RUANGRAWEE (KAO) KITICHOTKUL

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EDUCATION

Boston University Ph.D. in Electrical Engineering — GPA 4.00/4.00, Expected May 2027
Advised by Vivek K Goyal.

Stanford University M.S. in Electrical Engineering — GPA 4.00/4.3, June 2022

Stanford University B.S. in Electrical Engineering, *distinction* — GPA 4.09/4.3, June 2022

RESEARCH INTERESTS

Computational Imaging, Statistical Signal Processing

PUBLICATIONS

R. Kitichotkul, J. Rapp and V. K. Goyal, *The Role of Detection Times in Reflectivity Estimation With Single-Photon Lidar*, IEEE Journal of Selected Topics in Quantum Electronics, 2023.

M. Peng, R. Kitichotkul, S. W. Seidel, C. Yu, and V. K Goyal, *Denoising Particle Beam Micrographs With Plug-and-Play Methods*, IEEE Transactions on Computational Imaging, 9:581-593, 2023.

R. Kitichotkul, C. A. Metzler, F. Ong and G. Wetzstein, *SUREMap: Predicting Uncertainty in CNN-Based Image Reconstructions Using Stein's Unbiased Risk Estimate*, ICASSP 2021.

EXPERIENCE

Stanford Computational Imaging Lab — June 2020 - June 2022
Undergraduate Research

- Combined Stein's unbiased risk estimate (SURE) with approximate message passing to estimate per-pixel mean squared error of compressive sensing reconstructions without requiring ground truth images.
- Investigated the use of SURE to improve compressive sensing reconstructions by self-supervision.
- Extended D-VDAMP, an MRI reconstruction algorithm, to handle complex-valued measurements.

Agoda — June 2021 - August 2021
Data Science Internship

- Designed, prototyped, and tested an automatic content generation system for writing travel guides based on transformers for autoregressive language modeling. Prepared the data and trained the models used in the system. Wrote reports to communicate the project within the organization.

PROJECTS

Training Input-Convex Neural Networks using Convex Optimization — 2021
Signal Processing for Machine Learning Class Project — *Individual project*

- Proposed an approach to train two-layer input-convex ReLU networks using convex optimization. Our approach allows for training neural networks to global optimality in polynomial time. Input-convex neural networks can be optimized with respect to the input for applications such as control problems.

Text-guided Image Generation using Score-based Model — 2021
Deep Generative Models Class Project — *Group of 2*

- Proposed to generate images which capture the semantic meanings of text captions by using a loss from OpenAI CLIP model to guide the generative process of score-based generative models.

Sparse + Low-rank Approximation of Matrix Inverse 2021
Convex Optimization II Class Project *Group of 3*

· Proposed and implemented a scalable convex optimization approach to estimate a low-rank correction of a sparse approximate matrix inverse. Our approach can improve the preconditioning matrix in the Preconditioned Conjugate Gradient algorithm.

Combining CTC with Seq2Seq Produces Better Transcriptions 2021
Natural Language Understanding Class Project *Group of 3*

· Proposed a sequence-to-sequence framework for improving transcription accuracy of outputs from end-to-end automatic speech recognition (ASR) systems by leveraging pretrained end-to-end models.
· Finetuned some sequence-to-sequence models. Found that BART outperforms encoder-decoder systems pretrained with masked-language modeling in reducing the word error rate.

Training CNN for Mixed Poisson-Gaussian Noisy Images Without Ground Truth 2020
Machine Learning Class Project *Group of 2*

· Trained CNN-based image denoisers without requiring ground truth images by using an unbiased risk estimate for mixed Poisson-Gaussian noise model as the loss. Our approach enables the training of denoisers in settings where obtaining ground truth images is difficult, such as astrophotography.

Real-time Classification of Musical Chords with Non-Negative Least Squares 2020
Digital Signal Processing Class Project *Group of 2*

· Proposed an approach for musical chord detection based on digital signal processing and optimization.
· Implemented the detection system for real-time chord classification in C and C++ on the iOS platform.
· Won 2020 Project Design Award from the Department of Electrical Engineering, Stanford University.

Variants of SURE-LET Approach to Image Denoising 2020
Computational Imaging and Display Class Project *Individual project*

· Implemented Gaussian and Poisson denoising algorithms based on the SURE-LET approach which minimizes an estimated error by combining denoised images with different denoising strengths.

COURSEWORK & SKILLS

Electrical Engineering	Convex Optimization, Information Theory, Digital System Design Computational Imaging and Display, Statistical Signal Processing
Computer Science	Machine Learning, CNNs for Visual Recognition, Computer Systems, Deep Generative Models, Natural Language Understanding
Technical Tools	Python, Pytorch, MATLAB, C, C++
Languages	Thai (native speaker), Japanese (passed JLPT N3)

AWARDS

Distinguished Fellowship in Intelligent, Autonomous & Secure Systems, College of Engineering, Boston University 2022
Terman Scholastic Award, School of Engineering, Stanford University 2022
Project Design Award, Department of Electrical Engineering, Stanford University 2020
King's Scholarship, Thai Government 2017
Gold medal, International Chemistry Olympiad 2016

ACTIVITIES

Boston University RISE High School Program, Mentor 2023
Stanford Thai Student Association, Financial Officer 2019 - 2020
Stanford Splash, Teacher 2019