Ahmed Khaled

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Homepage

Education

2015–Present **B.Sc. Computer Engineering**, *Cairo University*, Egypt.
GPA: Distinction (3.96/4.0). Expected Graduation Date: July 2020.
Preparatory Year Rank: 8th/2200. First Year Rank: 3rd/64. Second Year Rank: 1st/64. Third Year Rank: 4th/64.

Research Experience

June–September 2019 **Research Intern**, *King Abdullah University of Science and Technology*, Saudi Arabia.
Worked in the group of Professor Peter Richtárik on Stochastic Optimization. Carried out novel mathematical analysis of optimization algorithms for federated learning, variance reduced methods and nonconvex stochastic gradient descent. Wrote experiments in Python with scikit-learn.

August–September 2018 **Undergraduate Research Assistant**, *Cairo University*, Egypt.
Worked with Professor Amir Atiya and Professor Ahmed Abdel-Gawad on speeding up the training of neural networks using fast matrix multiplication algorithms. Wrote code in CUDA C and interfaced it to the TensorFlow library.

Papers

A. K. and Peter Richtárik - Better Theory for SGD in the Nonconvex World.

Sélim Chraibi, **A. K.**, Dmitry Kovalev, Peter Richtárik, Adil Salim, and Matrin Takáč - Distributed Fixed Points Methods with Compressed Iterates.

A. K., Konstantin Mishchenko and Peter Richtárik - Tighter Theory for Local SGD on Identical and Heterogeneous Data - Artificial Intelligence and Statistics (AISTATS) 2020.

A. K., Konstantin Mishchenko and Peter Richtárik - Better Communication Complexity for Local SGD - *oral presentation* at the NeurIPS 2019 Federated Learning Workshop.

A. K. and Peter Richtárik - Gradient descent with Compressed Iterates - NeurIPS 2019 Federated Learning Workshop.

A. K., Konstantin Mishchenko and Peter Richtárik - First Analysis of Local GD on Heterogeneous Data - NeurIPS 2019 Federated Learning Workshop.

A. K., Amir Atiya, Ahmed Abdel-Gawad - Applying Fast Matrix Multiplication to Neural Networks - 35th ACM/SIGAPP Symposium on Applied Computing (ACM SAC) 2020.

Relevant Projects

Relevant Course Projects, these projects involved implementing research papers from scratch.

- Image Processing: Implemented Elad and Milanfar's Style-Transfer via Texture-Synthesis paper in Python using OpenCV, scikit-learn and NumPy. Code, Report.
- Multimedia: Implemented a gated neural nets algorithm (PAQ7) for compression in C++. Won 1st place out of 15 teams over the department for the best compression ratio on an Arabic text dataset. Report.
- Pattern Recognition: 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.
- Machine Intelligence: Led a team of 16 students in developing a Monte Carlo Tree Search based Go playing agent with a GUI and network play in C++. Won 2nd place out of 6 teams in a department-wide competition. Report.

Mathematics Self-Study, this was mainly to develop my mathematical maturity beyond class.

- Worked through a textbook on real analysis and wrote a solutions manual for it (link).
- Also worked through chapters of Axler's Linear Algebra Done Right, Bartle's Elements of Integration, Hrbacek and Jech's Set Theory, Aluffi's Algebra Chapter 0 and others.

Work Experience

Jun–Aug/2016, Aug–Sep/2017 **Nafham**, *Intern*.
Wrote web pages in HTML, JavaScript, & CSS, and PHP with Bootstrap and Laravel. Recorded more than 40 educational videos on high school mathematics.

Awards

Sep 2019 **Mentor Achievement Award**, *Learn IT, Girl 4th Edition*.
Awarded for successfully mentoring Natalia Grzywalska over March – June 2019 in programming in Java.

Skills

Technical: C/C++, Python, Java, LaTeX, Git.
Languages: English (fluent) and Arabic (native).