

Seo Taek Kong

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EDUCATION

University of Illinois Urbana-Champaign

Electrical and Computer Engineering

- **Ph.D. Candidate** advised by Professor R. Srikant Exp. May 2027
- **M.S.** in Electrical and Computer Engineering May 2019
- **B.S.** with Highest Honors, Minor in Math May 2017

RESEARCH INTERESTS

I study the algorithmic foundations of how AI systems produce knowledge, learn from human feedback, and make decisions. My work spans generative models and sequential decision-making, human-in-the-loop learning (active learning, crowdsourcing), and their mathematical foundations in stochastic approximation and optimal control, connecting rigorous theory to AI systems deployed at scale.

SELECTED PUBLICATIONS AND PREPRINTS (* Equal Contribution)

Generative Models

1. S. T. Kong, W. Wang, and R. Srikant. *Noise Schedule Design for Diffusion Models: An Optimal Control Perspective*. Preprint. 2026 [Job Market Paper]
2. Y. Du, S. T. Kong, and R. Srikant. *Direct Preference Optimization for LLM Alignment*. 2025

Theoretical Foundations: Stochastic Approximation

1. S. T. Kong and R. Srikant. “Finite-Sample Wasserstein Error Bounds and Concentration Inequalities for Nonlinear Stochastic Approximation”. *Preprint* (2026)
2. S. T. Kong et al. “Nonasymptotic CLT and Error Bounds for Two-Time-Scale Stochastic Approximation”. *Under Review at IEEE Transactions on Automatic Control* (2025)
3. S. T. Kong and R. Srikant. “When to Use Polyak-Ruppert Averaging in Stochastic Approximation”. *Work in Progress* (2026) (In Progress)

Crowdsourcing, Reliability, and Active Learning

1. S. Mandal*, S. T. Kong*, et al. “Spectral Clustering for Crowdsourcing with Inherently Distinct Task Types”. *Transactions on Machine Learning Research (TMLR)* (2025)
2. J. Kim*, S. T. Kong*, et al. “Key feature replacement of in-distribution samples for out-of-distribution detection”. *Proceedings of the AAAI Conference on Artificial Intelligence*. 2023
3. S. T. Kong et al. “A Neural Pre-Conditioning Active Learning Algorithm to Reduce Label Complexity”. *Advances in Neural Information Processing Systems*. 2022

ADDITIONAL PUBLICATIONS (* Equal Contribution)

Machine Learning for Clinical Decision-Making

1. J. Y. Shin et al. “Clinical utility of deep learning assistance for detecting various abnormal findings in color retinal fundus images: a reader study”. *Translational vision science & technology* 13.10 (2024)
2. H.-J. Choi et al. “Self-Accumulative Vision Transformer for Bone Age Assessment Using the Sauvegrain Method”. *European Conference on Computer Vision Workshop*. Springer. 2024
3. W. Jung et al. “Volume is all you need: improving multi-task multiple instance learning for WMH segmentation and severity estimation”. *MICCAI: International Workshop on Machine Learning in Clinical Neuroimaging*. Springer. 2022, pp. 23–31
4. D. Lee et al. “Augmenting Magnetic Resonance Imaging with Tabular Features for Enhanced and Interpretable Medial Temporal Lobe Atrophy Prediction”. *MICCAI: International Workshop on Machine Learning in Clinical Neuroimaging*. Springer. 2022
5. H. Kim et al. “Abstraction in pixel-wise noisy annotations can guide attention to improve prostate cancer grade assessment”. *MICCAI: Workshop on Medical Image Learning with Limited and Noisy Data*. Springer. 2022

6. M. Chung*, S. T. Kong*, et al. "Utilizing synthetic nodules for improving nodule detection in chest radiographs". *Journal of Digital Imaging* 35.4 (2022)
7. B. Lee*, S. T. Kong*, et al. "Self-Supervised Learning with Electrocardiogram Delineation for Arrhythmia Detection". *IEEE Engineering in Medicine & Biology Society (EMBC)*. 2021
8. J. Park et al. "Aggregation of cohorts for histopathological diagnosis with deep morphological analysis". *Scientific reports* 11.1 (2021), p. 2876
9. J. Son et al. "Leveraging the generalization ability of deep convolutional neural networks for improving classifiers for color fundus photographs". *Applied Sciences* 11.2 (2021), p. 591
10. B. Bae et al. "Manifold Ordinal-Mixup for Ordered Classes in TW3-Based Bone Age Assessment". *MICCAI 2020*. Cham, 2020, pp. 662–670. ISBN: 978-3-030-59725-2

Other Works

1. H. Gupta et al. *Almost Boltzmann Exploration*. 2019. arXiv: [1901.08708](https://arxiv.org/abs/1901.08708) [cs.LG]
2. S. T. Kong et al. "Structure identification in layered precedence networks". *IEEE Conference on Control Technology and Applications (CCTA)*. IEEE. 2017, pp. 1177–1182

WORK EXPERIENCE

NVIDIA, ML Research (PhD) Intern

Autonomous Vehicles, Santa Clara, CA.

