Mo Tiwari

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motiwari.com | U.S. Citizen

EDUCATION:

Stanford University, Stanford, CA — ***GPA: 4.2+*** — 2017 – 2023
Ph.D. in Computer Science
Thesis: "Accelerating Machine Learning Algorithms with Adaptive Sampling"
Areas: deep learning, multi-armed bandits, randomized algorithms
Advisors: Sebastian Thrun and Chris Piech
*Received over **$800,000** in fellowships*

M.S. in Computer Science (completed during Ph.D.) — ***GPA: 4.2+*** — June 2019

California Institute of Technology, Pasadena, CA — ***GPA: 4.0+*** — 2010 – 2013
*Top **5%** of Graduating Class (Top **15** students)*

B.S. in Mathematics with Honors — ***GPA: 4.0+*** — June 2013
B.S. in Physics with Honors — ***GPA: 4.0+*** — June 2013

Columbia University – **Columbia College**, New York, NY — ***GPA: 4.0+*** — 2009 – 2010

INDUSTRY EXPERIENCE:

SOFTWARE ENGINEER, TECHNICAL LEAD – FACEBOOK, INC. 2015 – 2017

- Technical lead of the team building ThreatExchange, Facebook's platform for sharing cybersecurity information
- Led product and feature development through 5 major releases that grew the number of enterprise customers from 92 to 500+
- Managed 3 interns who received and accepted fulltime offers

SECURITY RESEARCH SCIENTIST – EXPANSE, INC. (acquired for $800MM) 2014 – 2015

- As the fifth fulltime employee, performed the first systematic, continuous, and Internet-scale capture and analysis of device data and security vulnerabilities
- Built backend and frontend infrastructure to help analysts understand terabytes of prostitution advertisements and uncover human trafficking
- Work indirectly led to arrests of dozens of human traffickers and rescue of victims

RESEARCHER – DRW TRADING GROUP Summer 2013

- Created valuation models for various financial instruments, such as interest rate swaps and swaptions

SELECTED PUBLICATIONS:

- **Mo Tiwari**, Ryan Kang, Luke Lee, Sebastian Thrun, Ilan Shomorony, Martin Zhang. "BanditPAM++: Faster *k*-medoids Clustering." Neural Information Processing Systems ***(NeurIPS)*** 2023.
- **Mo Tiwari***, Guy Blanc*, Jane Lange*, Chirag Pabbaraju*, Colin Sullivan*, Li-Yang Tan* (listed alphabetically). "Harnessing the Power of Choices in Decision Tree Learning." Neural Information Processing Systems ***(NeurIPS)*** 2023.
- Aarohi Srivastava, …, **Mo Tiwari**, …, Ziyi Wu (444 authors, listed alphabetically). "Beyond the Imitation Game: Quantifying and Extrapolating the Capabilities of Language Models." Transactions on Machine Learning Research ***(TMLR)*** 2023.
- Yoshua Bengio*, Salem Lahlou*, Tristan Deleu*, Edward Hu, **Mo Tiwari**, Emmanuel Bengio. "GFlowNet Foundations." Journal of Machine Learning Research ***(JMLR)*** 2023.
- **Mo Tiwari**, Ryan Kang, Je-Yong Lee, Chris Piech, Ilan Shomorony, Sebastian Thrun, Martin Zhang. "MABSplit: Faster Forest Training Using Multi-Armed Bandits." Neural Information Processing Systems ***(NeurIPS)*** 2022.
- Qi Liu, …, **Mo Tiwari**, …, Shiew-Mei Huang (13 authors). "Landscape Analysis of the Application of Artificial Intelligence and Machine Learning in Regulatory Submissions for Drug Development from 2016 to 2021." Clinical Pharmacology and Therapeutics *2022.*
- **Mo Tiwari**, Martin Zhang, James Mayclin, Sebastian Thrun, Chris Piech, Ilan Shomorony. "BanditPAM: Almost Linear Time *k*-medoids Clustering via Multi-Armed Bandits." Neural Information Processing Systems ***(NeurIPS)*** 2020.
- **Mo Tiwari**, …, Charles C. Lin (13 authors). "Differentiation of Active Corneal Infections from Healed Scars Using Deep Learning." Journal paper in Ophthalmology. ***Best Poster Award*** *at associated conference, American Academy of Ophthalmology* ***(AAO)*** 2020**.**
- Serhat Arslan, **Mo Tiwari**, Chris Piech. "Using Google Search Trends to Estimate Global Patterns in Learning." ACM Learning @ Scale ***(L@S)*** 2020.

