Mahdi Morafah

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Summary

ML Ph.D. student at **UC San Diego**, Looking for internship positions for summer 2022. Former machine learning research intern at **TESLA**. Interested in Federated Learning, Machine Learning and Optimization with 5 publications. Strong mathematical, analytical, and programming skills. Awarded Dean's Powell Focht Fellowship for 2021-2022 academic year.

Research Interest

- Federated Learning
- Optimization
- Continual Learning
- Efficient & Sparse ML

Education

University of California San Diego — San Diego, CA
- ***Ph.D.*** *in Electrical and Computer Engineering* — *Sep 2021 - Sep 2025*
  Majoring *in Machine Learning and Data Science* ***(GPA: 4/4)***

University of California San Diego — San Diego, CA
- ***M.Sc.*** *in Electrical and Computer Engineering* — *Sep 2019 - Sep 2021*
  Majoring *in Machine Learning and Data Science* ***(GPA: 4/4)***

Amirkabir University of Technology — Tehran
- ***B.Sc.*** *in Electrical and Computer Engineering* — *Sep 2015 - Jul 2019*
  Majoring *in Signal and Image Processing* ***(Ranked 1st)***

Publications

- S. Vahidian*, **M. Morafah*** and B. Lin, "Personalized Federated Learning by Structured and Unstructured Pruning under Data Heterogeneity", *IEEE 41st International Conference on Distributed Computing Systems (ICDCSW)*, Jul 2021. [paper | video | code]
- V. Kungurtsev, **M. Morafah**, T. Javidi and G. Scutari, "Decentralized Asynchronous Non-convex Stochastic Optimization on Directed Graphs", *accepted to IEEE Transactions on Control of Network Systems (TCNS)*, Oct 2022. [paper]
- **M. Morafah***, S. Vahidian*, W. Wang* and B. Lin, "FLIS: Clustered Federated Learning via Inference Similarity for Non-IID Data Distribution", *ArXiv preprint arXiv:2208.09754*, Aug 2022. [paper | code]
- S. Vahidian*, **M. Morafah***, W. Wang, C. Chen, M. Shah and B. Lin, "Efficient Distribution Similarity Identification in Clustered Federated Learning via Principal Angles Between Client Data Subspaces", *ArXiv preprint arXiv:2209.10526*, Sep 2022. [paper | code]
- **M. Morafah***, S. Vahidian*, C. Chen, M. Shah and B. Lin, "Rethinking Data Heterogeneity in Federated Learning: Introducing a New Notion and Standard Benchmarks", *ArXiv preprint arXiv:2209.15595*, Sep 2022. [paper | code]
- **M. Morafah**, W. Wang and B. Lin, "*FedZoo: What is the State of Federated Learning with Non-IID Data?*", (in progress).
- **M. Morafah** and B. Lin, "*Federated Model Heterogeneity*", (in progress).

** denotes equal contribution*

Skills

- **Programming Languages**: Python, C/C++, MATLAB, Java
- **Cloud Computing**: AWS, Docker, Kubernetes
- **Analytical**: Statistics, Optimization, Linear Algebra, Variational Inference

Scripting: Bash, Vim, Nano, Git
ML Libraries: TensorFlow, PyTorch
Parallel Computing: MPI

Working Experience/Employment

- **TESLA** Palo Alto, CA
  Machine Learning Research Intern *Jan 2021 - May 2021*
  - **Self-driving cars:** conducted research on tracking and detection algorithms to improve the performance and solve the problems for the next generation of self-driving cars.

- **OPAL AI INC** Los Angeles, CA
  Machine Learning Research Intern *Aug 2020 - Sep 2020*
  - **Generating floor-plan:** conducted research on DNNs and algorithms to generate floor-plans using combined RGB camera images and depth point cloud data.

- **Statistical Visual Computing Laboratory** UC San Diego
  Summer Research Intern *Mar 2020 - Sep 2020*
  - **3D object detection:** conducted research in autonomous driving 3D object detection using NuScenes dataset. Our approach was using RGB camera images and Radar sensor (instead of Lidar) to achieve state-of-the-art results. Proposed a method for fusing Radar and RGB data.

Teaching Assistance

- **Teaching Assistant** San Diego, CA
  - **CSE 151B** Deep Learning - UC San Diego *Spring 2021*
  - **ECE 109** Engineering Probability & Statistics - UC San Diego *Fall 2020*
  - **ECE 101** Linear Systems Fundamentals (aka Signal & Systems) - UC San Diego *Winter 2020*
  - **ECE 161A** Introduction to Discrete-Time Signal Processing - UC San Diego *Fall 2019*
  - **Discrete-Time Signal Processing** - Amirkabir U of T *Spring 2019*

Relevant Courses

- Deep Learning & Apps
- Prob & Stats for Data Science
- Statistical Learning (I, II)
- Convex Optimization & Apps
- Applied Linear Algebra (I)
- Linear Algebra & Apps

Awards

- **Awarded** Dean's Powell Focht Fellowship ($54k) *2021-2022*
- **Semi-Finalist** Qualcomm Innovation Fellowship (Federated Bayesian Learning Framework) *Mar 2020*
- **Recipient** of EE Departmental Award for Ranking 1st in Bachelor's Program at Tehran Polytechnic University *2019*

Last Update: October 4, 2022