

Alexander Rodríguez

Assistant Professor at the University of Michigan

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Research Interests

Machine Learning, AI for Public Health, Time Series, Uncertainty Quantification, Multi-agent Systems, Computational Epidemiology, AI for Science, AI for Social Impact

Education

Ph.D. in Computer Science <i>Georgia Institute of Technology</i> – Distinction: Georgia Tech CoC Outstanding Dissertation Award	August 2023 <i>Atlanta, GA</i>
M.S. in Data Science <i>University of Oklahoma</i>	May 2018 <i>Norman, OK</i>
B.S. in Mechatronics Engineering (Robotics) <i>National University of Engineering</i>	Dec. 2014 <i>Lima, Peru</i>

Appointments

Assistant Professor <i>University of Michigan</i> Division of Computer Science and Engineering – Faculty Affiliate, Michigan Institute for Data Science (MIDAS) – Faculty Affiliate, E-Health & Artificial Intelligence (e-HAIL)	Aug. 2023–Present <i>Ann Arbor, MI</i>
Research Affiliate <i>Mayo Clinic</i> Division of Epidemiology	Aug. 2023–Present <i>Rochester, MN</i>
Research Intern <i>Google Research, Health AI</i> Public & Environmental Health Group	Summer 2022 <i>Palo Alto, CA</i>
Machine Learning Intern <i>Walmart Labs</i> Machine Learning Ranking Group	Summer 2019, Summer 2020 <i>Sunnyvale, CA</i>

Publications

Note: * denotes equal contribution

Manuscripts in Submission.....

1. Z. Zhao, A. Rodríguez, and B.A. Prakash. Performative Time-Series Forecasting. arXiv:2310.06077
2. A. Rodríguez*, H. Kamarthi*, P. Agarwal, J. Ho, M. Patel, S. Sapre, and B.A. Prakash. Data-Centric Epidemic Forecasting: A Survey. arXiv:2207.09370
3. S. Mathis et al. [collaborative effort of the CDC's FluSight Project]. Evaluation of FluSight influenza forecasting in the 2021-22 and 2022-23 seasons with a new target laboratory-confirmed influenza hospitalizations. medRxiv

Highly Refereed Venues.....

