Ahmed Abdelkader Abdelrazek

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ABOUT ME My research considers the entire geometry acquisition pipeline, with a focus on deep representations enabling accurate predictions and realistic synthetics, as well as sensor modeling. More broadly, I continually develop my expertise in geometric computing to solve practical problems in perception and learning. I thrive in multidisciplinary environments and have a passion for education and mentoring.

RESEARCH Computational Geometry, 3D Modeling, Computational Photography, Machine Learning.

CURRENT APPOINTMENT

Google Research, Mountain View, CA Jun 2022 - now

Research Scientist – Face Authentication

Delivered spoof detectors and critical analyses for next-gen devices. Led data collection and tooling.

PROFESSIONAL EXPERIENCE (SELECTED)

Sandia National Laboratories, Albuquerque, NM 2015 $\sim$ 2019

Visiting Researcher – Computer Science Research Institute

Designed and delivered thorough theoretical analysis of a first-of-kind meshing algorithm: VoroCrust.

Google Inc., Mountain View, CA Jun – Aug 2014

Intern Software Engineer – Google Research

Delivered parallelized robust point-cloud alignment, and experimented with shape retrieval.

Google Inc., Mountain View, CA Jun – Oct 2011

Intern Site Reliability Engineer – GMail SRE

Delivered advanced statistical monitoring of staging servers, and diurnal analyses for load balancing.

Google Switzerland GmbH, Zürich, Switzerland Jul – Sep 2010

Intern Software Engineer – GMail Spam, Abuse and Delivery

Delivered core engine for advanced bot detection, which now serves billions of QpS across platforms.

Microsoft Corporation, Redmond, WA Jun – Sep 2008

Intern Software Design Engineer in Test – Core Operating System Division

Prototyped physical key-press tests, and experimented with input paramter inference for fuzz testing.

EDUCATION

Ph.D. in Computer Science

University of Maryland, College Park, MD

- Thesis: Adaptive Sampling for Geometric Approximation
- Advisor: David M. Mount

M.Sc. in Applied Mathematics

Alexandria University, Alexandria, Egypt

- Thesis: Optimization Problems in Visual Surveillance
- Advisor: Hazem El-Alfy

B.Sc. in Computer Engineering

Alexandria University, Alexandria, Egypt

- Thesis: Device-free Passive Localization in Wi-Fi Networks
- Advisor: Moustafa Youssef

Publications (Selected)

Machine Learning

The Intrinsic Dimension of Images and Its Impact on Learning
Int. Conf. on Learning Representations (ICLR), 2021
Phillip Pope, Chen Zhu, A. A., Micah Goldblum, Tom Goldstein

Detection as Regression: Certified Object Detection by Median Smoothing
Advances in Neural Inf. Proc. Sys. (NeurIPS), 2020
Ping-yeh Chiang, Michael Curry, A. A., Aounon Kumar, John Dickerson, Tom Goldstein

Certified Defenses for Adversarial Patches
Int. Conf. on Learning Representations (ICLR), 2020
Ping-yeh Chiang*, Renkun Ni*, A. A., Chen Zhu, Chris Studor, Tom Goldstein

Headless Horseman: Adversarial Attacks on Transfer Learning Models
IEEE Conf. on Acoustics, Speech, and Signal Processing (ICASSP), 2020
A. A., M. Curry, L. Fowl, T. Goldstein, A. Schwarzschild, M. Shu, C. Studer, C. Zhu

Shape Modeling

VoroCrust: Voronoi Meshing without Clipping
ACM Trans. on Graphics (ToG) & SIGGRAPH 2020
A. A., C. Bajaj, M. Ebeida, A. Mahmoud, S. Mitchell, J. Owens, A. Rushdi

Sampling Conditions for Conforming Voronoi Meshing by the VoroCrust Algorithm
Symp. on Computational Geometry (SoCG), 2018
A. A., C. Bajaj, M. Ebeida, A. Mahmoud, S. Mitchell, J. Owens, A. Rushdi

