CV

AmirEhsan Khorashadizadeh

Personal Information

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Research Career

Visiting Researcher — **London, UK**
University College London (UCL) — **(2023 - present)**

Research Assistant — **Basel, Switzerland**
University of Basel — **(2020 - present)**

Education

Ph.D. In Data Science — **Basel, Switzerland**
University of Basel — **(2020 - present)**

M.Sc. In Electrical Engineering — **Tehran, Iran**
Sharif University of Technology (GPA: 18.52/20) — **(2018 - 2020)**

B.Sc. In Electrical Engineering — **Tehran, Iran**
University of Tehran (GPA: 17.01/20) — **(2013 - 2018)**

Research Interests

- **Deep Learning**
- **Computational Imaging**
- **Generative Modeling**
- **Image Reconstruction**

Publications

[1] AmirEhsan Khorashadizadeh, Tobias Liaudat, Jason McEwen and Ivan Dokmanić. 'MLPatch: Scalable Local Image Reconstruction.' Under review in ICML 2024.

[2] AmirEhsan Khorashadizadeh, Valentin Debarnot, Tianlin Liu and Ivan Dokmanić. 'GLIMPSE: Generalized Local Imaging with MLPs.' Preprint 2024 (available on Arxiv).

[3] Tianlin Liu, Jose Antonio Lara Benitez, Florian Faucher, AmirEhsan Khorashadizadeh, Maarten V. de Hoop, and Ivan Dokmanić. 'WaveBench: Benchmarks Datasets for Modeling Linear Wave Propagation PDEs.' Transactions on Machine Learning Research (TMLR 2024) (available on OpenReview).

[4] AmirEhsan Khorashadizadeh, Anadi Chaman, Valentin Debarnot and Ivan Dokmanić. 'FunkNN: Neural Interpolation for Functional Generation.' International Conference on Learning Representations (ICLR 2023) (available on OpenReview and Arxiv).

[5] AmirEhsan Khorashadizadeh, Vahid Khorashadizadeh, Sepehr Eskandari , Guy A. E. Vandenbosch and Ivan Dokmanić. 'Deep Injective Prior for Inverse Scattering.' IEEE Transactions on Antennas and Propagation (available on IEEE Xplore and Arxiv).

[6] AmirEhsan Khorashadizadeh, Konik Kothari, Leonardo Salsi, Ali Aghababaeiharandi, Maarten V. de Hoop and Ivan Dokmanić. 'Conditional Injective Flows for Bayesian Imaging.' IEEE Transactions on Computational Imaging (available on IEEE Xplore and Arxiv).

[7] AmirEhsan Khorashadizadeh, Ali Aghababaei, Tin Vlašić, Hieu Nguyen and Ivan Dokmanić. 'Deep Variational Inverse Scattering.' European Conference on Antennas and Propagation (EUCAP 2023) (available on IEEE Xplore and Arxiv).

[8] Tin Vlašić, Hieu Nguyen, AmirEhsan Khorashadizadeh and Ivan Dokmanić. 'Implicit Neural Representation for Mesh-Free Inverse Obstacle Scattering.' 56th Asilomar Conference on Signals, Systems, and Computers (available on Arxiv).

[9] Kothari, Konik, AmirEhsan Khorashadizadeh, Maarten de Hoop, and Ivan Dokmanić. 'Trumpets: Injective flows for inference and inverse problems.' Uncertainty in Artificial Intelligence (UAI 2021) (available on PMLR and Arxiv).

[10] Amir Ehsan Khorashadi-Zadeh, Massoud Babaie-Zadeh, and Christian Jutten. 'A Novel Pruning Approach for Bagging Ensemble Regression Based on Sparse Representation.' IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2020)(available on IEEE Xplore).

