# Ahmed Khaled

#### Education

- Jan 2022 Ph.D. Electrical and Computer Engineering, Princeton University, New Jersey, United States.
  - Present Advisor: Professor Chi Jin. GPA: 3.96/4.0.
- Oct 2015 B.Sc. Computer Engineering, Cairo University, Egypt.
- Aug 2020 GPA: Distinction with Honors (91.3%). Rank: 3<sup>rd</sup>/64.

# Work Experience

- May-Sep Research Scientist Intern, Meta, New York City, New York, United States.
  - 2023 Research scientist intern at the Fundamental AI Research Team at Meta working with Aaron Defazio. Worked on adaptive optimization.
- Jun-Oct 2020 Research Intern, KAUST, Saudi Arabia.
- Jun-Sep 2019 Research intern in the group of Professor Peter Richtárik. Worked on federated learning and optimization.
  - Aug-Sep Undergraduate Research Assistant, Cairo University, Egypt.
    - 2018 Worked with Professors Amir Atiya and Ahmed Abdel-Gawad on fast matrix multiplication algorithms. Wrote code in CUDA C.
  - Jun-Aug **Nafham**, *Intern*.
  - 2016/2017 Recorded more than 40 educational videos on high school mathematics and wrote web pages in HTML, JavaScript, & CSS, and PHP with Bootstrap and Laravel.

#### **Awards**

- 2023 School of Engineering and Applied Sciences (SEAS) Travel Grant, Princeton University.

  Awarded a travel grant worth used towards going to ICLR 2023.
- 2020/2022 **Top reviewer**, various conferences.
  - One of the top 10% of reviewers for ICML 2022 (awarded free registration, July 2022), AISTATS 2022 (awarded Feb. 2022) and NeurIPS 2020 (awarded free registration, Oct. 2020).
- Oct 2020 INFORMS Undergraduate Operations Research Prize Finalist, Institute for Operations Research and the Management Sciences (INFORMS).
  - One of ten finalists selected to give a presentation on outstanding research done as an undergraduate.
- Jan 2020 SIGAPP Student Travel Award, ACM, (Declined).
  - Travel award worth \$700 used towards going to the ACM SAC 2020 conference. Declined due to Covid.
- Sep 2019 Mentor Achievement Award, Learn IT, Girl 4th Edition.
  - Awarded for successfully mentoring Natalia Grzywalska over March-June 2019 in learning IT.
- Feb 2021 **UW College of Engineering Dean's Fellowship**, *UWashington*, (Declined). Four-year fellowship offered to the top incoming doctoral applicants at the University of Washington.

## Papers

#### Conference papers

- (1) **A. Khaled**, Konstantin Mishchenko, and Chi Jin DoWG Unleashed: An Efficient Universal Parameter-Free Gradient Descent Method NeurIPS 2023.
- (2) A. Khaled and Chi Jin Faster federated optimization under second-order similarity ICLR 2023.
- (3) Konstantin Mishchenko, **A. Khaled**, and Peter Richtárik Proximal and Federated Random Reshuffling ICML 2022.
- (4) Elnur Gasanov, **A. Khaled**, Samuel Horváth, and Peter Richtárik FLIX: A Simple and Communication-Efficient Alternative to Local Methods in Federated Learning - AISTATS 2022.

- (5) Konstantin Mishchenko, **A. Khaled**, and Peter Richtárik Random Reshuffling: Simple Analysis with Vast Improvements NeurIPS 2020.
- (6) **A. Khaled**, Konstantin Mishchenko, and Peter Richtárik Tighter Theory for Local SGD on Identical and Heterogeneous Data AISTATS 2020.
- (7) **A. Khaled**, Amir F. Atiya, Ahmed H. Abdelgawad Applying Fast Matrix Multiplication to Neural Networks ACM SAC 2020.

Journal papers

- (8) A. Khaled, Othmane Sebbouh, Nicolas Loizou, Robert M. Gower, and Peter Richtárik Unified Analysis of Stochastic Gradient Methods for Composite Convex and Smooth Optimization - Journal of Optimization Theory and Applications (JOTA) 2023.
- (9) **A. Khaled** and Peter Richtárik Better Theory for SGD in the Nonconvex World Transactions of Machine Learning Research (TMLR) 2023.

**Preprints** 

- (10) Aaron Mishkin\*, **A. Khaled**\*, Yuanhao Wang, Aaron Defazio, and Robert M. Gower Directional Smoothness and Gradient Methods: Convergence and Adaptivity arXiv:2403.04081 (2024).
- (11) A. Khaled, Chi Jin Tuning-Free Stochastic Optimization arXiv:2402.07793 (2024).
- (12) Abdurakhmon Sadiev, Grigory Malinovsky, Eduard Gorbunov, Igor Sokolov, **A. Khaled**, Konstantin Burlachenko and Peter Richtárik Federated Optimization Algorithms with Random Reshuffling and Gradient Compression arXiv:2206.07021 (2022).
- (13) Sélim Chraibi, **A. Khaled**, Dmitry Kovalev, Peter Richtárik, Adil Salim, and Matrin Takáč Distributed Fixed Points Methods with Compressed Iterates arXiv:1912.09925 (2019).

Workshop papers

- (14) Aaron Mishkin\*, **A. Khaled**\*, Aaron Defazio, and Robert M. Gower A novel analysis of gradient descent under directional smoothness Poster at the NeurIPS 2023 Optimization for ML workshop.
- (15) **A. Khaled**, Konstantin Mishchenko, and Peter Richtárik Better Communication Complexity for Local SGD *Oral presentation* at the NeurIPS 2019 Federated Learning workshop.
- (16) **A. Khaled** and Peter Richtárik Gradient descent with Compressed Iterates Poster at the NeurIPS 2019 Federated Learning workshop.
- (17) **A. Khaled**, Konstantin Mishchenko, and Peter Richtárik First Analysis of Local GD on Heterogeneous Data Poster at the NeurIPS 2019 Federated Learning workshop.

Note: \* indicates joint first authorship.

### Skills

Technical Python, C/C++, LATEX, Git.

Languages English (fluent) and Arabic (native).

# Programming projects

- O Style Transfer (Image Processing course project): Implemented Elad and Milanfar's Style-Transfer via Texture-Synthesis paper in Python using OpenCV, scikit-learn and NumPy. Code, Report.
- O Gated Neural Networks (Multimedia course project): Implemented a gated neural nets algorithm (PAQ7) for compression in C++. Won 1<sup>st</sup> place out of 15 teams in a department-wide text compression contest. Report.
- GoSlayer (Machine Intelligence course project): Led a team of sixteen people in implementing an AI agent that plays Go based on Monte-Carlo Tree Search and various heuristics. Code, Report.
- Arabic OCR (Pattern Recognition course project): Implemented Nashwan et al.'s A Holistic Technique for an Arabic OCR System paper in Python using OpenCV, scikit-learn, and NumPy, in addition to multiple other papers. Code, Report.

## Teaching

Spring 2023 ECE539/COS512, Princeton University.

Teaching assistant for ECE539: Optimization for Machine Learning. Graduate course on optimization.