4. A. Chopra, A. Rodríguez, B.A. Prakash, R. Raskar, T. Kingsley. Using Neural Networks to Calibrate Agent Based Models Enables Improved Regional Evidence for Vaccine Strategy and Policy. *Vaccine – Special Issue in ML-Driven Vaccine Development against Emerging Infections*. 2023.
5. H. Kamarthi, L. Kong, A. Rodríguez, C. Zhang, B.A. Prakash. When Rigidity Hurts: Soft Consistency Regularization for Probabilistic Hierarchical Time Series Forecasting. *Proceedings of the 29th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD)*. August 2023. Acceptance Rate (Research Track): 22%.
6. A. Chopra*, A. Rodríguez*, J. Subramanian, B. Krishnamurthy, B.A. Prakash, R. Raskar. Differentiable Agent-based Epidemiology. *Proceedings of the 22th International Conference on Autonomous Agents and MultiAgent Systems (AAMAS)*. May 2023. Acceptance Rate (Full Paper): 23.3%.
7. A. Rodríguez. AI & Multi-agent Systems for Data-centric Epidemic Forecasting. *Proceedings of the 22th International Conference on Autonomous Agents and MultiAgent Systems (AAMAS)*. May 2023. (Doctoral Consortium).
8. A. Rodríguez, J. Cui, N. Ramakrishnan, B. Adhikari, B.A. Prakash. EINNs: Epidemiologically-informed Neural Networks. *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*. February 2023 (Oral Presentation). Acceptance Rate: 19%.
9. A. Rodríguez, H. Kamarthi, B.A. Prakash. Epidemic Forecasting with a Data-Centric Lens. *Proceedings of the 28th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD)*. August 2022. (Lecture-style Tutorial)
10. A. Chopra*, A. Rodríguez*, J. Subramanian, B. Krishnamurthy, B.A. Prakash, R. Raskar. Differentiable Agent-based Epidemiological Modeling for End-to-end Learning. *ICML 2022 Workshop AI for Agent-Based Modelling (AI4ABM @ ICML)*. Oral presentation – **Best paper award**
11. H. Kamarthi, A. Rodríguez, B.A. Prakash. Back2Future: Leveraging Backfill Dynamics for Improving Real-time Predictions in Future. *International Conference on Learning Representations (ICLR)*. April 2022.
12. E. Cramer, et al. [collaborative effort of the CDC’s COVID-19 Forecast Hub]. Evaluation of individual and ensemble probabilistic forecasts of COVID-19 mortality in the US. *Proceedings of the National Academy of Sciences (PNAS)*. 2022. Impact Factor: 11.2. – **Our model DeepCOVID was ranked top 5 in the CDC COVID-19 Forecast Hub**
13. E. Cramer, et al. [collaborative effort of the COVID-19 Forecast Hub]. The United States COVID-19 Forecast Hub dataset. *Scientific Data*. 2022. Impact Factor: 6.4.
14. H. Kamarthi, L. Kong, A. Rodríguez, C. Zhang, B.A. Prakash. CAMul: Calibrated and Accurate Multi-view Time-Series Forecasting. *The ACM Web Conference 2022 (WebConf)*. April 2022. Acceptance Rate: 17%.
15. H. Kamarthi, L. Kong, A. Rodríguez, C. Zhang, B.A. Prakash. When in Doubt: Neural Non-Parametric Uncertainty Quantification for Epidemic Forecasting. *Neural Information Processing Systems (NeurIPS)*. December 2021. Acceptance Rate: 26%.
16. A. Rodríguez*, N. Muralidhar*, B. Adhikari, A. Tabassum, N. Ramakrishnan, B.A. Prakash. Steering a Historical Disease Forecasting Model Under a Pandemic: Case of Flu and COVID-19. *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*. February 2021. Acceptance Rate: 21%.
17. A. Rodríguez, A. Tabassum, J. Cui, Jiajia Xie, J. Ho, P. Agarwal, B. Adhikari, B.A. Prakash. DeepCOVID: An Operational DL-driven Framework for Explainable Real-time COVID-19 Forecasting. *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*. February 2021.
18. A. Rodríguez, B. Adhikari, A. González, C.D. Nicholson, A. Vullikanti, B.A. Prakash. Mapping Network States using Connectivity Queries. *IEEE International Conference on Big Data (Big Data)*, Atlanta, GA. December 2020 (Long paper). Acceptance Rate: 15.5%.

19. A. Rodríguez, B. Adhikari, A. González, C.D. Nicholson, A. Vullikanti, B.A. Prakash. Using Connectivity Queries to Map Network States. *NeurIPS Artificial Intelligence and Humanitarian and Disaster Relief (AI + HADR @ NeurIPS) Workshop*. December 2020.
20. A. Rodríguez*, N. Muralidhar*, B. Adhikari, A. Tabassum, N. Ramakrishnan, B.A. Prakash. Steering a Historical Disease Forecasting Model Under a Pandemic: Case of Flu and COVID-19. *NeurIPS Machine Learning in Public Health (MLPH @ NeurIPS) Workshop*. December 2020.
21. S.E. Amiri, B. Adhikari, J. Wenskovitch, A. Rodríguez, M. Dowling, C. North, B.A. Prakash. NetReAct: Interactive Learning for Network Summarization. *NeurIPS Human And Machine in-the-Loop Evaluation and Learning Strategies (HAMLETS @ NeurIPS) Workshop*. December 2020.
22. A. Rodríguez, B. Adhikari, N. Ramakrishnan, B.A. Prakash. Incorporating Expert Guidance in Epidemic Forecasting. *KDD Epidemiology meets Data Mining and Knowledge Discovery (epiDAMIK @ KDD) Workshop, San Diego, CA*. August 2020.
23. C.D. Nicholson and A. Rodríguez. A Hybrid Machine Learning Approach to the Stochastic Network Design Problem For Mitigation Strategies. *2018 INFORMS Annual Meeting, Phoenix, AZ*. November 2018.
24. A. Rodríguez and C.D. Nicholson. A Data-based Paradigm for Mitigation Decision-Making in Critical Infrastructure. *IISE Annual Conference & Expo 2018, Orlando, FL*. May 2018.
25. A. Khosrojerdi, J. Allen, F. Mistree, and A. Rodríguez. Sustainable Design of Plug-in Hybrid Electric Vehicle Charging Stations Considering Service Level. *2014 INFORMS Annual Meeting, San Francisco, CA*. November 2014.

