026.02

Advisor: Prof. Jae Wook Song

HANYANG UNIVERSITY

Undergraduate Intern, Business & A.I. Lab, 2019.08 – 2019.12

Advisor: Prof. Jong Woo Kim

RESEARCH & PUBLICATIONS

INTERNATIONAL JOURNALS & CONFERENCE PROCEEDINGS (*: Corresponding)

- [4] **Kim, Namhyoung**, and Jae Wook Song*. “Vector-Quantized Discrete Latent Factors Meet Financial Priors: Dynamic Cross-Sectional Stock Ranking Prediction for Portfolio Construction.” *Proceedings of the 35th International Joint Conference on Artificial Intelligence (IJCAI-ECAI 2026)*. Acceptance rate: 13.6%.
- [3] Na, Yosep, **Namhyoung Kim**, Joon Ho Jun, and Jae Wook Song*. “HAR-CEV: Probabilistic Volatility Forecasting with Adaptive Mean Reversion under Distribution Shift.” *Proceedings of the 7th ACM International Conference on AI in Finance (ICAIF '26)*. To appear.
- [2] **Kim, Namhyoung**, Yosep Na, and Jae Wook Song*. “Deep Mean-Reversion: A Physics-Informed Contrastive Approach to Pairs Trading.” *Proceedings of the 6th ACM International Conference on AI in Finance (ICAIF '25)*: 405–412. Oral presentation, acceptance rate: 15.5%.
- [1] **Kim, Namhyoung**, Seung Eun Ock, and Jae Wook Song*. “FactorVQVAE: Discrete Latent Factor Model via Vector Quantized Variational Autoencoder.” *Knowledge-Based Systems* 318 (2025): 113460.

DOMESTIC JOURNALS (*: Corresponding)

- [1] Ock, Seung Eun, Jun Young Byun, **Namhyoung Kim**, and Jae Wook Song*. “Machine Learning-based Regional Healthy Life Expectancy Estimation Model: An Empirical Analysis Using Gyeongsangbuk-do Data.” *Korean Management Science Review* 41.1 (2024): 51–70.

UNDER REVIEW & WORKING PAPERS (*: Corresponding)

- [3] **Kim, Namhyoung**, Yosep Na, Jiwon Park, and Jae Wook Song*. “LEXICON: Making Factors Talk with Language-Grounded Anchors in Stock Return Prediction.” *Revise & Resubmit, ACM SIGKDD 2027*.
- [2] **Kim, Namhyoung**, and Jae Wook Song*. “PRAXIS: Policy-Coupled Group Robustness for Interpretable Deep Hedging.”
- [1] **Kim, Namhyoung**, Seungwon Shin, Jiwon Park, and Jae Wook Song*. “Decision Space Quantization.”

PRESENTATIONS

INTERNATIONAL CONFERENCE (*: Corresponding, †: Equal contribution)

- [6] Park, Jiwon[†], **Namhyoung Kim**[†], Seungwon Shin, and Jae Wook Song*. “Text as Structure, Not Signal: Text-Aligned Groups for Distributionally Robust Stock Ranking.” *Workshop on Interpretability and Alignment of Financial Models, The 7th ACM International Conference on AI in Finance (IAFM '26)*, 2026.11, Milan, Italy. To be presented.
- [5] **Kim, Namhyoung**, and Jae Wook Song*. “Vector-Quantized Discrete Latent Factors Meet Financial Priors: Dynamic Cross-Sectional Stock Ranking Prediction for Portfolio Construction.” *Asian Quantitative Finance Conference (AQFC 2026)*, 2026.07, Pohang, Korea.
- [4] Na, Yosep, Jun Young Byun, Jungyoon Song, **Namhyoung Kim**, and Jae Wook Song*. “Probabilistic Forecasting of High-Frequency Crypto Volatility via Decomposition-Integrated Recurrent Neural Networks.” *Workshop on Rethinking Financial Time-Series, The 6th ACM International Conference on AI in Finance (ICAIF-W)*, 2025.11, Singapore.
- [3] **Kim, Namhyoung**, Janghyuk Youn, and Jae Wook Song*. “FPQ-VAE: A Dynamic Factor Model Fusing Financial Priors and Vector-Quantized Factors for Stock Rank Prediction.” *Workshop on Advances in Financial AI, The 34th ACM International Conference on Information and Knowledge Management (CIKM-W)*, 2025.11, Seoul, Korea.
- [2] Song, Jae Wook*, **Namhyoung Kim**, and Dongwon Ryu. “Deep Hedging of Equity-Linked Securities.” *INFORMS Annual Meeting*, 2024.10, Seattle, WA, USA.
- [1] **Kim, Namhyoung**, Seung Eun Ock, and Jae Wook Song*. “Risk Propensity-specific Portfolio Recommendation via Self-supervised Learning.” *Workshop on Recommender Systems in Finance (Fin-RecSys), The 33rd International Joint Conference on Artificial Intelligence (IJCAI-W)*, 2024.07, Jeju, Korea.