May 2026 - August 2026

Amazon, Applied Scientist (PhD) Intern

Search Relevance. Palo Alto, CA.

May 2023 - February 2024

- Fine-tuned a large language model as a listwise re-ranker for product search, training on rich text and unstructured product data to improve ranking relevance.
- Ran multi-GPU distributed training on AWS SageMaker with PyTorch and HuggingFace.

Product Quality and Perfect Order Experience. Seattle, WA.

May 2024 - August 2024

- Built a GBDT/neural-network ensemble to predict customer satisfaction, producing dense defect-probability scores that mitigated label sparsity in interaction logs.
- Fed these scores into downstream search ranking and fault attribution; implemented the data and modeling pipeline in Spark, Polars, and AutoGluon.

VUNO, Team Lead and Researcher

Chest X-Ray | Advanced Research, South Korea

May 2019 - August 2022

- Designed active-learning and out-of-distribution (OOD) detection algorithms for medical imaging: active learning cut expert annotation cost, and OOD detection flagged unreliable inputs to prevent silent failures (NeurIPS '22, AAAI '23).
- Led a research team bringing these methods into medical-imaging; authored multiple U.S. & Korean patents (filed/pending).

PATENTS

1. **S.T. Kong**, S. Jeon, J.W. Lee, H.S. Lee, K. H. Jung, *Method for Constructing Dataset*
2. M. Chung, B. Park, **S.T. Kong**, Y. Chung, *Method for Detecting Abnormal Findings and Generating Interpretation Text Of Medical Image*.
3. B. Park, M. Chung, **S.T. Kong**, Y. Chung, *Method to Read Chest Image*.

HONORS AND PROFESSIONAL SERVICE

- **Outstanding Program Committee Member**, AAAI 2026. Awarded to top 0.16% of reviewers (42/26,421).
- **Session Chair**: INFORMS Applied Probability Society (APS) 2025. (Topic: Finite-time bounds)
- **Peer Review**: NeurIPS (2022, 2023, 2025, 2026), ICML (2022, 2023, 2026), AAAI (2026), and IEEE OJ-CSYS

TEACHING EXPERIENCE

1. ECE 586: [Graduate] MDPs and Reinforcement Learning, Fall 2025.
Teaching Assistant; delivered the course lecture on Temporal Difference with Function Approximation.

2. ECE 310: [Undergraduate] Digital Signal Processing, Fall 2017.
Teaching Assistant; led recitation sessions.

INVITED TALKS AND OTHER CONFERENCE PRESENTATIONS

1. (Oral) **S.T. Kong**, S. Jeon, K.H. Jung, *Alleviating Annotation Costs by Combining Active and Semi-Supervised Learning*. In: Korean Society for industrial and Applied Mathematics KSIAM 2020.
2. (Oral) J. Kim*, **S.T. Kong***, *Development of a deep learning-based caries detection network using panoramic dental radiographs* In. Korean Society of Artificial Intelligence in Medicine KoSAIM 2020
3. (Invited Seminar) **S.T. Kong**. *A Mathematical Perspective of Semi-Supervised Learning: Empirical Successes and Coherence to Generalization Theory*. Presentation at Korea Advanced Institute of Science and Technology (KAIST). 20 July 2020.
4. (Invited Seminar) **S.T. Kong**. *Misaligned Domains Occurring in Practice and Test Time-Adaptive Domain Adaptation*. Presentation at Korea Advanced Institute of Science and Technology (KAIST). 27 July 2020.
5. (Scientific Poster) **S.T. Kong**, B.H. Park, B. Woong, M.K. Jung, K.H. Jung. *Localizing Nodules in Chest Radiographs: Deep Learning-based Image Processing for Multi-Center, Multi-Device Validation*. Radiological Society of North America (RSNA). 2020.
6. (Oral) J. Son, B. Park, J. Sung, **S.T. Kong**, J. Park, K.H. Jung. *A Deep Learning Framework for Interpretable Diagnoses of Pulmonary Diseases through Odds-Ratio Analysis in Radiographic Findings*. Radiological Society of North America (RSNA). 2020.