

Aaron McMillan Fraenkel

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Experience

Halicioglu Data Science Institute, UCSD

TENURE TRACK ASSISTANT TEACHING PROFESSOR

- Chair, Data Science Program Committee (major/minor)

San Diego, CA

Aug. 2018 - PRESENT

Amazon.com

SENIOR MACHINE LEARNING SCIENTIST III

- Machine learning technical lead for bot detection.
- Model design and development for account takeover.
- Lead research initiatives and intern projects.

San Diego, CA

Nov. 2016 - Aug. 2018

ID Analytics / LifeLock

SENIOR DATA SCIENTIST

- Design and initial implementation of new consumer products (full stack).
- Develop, train, and maintain fraud models.
- Research projects: ML algorithm development and new technologies.

San Diego, CA

Sep. 2014 - Nov. 2016

Boston College

VISITING ASSISTANT PROFESSOR OF MATHEMATICS

Penn State University

CHOWLA RESEARCH ASSISTANT PROFESSOR

University of Mass, Boston

LECTURER (GRADUATE SCHOOL)

University of California, Berkeley

GRADUATE STUDENT INSTRUCTOR (GRADUATE SCHOOL)

Boston, MA

Aug. 2012 - Aug. 2014

State College, PA

Aug. 2011 - Aug. 2012

Boston, MA

Jan. 2011 - Jun. 2011

Berkeley, CA

Aug. 2004 - Aug. 2011

Education

University of California, Berkeley

PH.D. IN MATHEMATICS

- Dissertation: *On Embedding Singular Poisson Spaces*

Berkeley, CA

2011

University of California, Berkeley

B.S. IN MATHEMATICS

MIT

VISITING SCHOLAR

UPMC, Universite Paris VI

VISITING SCHOLAR

Berkeley, CA

2004

Cambridge, MA

2008

Paris, Fr

2009

Research

My research interests span applied machine learning across a variety of fields, particularly understanding the robustness of techniques applied to heterogeneous data-types without a natural choice of metric. I'm especially interested in exploring these concepts in profiling and understanding behaviors on the internet, in the areas of security and abusive conduct. I'm also active in Data Science pedagogy and course development. See the curriculum page of my website for details.

Teaching Activities

UCSD

AS AN ASSISTANT TEACHING PROFESSOR (* MEANS COURSE DEVELOPED FROM SCRATCH)

- Capstone Methodology: Data Science Software Development (WI2020, SP2020)*
- Capstone Seminar: Anomalies in Heterogeneous Graphs (WI2020, SP2020)*
- Capstone Seminar: Predictive Policing and Fair Policing (WI2020, SP2020)*
- Practice and Applications of Data Science (WI2019, SP2019, FA2019)*
- Teaching Methods in Data Science (WI2019, FA2019)
- Principles of Data Science (FA2018)
- Workshop in Data Science (FA2018)*

San Diego, CA

2018-PRESENT

Boston College

Chestnut Hill, MA

AS A VISITING ASSISTANT PROFESSOR

2012-2014

- Probability theory: an Introduction to Random Variables using R (S2013, F2013)
- Complex Analysis (F2012, S2013)
- Calculus I (F2012)
- Calculus II (F2013)
- Introduction to Abstract Mathematics (S2014)

Penn State University

State College, PA

AS A RESEARCH ASSISTANT PROFESSOR

2011-2012

- Multi-Variable Calculus (F2011, course coordinator)

University of Mass, Boston

Boston, MA

AS A LECTURER (GRADUATE STUDENT)

2011

- Calculus II, S2011

UC Berkeley

Berkeley, CA

AS A GRADUATE STUDENT INSTRUCTOR

2004-2010

- courses taught: Real Analysis (Su2010), Multi-Variable Calculus (Su2005)
- recitations led: Real Analysis, Linear Algebra, Calculus I,II, III

Mentoring & Advising

Undergraduate Research (Funded)

HDSI, UCSD

ADVISOR

2018-2019

- Non-parametric Graph Sampling
- **babypandas**: An Opinionated Pandas API for New Coders.
- Zillow ZTrax: Organizing and Querying Large Housing Data.
- Zillow ZTrax: Understanding Housing Transactions.
- Scaling the Estimation of the Rate of Recession of Glaciers.
- Data Compression via MMD.
- Reassessment of Credit Risk Modeling with Macroeconomic Factors.