DOMESTIC CONFERENCE (*: Corresponding)

- [7] **Kim, Namhyoung**, and Jae Wook Song*. “Vector-Quantized Discrete Latent Factors Meet Financial Priors: Dynamic Cross-Sectional Stock Ranking Prediction for Portfolio Construction.” *Fall Conference of the Korean Society of Industrial and Systems Engineering (KSIE)*, 2026.10, Jeju, Korea. To be presented.
- [6] **Kim, Namhyoung**, and Jae Wook Song*. “PRISM-VQ: Fusing Financial Priors and Vector-Quantized Latent Factors for Dynamic Cross-Sectional Stock Prediction.” *Fall Conference of the Korean Association of Futures and Options (KAFO)*, 2025.12, Seoul, Korea.
- [5] **Kim, Namhyoung**, Juhwan Kim, and Jae Wook Song*. “Vector Quantization for Efficient Financial Representation Learning.” *Spring Joint Conference of KII/KORMS/KSS*, 2025.06, Jeju, Korea.
- [4] **Kim, Namhyoung**, Seung Eun Ock, and Jae Wook Song*. “FactorVQVAE: Discrete Latent Factor Model via Vector Quantized Variational Autoencoder.” *Joint Conference with the Allied Korea Finance Associations*, 2025.05, Seoul, Korea.

- [3] Kim, Juhwan, **Namhyoung Kim**, Seung Eun Ock, and Jae Wook Song*. “Pairs Trading via Contrastive Learning.” *Spring Joint Conference of KORMS/KIIE/KSS*, 2024.05, Yeosu, Korea.
- [2] Park, Minho, **Namhyoung Kim**, Jun Young Byun, and Jae Wook Song*. “Data Augmentation in Embedding Space for Natural Language Processing based on the Vector Quantized Generative Adversarial Networks.” *Spring Joint Conference of KIIE/KORMS*, 2023.06, Jeju, Korea.
- [1] **Kim, Namhyoung**, Young Hoon Choi, Minho Park, and Jae Wook Song*. “Can a Pre-trained Language Model Be a Superior Counsel in Equity Research Report-Driven Investment Strategy?” *Spring Joint Conference of KORMS/KIIE*, 2022.06, Jeju, Korea.

PROJECTS & GRANTS

RESEARCH GRANTS

- [6] ELS Hedging Decision System via Neural Optimal Control
Seoul Business Agency (SBA), Fintech Commercialization Program, 2026.07 – Present. (Project Lead)
- [5] Investor-Tailored Structured Derivatives via Time-Series Generation
TIPS R&D, 2026.04 – Present. (Technical Lead)
- [4] Robust Generative Representation Learning of Financial Data Using Vector Quantized Variational Autoencoder and Its Applications
NRF of Korea (Research Grant), 2025.09 – 2026.08.
- [3] Applications of Artificial Intelligence in Portfolio using Vector Quantization-Variational Autoencoder
NRF of Korea (Humanities & Social Sciences, Joint Research), 2023.06 – 2025.06.
- [2] Loan Eligibility Classification Model using Explainable Artificial Intelligence
NRF of Korea (Research Grant), 2021.06 – 2023.02. (RA)
- [1] An Education and Research Team for Sharing and Cooperation based Smart Systems
BK21 Four, NRF of Korea, 2021.03 – 2025.07.

INDUSTRY PROJECTS

- [7] Analysis of Financial Activities using AI Technologies
Korea Financial Telecommunications & Clearings Institute (KFTC), 2025.03 – 2025.07.
- [6] Machine Learning-Based Model Portfolios for Retirement Pension Management
FnDataLab, 2024.03 – 2024.06.
- [5] Pricing of Exotic Options and Structured Products via Machine Learning
Risk X tech Lab, 2023.10 – 2024.01.
- [4] Machine Learning-driven Risk Rating Assessment of Global Investment Assets
FnDataLab, 2023.05 – 2023.08.
- [3] Sales Analytics based on Graph Neural Network and Natural Language Processing
IOI Soft, 2022.11.
- [2] Business Analytics for Small and Medium-sized Enterprises
Hyperlounge, 2021.10 – 2021.11.
- [1] Business Effectiveness Analysis on Fine Dust Reduction Forest Project
KOFPI (Research Grant), 2021.05 – 2021.10.

PATENTS

- Three Korean patent applications, 2026: market scenario generation via Lie algebra, deep hedging system for structured products, and others.

DISTINCTIONS & AWARDS

- Outstanding Paper Award, Korean Management Science Review, KORMS, 2024.11
- BK21 Scholarship, NRF of Korea, 2021.03 – 2025.07
- A.I. Graduate School Support Project Scholarship, IITP of Korea, 2020.09 – 2020.10
- Cum Laude, Hanyang University, 2020.02
- Financial Quant Professional Training Project Scholarship, Hanyang University, 2018.12

TEACHING ASSISTANT

HANYANG UNIVERSITY

- 11391 – Creative Programming for Engineers, 2025 Spring.

TECHNICAL SKILLS

- PROGRAMMING: Python, PyTorch, $\text{\LaTeX}$, Git, Docker, Linux, Weights & Biases

REFERENCES

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