ZALAN FABIAN, PHD CANDIDATE

University of Southern California, Ming Hsieh Dept. of Electrical and Computer Engineering, Los Angeles, CA
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RESEARCH INTERESTS

- Machine learning, optimization and signal processing
- Artificial intelligence for the basic sciences - MRI, computational imaging and microscopy
- Federated and continual learning
- Data-efficient training of deep learning models
- Understanding the generalization properties of deep learning algorithms
- Efficient second-order optimization for deep neural network training
- Large-scale and distributed computing over cloud infrastructure

ACTIVE PROJECTS

- **Deep learning with limited data:** designing novel techniques to reduce the reliance of deep learning models on large training datasets; particular focus on vision problems in the sciences and emerging MRI technologies

- **Federated continual learning:** flexible modeling of client activity and preferences in federated settings; memory bank design to tackle catastrophic forgetting in federated continual learning

- **Second-order optimizers for deep learning:** designing scalable and efficient optimization algorithms for deep learning to accelerate training via exploiting local curvature information

RESEARCH EXPERIENCE

University of Southern California **Department of Electrical and Computer Engineering**

Research assistant *Jan 2018 to present*

- Advisor: Mahdi Soltanolkotabi
- Research assistant at USC Foundations of Learning from Signals and Data Lab
- Projects on the intersection of machine learning, signal processing and optimization
- Focusing on applications for the basic sciences and medical imaging
- Understanding deep learning and learning from limited data

University of New Hampshire **Department of Electrical and Computer Engineering**

Research assistant *Aug 2015 to May 2017*

- Advisor: Se Young Yoon
- Research assistant at UNH Robotics Lab
- Projects on intelligent robotic swarm control both in theory and practice

EDUCATION

- PhD, Electrical Engineering, University of Southern California, 2017 - present
  - Advisor: Mahdi Soltanolkotabi
  - Focus: machine learning, deep learning, optimization, medical imaging
- MSc, Electrical Engineering, University of New Hampshire, 2017
  - Advisor: Se Young Yoon
  - Focus: non-linear and robust control, multi-agent robotic systems
- BSc, Electrical Engineering, Budapest University of Technology, 2014
  - Focus: signals and systems, control theory
- BSc. (double degree program), Engineering, Kyungpook National University, 2014
  - Focus: computer vision, intelligent systems and data mining

AWARDS AND DISTINCTIONS

- Ming Hsieh Institute PhD Scholar 2021-2022
- Annenberg PhD Fellow, 2017-2021
- BSc degree *summa cum laude*, 2014
- Academic Scholarship recipient, 2010-2014

PUBLICATIONS

[1] **Z. Fabian** and M. Soltanolkotabi, *HUMUS-Net: Hybrid unrolled multi-scale network architecture for accelerated MRI reconstruction*, 2022, arXiv preprint arXiv:2203.08213

[2] **Z. Fabian**, R. Heckel and M. Soltanolkotabi, *Data Augmentation for Deep Learning Based Accelerated MRI Reconstruction with Limited Data*, 2021, International Conference on Machine Learning

[3] **Z. Fabian**, J. Haldar, R. Leahy and M. Soltanolkotabi, *3D Phase Retrieval at Nano-Scale via Accelerated Wirtinger Flow*, 2020, European Signal Processing Conference

[4] S. M. M. Kalan, **Z. Fabian**, A. S. Avestimehr and M. Soltanolkotabi, *Minimax Lower Bounds for Transfer Learning with Linear and One-hidden Layer Neural Networks*, 2020, Neural Information Processing Systems

[5] S. Oymak, **Z. Fabian**, M. Li and M. Soltanolkotabi, *Generalization Guarantees for Neural Networks via Harnessing the Low-Rank Structure of the Jacobian*, 2019, arXiv preprint arXiv:1906.05392

[6] **Z. Fabian** and S. Y. Yoon, *Coordination of Balanced Leader-Follower Swarms with Time-Varying Social Potential Functions*, 2017, IEEE Conference on Decision and Control

[7] **Z. Fabian** and S. Y. Yoon, *Coordination of Multi-Agent Leader-Follower System with Time-Varying Objective Function*, 2016, IEEE Conference on Decision and Control

TEACHING AND MENTORING EXPERIENCE

University of Southern California — **Department of Electrical and Computer Engineering**
Teaching assistant — *Fall 2019*

- Optimization for the Information and Data Sciences

University of Southern California — **Viterbi School of Engineering**
Graduate mentor — *Fall 2019 - present*

- Student mentor in the Viterbi Graduate Mentorship Program
- Supporting and advising incoming engineering graduate students

University of Southern California — **Department of Electrical and Computer Engineering**
Research mentor — *Fall 2019 - Spring 2020*

- Mentoring and advising a student in their undergraduate research and thesis
- Research project on over-parameterized neural networks

University of New Hampshire — **Department of Electrical and Computer Engineering**
Teaching assistant — *Fall 2016 - Spring 2017*

- Computer Organizations

CONFERENCE REVIEW

- International Conference on Machine Learning (ICML 2021, ICML 2022)
- International Conference on Learning Representations (ICLR 2020, ICLR 2021, ICLR 2022)
- Neural Information Processing Systems (NeurIPS 2020, NeurIPS 2021)
- Sampling Theory and Applications (SampTA 2019)
- IEEE Conference on Decision and Control (CDC 2016, 2017)

OTHER SKILLS

Software Python, Pytorch, Tensorflow, Matlab, C/C++, LaTeX

Languages English: professional. Hungarian: native. German: basic.