Thesis.....

26. A. Rodríguez. Artificial Intelligence for Data-centric Surveillance and Forecasting of Epidemics. *Ph.D. Thesis, Georgia Institute of Technology, 2023*.
27. A. Rodríguez. Data-based Stochastic Network Mitigation. *M.S. Thesis, University of Oklahoma, 2018*.

Honors and Awards

1. **Outstanding Doctoral Dissertation Award** 2024
Georgia Tech College of Computing [cc.gatech.edu]
2. **AAAI-23 Travel Scholarship** 2023
Awarded \$500.
3. **Rising Star in ML & AI** 2022
One of the 17 PhD students and postdocs selected by the University of Southern California (USC).
4. **Best Paper Award** 2022
AI4ABM workshop @ ICML 2022 [ai4abm.org/workshop_icml2022]
5. **Selected Participant to the Heidelberg Laureate Forum** [heidelberg-laureate-forum.org] 2022
One of the 200 young researchers worldwide selected to meet with laureates in CS and mathematics.
6. **ACM SIGKDD Travel Award** 2022
Awarded \$800.
7. **Rising Star in Data Science** [datascience.uchicago.edu/rising-stars] 2021
One of the 30 PhD students and postdocs selected by the University of Chicago Data Science Institute.
8. **1st Place at the COVID-19 Symptom Data Challenge** [symptomchallenge.org] 2020
Out of 35 teams (115 participants, 10+ countries). Organized by Catalyst Health, Facebook and CMU. Awarded \$50000.
9. **2nd Place at the C3.ai COVID-19 Grand Challenge** [c3.ai/c3-ai-covid-19-grand-challenge] 2020
Among data science teams with 700+ participants from 40+ countries. Awarded \$25000.

10. **ACM SIGKDD Travel Award** 2020
11. **Richard Tapia Travel Award - IBM Scholar** 2019
12. **Broadening Participation in Data Mining (BPDm) Scholarship** 2016
Workshop co-located with the KDD conference. Awarded \$650.
13. **Honored by the Congress of the Republic of Peru [media]** 2015
Commission for science and technology. In recognition to winning an international academic competition.
14. **1st Place at the ASME Old Guard Oral Presentation Competition** 2014
Hosted for Latin America by the American Society of Mechanical Engineers (ASME). Awarded \$500.
15. **Peru LNG Scholarship [media]** 2013
Awarded \$13000 to study at The University of Oklahoma as an exchange student for one year.
16. **Dean's list for Mechatronics Engineering at National University of Engineering** 2013
17. **Designated as President of the Artificial Intelligence Student Research Group GISCIA** 2013
Selected based on my active involvement in research.
18. **4th place in the National University of Engineering Entrance Exam** 2009
Best engineering school in Peru (< 10% acceptance rate).

Community Activities

Tutorials.....

