ISIDOROS TZIOTIS

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EDUCATION

Ph.D. in Electrical and Computer Engineering *2017 - May 2024(expected)*
University of Texas at Austin, USA (Advisor: Prof. Aryan Mokhtari)
Master of Science in Logic, Algorithms and Computation (MPLA) *2014 - 2016*
National Kapodistrian University of Athens, Greece
Bachelor of Science in Informatics and Telecommunications *2007- 2013*
National Kapodistrian University of Athens, Greece

RESEARCH INTERESTS

- **Machine Learning:** Federated Learning, Representation Learning, Fully Decentralized Learning
- **Optimization:** Adaptive Optimization, Non-Convex Optimization, Combinatorial Optimization
- **Game Theory:** Voluntary Participation in Federated Learning, Fairness, Bayesian Games

INDUSTRY EXPERIENCE

Amazon - Applied Scientist Intern *May 2022 - Sep 2022*

· Proposed and analyzed semi-asynchronous Federated Learning algorithms with robust performance in the presence of stragglers and data-heterogeneous clients in the network (data & system heterogeneity).

· Provided experimental results showcasing the superior performance of our straggler-resilient methods over established baselines in academic (CIFAR10, CIFAR100, FEMNIST) and industry datasets.

REVIEWING SERVICE

Conferences: NeurIPS 2022/2023, ICML 2022/2023, AISTATS 2021/2023/2024, ICLR 2024
Journals: IEEE Transactions on Information Theory/Mobile Computing/Networking

PUBLICATIONS AND PREPRINTS

I. Tziotis, S. P. Karimireddy, A. Mokhtari, "Objective Oriented Personalization in Federated Learning", *Ongoing.*

I. Tziotis, Z. Shen, R. Pedarsani, H. Hassani, A. Mokhtari, "Straggler-Resilient Personalized Federated Learning; Adaptive Node Selection and Representation Learning", *TMLR 2023.*

M. Faw*, **I. Tziotis***, C. Caramanis, A. Mokhtari, S. Shakkottai, R. Ward, "The Power of Adaptivity in SGD: Self-Tuning Step Sizes with Unbounded Gradients and Affine Variance", *COLT 2022.*

A. Reisizadeh, **I. Tziotis,** H. Hassani, A. Mokhtari, R. Pedarsani, "Straggler-Resilient Federated Learning: Leveraging Interplay Between Statistical Accuracy and System Heterogeneity", *IEEE JSAIT 2022.*

A. Reisizadeh, **I. Tziotis,** H. Hassani, A. Mokhtari, R. Pedarsani, "Adaptive Node Participation in Straggler-Resilient Federated Learning", *IEEE ICASSP 2022.*

I. Tziotis, C. Caramanis, A. Mokhtari, "Achieving Second Order Optimality in Decentralized Non-Convex Optimization via Perturbed Gradient Tracking", *NeurIPS 2020.*

PROJECTS

Objective Oriented Personalization in Federated Learning *May 2022 - Ongoing*

· Analyzed personalization models for various objectives (maximum participation, maximum welfare, fairness) in the Bayesian Hierarchical setting for Mean Estimation and Federated Learning.

· Provided experimental results illustrating the performance of different personalization models with respect to different objective functions (maximum participation, maximum welfare, fairness).

Straggler-Resilient Personalized Federated Learning (SRPFL) *Jun 2022 - Feb 2023*

· Proposed and analyzed SRPFL, a meta-algorithm that utilizes representation learning techniques to enhance the performance of personalized federated methods in data and system heterogeneous regimes.

· Provided experimental results showcasing logarithmic speedup provided by SRPFL in the performance of state of the art personalized federated methods such as FedRep and Local-Global FedAvg.

The power of adaptivity in SGD *May 2021 - Jan 2022*

· The first paper that bridges the gap between SGD and adaptive methods in the non-convex regime.

· Proved that Adagrad-Norm exhibits optimal convergence rate in the same settings as SGD!

Inferring Economic Implications of Covid-19 (*Course Project*) *Sep 2020 - Dec 2020*

· Assembled, pre-processed and analyzed health datasets related to Covid-19 across US states.

· Inferred future trends of US economic indicators utilizing time series analysis on health datasets.

Federated Learning with Adaptive Node Participation (FLANP) *Jul 2019 - Dec 2019*

· Proposed and analyzed FLANP, a novel meta-algorithm that enhances the performance of traditional federated learning methods in system-heterogeneous regimes.

· Provided experimental results showcasing logarithmic speedup provided by FLANP in the performance of state of the art federated schemes, such as FedAvg, FedNova and FedGATE.

Perturbed Decentralized Gradient Tracking *Feb 2019 - Jun 2019*

· Proposed and analyzed Perturbed Decentralized Gradient Tracking, the first decentralized algorithm that converges to second order stationary points in polynomial time (escaping saddle points).

· Provided experimental results showcasing the superior performance of Perturbed Decentralized Gradient Tracking in non-convex settings compared to established fully decentralized baselines.

Perturbed Gradient Descent (*Course Project)* *Feb 2019 - May 2019*

· Analyzed the behavior of the Perturbed Gradient Decent algorithm around saddle points.

· Simulated Perturbed Gradient Decent and compared against established baselines.

TECHNICAL STRENGTHS

Programming Languages	Python, C/C++, Java, HTML, PHP
Software & Tools	Matlab, Latex

RELEVANT GRADUATE COURSEWORK

Convex Optimization, Large Scale Optimization, Statistical Machine Learning, Data Mining, Online Learning, Combinatorial Optimization, Randomized Algorithms, Probabilities and Stochastic Processes

TEACHING ASSISTANTSHIP

The University of Texas at Austin

· Design and Analysis of Algorithms, Fall 2017, Spring 2018 and Fall 2019

· Advanced Topics in Algorithmic Game Theory, Spring 2019

National Technical University of Athens

· Design and Analysis of Algorithms, Fall 2016

· Algorithmic Game Theory, Spring 2017

HONORS AND AWARDS

Gerondelis Foundation Scholarship for Graduate Studies *2019*
Award for exceptional academic performance.

Cockrell School of Engineering Merit-based Recruiting Fellowship *2017, 2018*
Award for exceptional grades and academic performance.

Eurobank EFG Scholarship *2007*
Award for top 3 students accepted at the Department of Informatics and Telecommunications.