Advising: Amazon Summer Intern Program

Amazon.com

ADVISOR

2017

- Developed summer project and mentored intern in machine learning.
- Project resulted in a production product / job offer.

Advising: Undergraduate Honors Projects

Penn State University

ADVISOR

2011-2012

- Undergraduate honors project ("Applications of gaussian curvature," Fall 2011).
- Undergraduate independent study ("Differential Topology," Spring 2012).

Honors & Awards

2012	Recipient , Recognized faculty for influencing students in their transition to college	Penn State
2010	Recipient , RTG NSF Graduate Student Fellowship	UC Berkeley
2009	Recipient , Outstanding Graduate Student Instructor Award	UC Berkeley
2004	Recipient , Percy Lionel Davis Award for Excellence in Scholarship in Mathematics	UC Berkeley

Publications & Preprints

2018	Bot Detection and Machine Learning , Amazon Machine Learning Conference (internal)
2013	Extensions of Poisson Structures on Singular Hypersurfaces , arXiv:1310.6083
2011	On Embedding Singular Poisson Spaces , arXiv:1108.2207

Presentation

June 2019	Lightning Talk: “Data8 meets Messy Data” , Data Science Pedagogy Workshop	UC Berkeley
Dec. 2018	Adversarial Machine Learning in Production , AI Seminar, CSE UCSD	UCSD
Apr. 2018	Assessing, Detecting, and Mitigating Bots in the Absence of Ground-Truth. , Special Lecture Series, CSE UCSD	UCSD
Dec. 2017	Machine Learning in Bot Detection , Amazon Machine Learning Lecture Series	San Francisco, CA
Apr. 2017	Bots and Account Takeover , Amazon Science Fair	Seattle, WA
Jul. 2013	20 years of the Poisson embedding problem , Symposium in honor of Alan Weinstein, Institute Henri Poincare	Paris, FR
Jul. 2013	The Poisson embedding problem , Geomtry Seminar, Instituto de Ciencias Matematicas	Madrid, ES
Oct. 2011	Embedding singular Poisson varieties , “Gone Fishing” Poisson Geometry Conference, Washington University	STL, MO
May. 2011	Embedding singular Poisson varieties , Northern California Symplectic Geometry Seminar	Stanford, CA
April. 2011	Embedding singular Poisson varieties , Department Colloquium, UMass Boston	Boston, MA
Oct. 2010	A Levi-type decomposition of singular Poisson varieties , Geometry and Physics Seminar, Penn State University	State College, PA

Committees

2019	Chair , Undergraduate Program	HDSI, UCSD
2019	Member , Committee on Diversity, Equity, and Inclusion (DEI)	HDSI, UCSD
2019	Member, Chair , HDSI Search Committee(s)	HDSI, UCSD
2018-2019	Advisor , Industry Advisor Program	HDSI, UCSD
2018	Member , M.S. Admission Committee	CSE, UCSD
2017	Reviewer, security and bot detection , Amazon Research Awards	Amazon.com
2017	Referee , Amazon Machine Learning Conference	Amazon.com

Skills

Programming Languages	Python, golang, bash, sql, Scala, R, javascript, \LaTeX
Systems	unix, osx, hdfs, aws
Machine Learning Algorithms	<ul style="list-style-type: none"> • trees: gradient boosted trees, random forest, isolation forest. • neural networks: autoencoders, graph-convolutional networks, lstm. • clustering: k-means, hierarchical, agglomerative, persistent homology. • adaptive: bandit algorithms.
Tools & Libraries	<ul style="list-style-type: none"> • ml libraries: spark-ml, scikit-learn, tensorflow, keras • productivity: emacs, git, jupyter, d3.js, react.js • hadoop: spark, hive, pig