BERK ISKENDER

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EDUCATION

- **University of Illinois Urbana-Champaign (UIUC), IL, US** — Overall GPA: **3.94/4.00**
  M.S./Ph.D., ECE **Advisor**: Prof. Yoram Bresler **M.S. Graduation:** 2020 / **Ph.D. Expected**: Spring 2024
- **Middle East Technical University (METU), Ankara, TR** — Overall GPA: **4.00/4.00**
  B.S., Electrical Engineering **Rank**: 1st (Valedictorian) **Graduation**: June 2018

EXPERIENCE

Summer/Fall 2022 — *PhD SWE (Machine Learning) Internship, and Student Researcher*, ***Google - CA, US***
· Research on improving self-supervised dense contrastive learning of uncurated data using transformers, different dense comparison techniques, and reconstruction decoders (work published in NeurIPS 2022 Self-Supervised Learning - Theory & Practice Workshop).

Summer 2021 — *PhD SWE (Machine Learning) Internship,* ***Google - CA, US***
· Implemented & compared various visual-semantic image embedding techniques, and deployed a novel supervised contrastive learning-based method to replace the attribute-based embedding to assist graph-hierarchical clustering at Google Geo.

Summer 2020 — *Research Internship,* ***Michigan State University (MSU) - MI, US***
· Worked on developing block-matching algorithms with learned sparsifying transforms for image denoising (work published in IEEE ICIP 2021) and dynamic estimation methods. **Advisor:** Prof. Saiprasad Ravishankar

Summer 2019 — *Graduate Research Internship,* ***Los Alamos National Laboratory (LANL) - NM, US***
· Worked on the machine/deep learning-based tomographic reconstruction methods for ill-posed single-view reconstruction.

Summer 2017 — *Internship,* ***ASELSAN Advanced Sensing Research Program Department - Ankara, TR***
· Time/frequency domain passive acoustic mapping, sparsity-based microbubble detection with constrained optimization for ultrasound.

Internship, ***KAREL Electronics Research & Development Center – Ankara, TR***
Summer 2016 · Performed image processing tasks for vehicles on ARM NXP iMX6 by cross-compilation of OpenCV libraries.

Teaching Graduate teaching assistant (TA) of Digital Signal Processing course for Fall 2019, Spring 2020, and Fall 2020 (Head TA)
Reviewer IEEE Transactions on Computational Imaging, IEEE Transactions on Medical Imaging

PUBLICATIONS

- B. Iskender, M. Klasky, Y. Bresler, "RED-PSM: Regularization by Denoising of Partially Separable Models for Dynamic Imaging", *IEEE/CVF ICCV 2023.*
- B. Iskender, M. Klasky, B. Patterson, Y. Bresler, "Factorized Projection-domain Spatio-temporal Regularization for Dynamic Tomography", *IEEE ICASSP 2023.*
- B. Iskender, Z. Xu, S. Kornblith, E. Chu, M. Khademi, "Improving Dense Contrastive Learning with Dense Negative Pairs", *NeurIPS 2022: 3rd Workshop on Self-Supervised Learning: Theory and Practice.*
- B. Iskender, M. Klasky, Y. Bresler, "Dynamic Tomography Reconstruction by Projection-Domain Separable Modeling", *IEEE IVMSP 2022 & arXiv:2204.09935.*
- B. Iskender, Y. Bresler, "Scatter Correction in X-ray CT by Physics-Inspired Deep Learning", *IEEE Transactions on Computational Imaging*, *2022.*
- S. Liang, B. Iskender, B. Wen, S. Ravishankar, "Learned feature-domain block matching for image restoration", *IEEE Intl. Conf. on Image Processing (ICIP) 2021*.
- B. Iskender, Y. Bresler, "A physics-motivated DNN for X-ray CT scatter correction", *IEEE 17th Intl. Symposium on Biomedical Imaging*, *IEEE ISBI 2020.*
- B. Iskender, Y. Bresler, "X-ray CT scatter correction by a physics-motivated DNN with opposite view processing", *CT Meeting 2020.*
- B. Iskender, S.F. Oktem, "Image restoration for sparse aperture optical systems", *26th Signal Proc. and Comm. Applications Conference (SIU), 2018.*

RESEARCH TOPICS & INTERESTS

- Interested in *machine learning, computer vision, signal processing, computational imaging & the theory of inverse problems.*
- *Ph.D.*: Dynamic imaging from undersampled measurements using machine learning & analytical techniques.
- *M.S.*: De-scattering inverse problem in X-ray CT imaging using physics-inspired deep learning.
- *Internships:* Improving dense contrastive learning for computer vision tasks, block-matching algorithms with learned transforms for denoising.
- *B.S.*: Sparsity-based deconvolution for periodic aperture imaging.

SEVERAL COURSEWORK & PROJECTS

- ***Computer Vision:*** *Project:* Implementation/comparison of SoTA algorithms for agricultural image segmentation
  Coursework: content-based image retrieval, shape retrieval, image registration, optical flow calculations, scale-space blob detection…
- ***Machine Learning:*** Project on supervised image super-resolution and denoising on low-dose X-ray images
- ***Machine Learning for Signal Processing:*** *Project:* Developing a super-resolution objective maximizing Fourier shell correlation for a GAN-based model
- ***Generative AI Models:*** Application of deep prior generative models for video reconstruction to dynamic tomography problem
- ***Digital Imaging:*** Project on CNN-based projected gradient descent for consistent X-ray CT scatter correction
- ***Vector Space Signal Processing****:* Project on reducing spatially varying out-of-focus blur
- ***Computational Inference and Learning:*** Project: LASSO problem analysis and comparison of various analytic/learning-based algorithms
- ***Senior Project****:* Implemented computer vision tasks (shape detection, motion control, and decision) of a basketball-playing robot on Raspberry Pi 3
- ***Digital Signal Processing II:*** Project on solving ill-posed inverse problems using ML/classical models
- ***Probability & Random Var.:*** Project on maximum likelihood parameter estimation from observations in the detection of moving objects
- ***Communications I:*** Project on hypothesis testing for amplitude or frequency-modulated signals
- ***Random Processes, Convex optimization, …***

QUALIFICATIONS

- **Programming**: **Core:** Python, Pytorch, TensorFlow, Matlab, LaTeX, **Used for various tasks:** C/C++, SQL, HTML, ARM Assembly
- **Application, Software**: Github, OpenCV, MS Office, LabView, GEANT4, **Used for various coursework:** Altera Quartus, LTSpice, KeyCreator (CAD)
- **Operating Systems**: Linux OS, Linux Board Support Package (BSP), MS Windows OS
- **Languages**: English (Proficient), Turkish (Native), Spanish (Beginner)

ACHIEVEMENTS & AWARDS

- Ranked 1st in the Electrical Engineering department (Valedictorian) at Middle East Technical University, 2018
- METU EE Bulent Kerim Altay Award (6 times) (Highest academic performance award for the related semester given by the department)
- Nationwide Top 100th student scholarship given by the Turkish Ministry of Education
- Finalist for the student best paper award competition of IEEE CAMSAP 2023