A Constrained Resampling Strategy for Mesh Improvement
Symp. on Geometry Processing (SGP), 2017
A. A.*, Ahmed Mahmoud*, Ahmad Rushdi, Scott Mitchell, John Owens, Mohamed Ebeida

Cyber-Physical Systems

Argus: Realistic Target Coverage by Drones
ACM/IEEE Int. Conf. on Information Processing in Sensor Networks (IPSN), 2017
Ahmed Saeed, A. A., Azin Neishaboori, Mouhyemen Khan, Khaled Harras, Amr Mohamed
– Full version in the ACM Trans. on Sensor Networks (TOSN), 2019

Visibility Induction for Discretized Pursuit-Evasion Games
AAAI Conf. on Artificial Intelligence (AAAI), 2012
A. A., Hazem El-Alfy

Analysis of a Device-free Passive Tracking System in Typical Wireless Environments
Int. Conf. on New Technologies, Mobility and Security (NTMS), 2009
Ahmed Kosba, A. A., Moustafa Youssef

Approximation Algorithms

Approximate Nearest-Neighbor Search for Line Segments
Symp. on Computational Geometry (SoCG), 2021
A. A., David M. Mount

Approximate Nearest Neighbor Searching with Non-Euclidean and Weighted Distances
ACM-SIAM Symp. on Discrete Algorithms (SODA), 2019
A. A., Sunil Arya, Guilherme da Fonseca, David M. Mount

Economical Delone Sets for Approximating Convex Bodies
Scandinavian Symp. and Workshops on Algorithm Theory (SWAT), 2018
A. A., David M. Mount

The Inapproximability of Illuminating Polygons by α-Floodlights
Canadian Conf. on Computational Geometry (CCCG), 2015
A. A., Ahmed Saeed, Khaled Harras, Amr Mohamed

Honours & Awards

Peter O'Donnel, Jr. Postdoctoral Fellowship, University of Texas, Austin, 2020-2022.

Ann G. Wylie Dissertation Fellowship, University of Maryland, College Park, 2019.

Dean's Fellowship, University of Maryland, College Park, 2013-2014.

Honorable Mention, The ACM International Collegiate Programming Contest - World Finals, 2011.

Bronze medal, Egyptian Olympiad in Informatics, 2006.

Service (selected)

Conference Reviewer/Sub-reviewer

- Annual Conf. on Neural Info. Proc. Systems (NeurIPS)
- Int. Conf. on Learning Representations (ICLR)
- Int. Conf. on Machine Learning (ICML)
- IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)
- IEEE Int. Conf. on Robotics and Automation (ICRA)
- IEEE Int. Conf. on Advanced Robotics (ICAR)
- IEEE Int. Conf. on Automation Science and Engineering (CASE)
- High-Performance Graphics (HPG)
- ACM-SIAM Symp. on Discrete Algorithms (SODA)
- Symp. on Computational Geometry (SoCG)
- Int. Symp. on Algorithms and Computation (ISAAC)
- Canadian Conf. on Computational Geometry (CCCG)

Journal Reviewer/Sub-reviewer

- Algorithmica (ALGO)
- Mathematics of Computation
- The Visual Computer (TVCJ)
- Computers & Graphics
- IEEE Access
- Language Resources and Evaluation (LREV)
- Robotics and Automation Letters (RA-L)
- Computational Geometry Theory and Applications (CGTA)

Teaching

University of Maryland, College Park, MD — Fall 2013 – Fall 2016
Teaching Assistant

CMSC 754: Computational Geometry (Fall 2016)
CMSC 351: Algorithms (Summer 2016)
CMSC 425: Game Programming (Spring 2016)
CMSC 451: Design and Analysis of Computer Algorithms (Fall 2015)
CMSC 250: Discrete Structures (Fall 2013, Spring 2014)

Alexandria University, Alexandria, Egypt — Fall 2009 – Spring 2013
Teaching Assistant

Calculus, Differential Equations, Numerical Methods, Probability, Linear Algebra, C Programming, Object Oriented Programming, Data Structures, Algorithms, Machine Learning, Automata Theory.