Honors and Awards

- Research Fellowship by Promotion of Young Talent at the University of Basel (2023)
- Poster competition winner in Maths4DL conference, London (2023)
- Ranked 4^{th} among 15000 participants in the master of electrical engineering exam (2018)
- Ranked 183^{th} among 200,000 participants in the national university entrance exam (2013)

Thesis

M.Sc. thesis: AmirEhsan Khorashadizadeh,"Pruning Machine Learning Models by Sparse Representation", Dept. Elect. Eng., Sharif University of Technology, Tehran, Iran. (2019-2020)
Supervisor: Prof. Massoud Babaie-Zadeh

B.Sc. thesis: AmirEhsan Khorashadizadeh,"Speaker Recognition System", Dept. Elect. Eng., University of Tehran, Tehran, Iran. (2017)
Supervisor: Prof. Mohammad Ali Akhaee

Technical Skills

- Programming: Python, R
- Tool/Software: PyTorch, Tensorflow, Matlab, Git, Pandas, OpenCV
- Language Proficiency: English (Fluent)

Research Experience

- Bayesian Modeling of Imaging Inverse Problems SADA Lab (2020-2023)
  - Trumpets: Injective Flows for Inference and Inverse Problems:
    We proposed injective normalizing flows called Trumpets with a low dimensional latent space making it a natural choice for solving ill-posed inverse problems, from image super-resolution and image in-painting to imaging problems.
  - Conditional Injective Flows for Bayesian Imaging:
    We developed a Bayesian framework, based on injective flows, for posterior sampling and uncertainty quantification of ill-posed imaging inverse problems. The proposed model can efficiently generate physically meaningful posterior samples over various imaging inverse problems including computed tomography (CT), seismic imaging, and inverse scattering.
  - Deep Variational Inverse Scattering:
    We introduced U-Flow, a Bayesian U-Net network based on conditional normalizing flows,

which generates high-quality posterior samples and estimates physically meaningful uncertainty. We show that the proposed model significantly outperforms the recent normalizing flows regarding posterior sampling while having comparable performance with the U-Net in point estimation.

- **Deep Injective Prior for Inverse Scattering:**
  We developed an unsupervised framework for Bayesian modeling of inverse scattering problems based on deep generative models. With comparable performance with state-of-the-art deep learning methods like U-Net, our proposed framework can be used for posterior sampling and uncertainty quantification with strong performance on real experimental data.

- **Neural Fields** — SADA lab & SciAI group (2022-present)
  - **FunkNN: Neural Interpolation for Functional Generation:**
    We proposed a local continuous super-resolution network termed FunkNN that can recover the image at any arbitrary continuous coordinate and resolution. FunkNN generates high-quality continuous images and exhibits strong out-of-distribution performance thanks to its patch-based design.
  - **GLIMPSE: Generalized Local Imaging with MLPs:**
    In this project, we built a local processing network for CT image reconstruction. Our model, called Glimpse, has a strong generalization; it significantly outperforms standard CNNs on out-of-distribution data while maintaining a memory footprint almost independent of image resolution; 5GB memory suffices to train on 1024×1024 images.
- **Single-cell RNA-seq in drug discovery** — Roche (Aug 2022)

  In this collaborative project, our team employed various machine learning frameworks to facilitate single-cell drug discovery. We leveraged a random forest classifier to identify the cell types with more distinguishable cells between healthy and inflamed.

Relevant Courses

- Graduate
  - Pattern Recognition: (17.3)
  - DeepLearning: (20/20)
  - Statistical Learning: (19.4/20)
  - Discrete-time Signal Processing (DSP): (16.6/20)
  - Computer Vision: (19/20)
  - Numerical Optimization: (20/20)
  - Model- and Learning-Based Inverse Problems in Imaging (ETH): (6/6)
  - Statistical Models in Computational Biology (ETH): (5.5/6)
- Undergraduate
  - Calculus: (19.25/20)
  - Differential Equations: (20/20)
  - Numerical Computations: (19.9/20)
  - Engineering Mathematics: (18/20)
  - Engineering Probability & Statistics: (18.5/20)
  - Linear Control Systems: (19.1/20)
  - Systems Analysis:(18.3/20)