PREPRINTS:

- **Mo Tiwari***, Colin Sullivan*, Sebastian Thrun. "MAPTree: Beating 'Optimal' Decision Trees with Bayesian Decision Trees." *arXiv.*
- **Mo Tiwari**, Ryan Kang*, Je-Yong Lee*, Luke Lee*, Chris Piech, Ilan Shomorony, Sebastian Thrun, Martin Zhang. "Faster Maximum Inner Product Search in High Dimensions." arXiv.
- **Mo Tiwari***, Colin Sullivan* Sebastian Thrun, Chris Piech. "Bayesian Decision Trees via Tractable Priors and Probabilistic Context-Free Grammars." arXiv.
- Ali Mohsen, **Mo Tiwari**. "Image Compression and Classification Using Qubits and Quantum Deep Learning." arXiv.
- Kausthubh D. Dhole, …, **Mo Tiwari**, …, Yue Zhang (122 authors). "NL-Augmenter: A Framework for Task-Sensitive Natural Language Augmentation." arXiv.

OPEN SOURCE CONTRIBUTIONS:

- **BanditPAM:** https://github.com/motiwari/BanditPAM. **Primary author, 600+ stars.**
  A high-performance Python package, written in C++, that implements the algorithm from our NeurIPS 2020 paper and is `pip`-installable via `pip install banditpam`.

TEACHING AND MENTORSHIP:

- ***Course Assistant for Client-Side Internet Technologies (CS 193C)*:** Graded assignments, provided feedback, and answered questions for over 100 students each quarter during the summers of 2020 and 2021. Recruited top students for research projects.
- **EDGE Mentor:** Mentored three early Ph.D. students in Computer Science at Stanford University through a formal, funded appointment.
- **Ph.D. Student Mentor:** Managed over a dozen undergraduate, M.S., and junior Ph.D. students at Stanford University. Upward reviews available upon request.

ADDITIONAL RESEARCH EXPERIENCE:

RESEARCHER – JOHN PRESKILL GROUP 2011 – 2012

- With Prof. John Preskill, Dr. Spiros Michalakis, Dr. Jeongwan Haah at Caltech, proved that a certain class of quantum systems would never function as a form of quantum storage, eliminating their viability in a quantum computer

RESEARCHER – LARGE HADRON COLLIDER (LHC) Summer 2010

- Analyzed the first data from the Compact Muon Solenoid (CMS) experiment at the LHC, where the Higgs Boson was later discovered
- Discovered and corrected experimental defects by analyzing Missing Transverse Energy to calibrate experimental setups
- Later received admission to the Ph.D. program in Physics at MIT to continue research on this experiment

RESEARCHER – YORKTOWN HIGH SCHOOL 2007 – 2009

- Developed an assistive aid to help patients with physical disabilities complete exercises
- Device led to an 80% increase in patients' exercise completion rate and a 34% decrease in recovery time
- Won third place in category internationally at Intel ISEF 2009

INVITED TALKS:

- **Highlights of Algorithms 2021 (HALG21) Conference**: "BanditPAM: Almost Linear Time *k*-Medoids Clustering via Multi-Armed Bandits."
- **U.S. Food and Drug Administration:** "An Introduction to Clustering, Multi-armed Bandits, and BanditPAM."

- **Twitch:** “Novel Data Augmentation, Multi-Armed Bandits, and more: New Machine Learning Techniques for Twitch Safety.”
- **C3.ai:** “*k*-medoids Clustering and Multimodal Data Augmentation.”
- **Facebook:** “ThreatExchange v2.8 Webinar.” Joint presentation. https://www.youtube.com/watch?v=SVVC4ZLYHmk
- **Microsoft Security Research Alliance:** “Tracking Advanced Persistent Threats with ThreatExchange.” Joint presentation.

ACADEMIC HONORS:

- Stanford Data Science Scholarship 2022 – 2024
  - 1 of 16 graduate student awardees, University-wide, in cohort
  - 1 of 71 awardees since award inception in 2018
- Stanford Center for Open and Reproducible Science Innovator Prize 2021
  - 1 of 2 University-wide inaugural awardees
- Stanford Interdisciplinary Graduate Fellowship (SIGF) 2020 – 2023
  - Full funding for the Ph.D. for 3 years
  - 1 of 33 graduate student awardees, University-wide, in cohort
  - 1 of 295 awardees since award inception in 2008
- J.P. Morgan AI Research Ph.D. Fellowship 2020
- Oak Ridge Institute for Science and Education (ORISE) Fellowship 2019 – Present
- UnifyID Fellow (Declined) 2018
- Pear VC Fellow 2017 – Present
- NSF Graduate Research Fellowship Program Honorable Mention 2013
- Caltech Summer Undergraduate Research Fellowship (SURF) 2011, 2012
- IBM T.J. Watson Memorial Scholarship 2009 – 2012
- Caltech - San Pietro Travel Prize Recipient 2011
- I. I. Rabi Scholarship 2009 – 2010
- Intel International Science and Engineering Fair (ISEF) - Third place 2009