1. AI for Data-centric Epidemic Forecasting. *Tutorial at AAAI (Half-day), February 2023.* [materials]
2. Data-centric Epidemic Forecasting. *Tutorial at KDD (Lecture-style), August 2022.* [materials]
3. Data-driven Computational Methods for Disease Forecasting for Researchers and Practitioners. *Invited Tutorial Session by Forecasting for Social Good Research Network, Cardiff University. November 2021.* [materials][video]

Talks and Panels.....

1. Epidemic Forecasting with a Data-Centric Lens. *Invited Keynote Speaker at the NeurIPS LatinX in AI Research Workshop, December 2023.*
2. Slow Science Panel. *Invited Panelist at the NeurIPS New In ML Workshop, December 2023.*
3. Personalizing Population Health through Machine Learning. *Invited Talk at the University of Michigan e-HAIL Seminar, December 2023.*
4. Bridging AI, Data, and Epidemiological Models. *Invited Talk at the University of Michigan AI Seminar, November 2023.*
5. AI for Public Health: Epidemic Forecasting Through a Data-Centric Lens. *Invited Talk at the University of Michigan AI Symposium, October 2023.*
6. Faculty Panel on Graduate Studies. *Panelist at Explore Grad Studies in CSE Workshop, University of Michigan, September 2023.*
7. Unlocking the Benefits of AI for Small Businesses. *Invited Speaker at the Latin American Association ACCIONA Business Center, June 2023.*
8. Differentiable Agent-based Modeling for Epidemiology. *Invited Talk at the University of Virginia Biocomplexity Institute (Anil Vullikanti's lab), May 2023.*
9. ML for Epidemic Forecasting. *Invited Talk at the MIT Media Lab, Camera Culture (Ramesh Raskar's lab), January 2023.*
10. AI for Data-centric Surveillance and Forecasting of Epidemics. *Invited Talk at the University of Southern California, Symposium Frontiers of Machine Learning and Artificial Intelligence, November 2022.*

11. Data and AI for Public Health: Frameworks for Data-Centric Epidemic Forecasting. *Invited Talk at Google Health AI, June 2022.*
12. Deep Learning Frameworks for Epidemic Forecasting. *Rising Stars in Data Science Workshop, University of Chicago Data Science Institute (DSI), November 2021.*
13. AI/ML for Pandemic Response. *Invited Talk at PathCheck Global Health Innovators Talk Series, May 2021.* [video]
14. Life During Grad School. *Invited Panelist at ExploreCSR @ University of Rhode Island, April 2021.* [link]
15. DeepOutbreak: A Deep Learning Framework for Improved Situational Awareness of the Spread of COVID-19 and Flu. *COVID-19 Symptom Data Challenge Winners Showcase, December 2020.* [video]
16. 5 Minutes of Fame: Student Researchers. *Invited Panelist at Techsuyo 2020, October 2020.* [video]
17. COVID-19 Forecasting with Deep Learning. *Speaker at the CDC/MIDAS COVID Forecasting Meeting, August 2020.*

Funding

1. US Department of Health and Human Services, Centers for Disease Control and Prevention. *Michigan-Public Health Integrated Center for Outbreak Analytics and Modeling.* Duration: 2023-2028.

Teaching

University of Michigan: EECS 492 Introduction to Artificial Intelligence (Fall 2023, Winter 2024).

Georgia Tech: Guest lecturer in CSE 8803 Data Science for Epidemiology.

Virginia Tech: TA in CS 5834 Urban Computing; CS 5757 Information Visualization; CS 2114 Data Structures.

University of Oklahoma: TA & guest lecturer in DSA 5103 Intelligent Data Analytics.

Service

Academic.....

Program Committee Chair and Co-organizer

epiDAMIK Workshop @ KDD [epidamik.github.io] 2021–2024
 Leading workshop in data science for epidemiology and public health

Conference Program Committee Member

NeurIPS, AAAI, ICLR, WebConf, IJCAI, ICML, UAI, BigData, ASONAM Multiple

Workshop Program Committee Member

AI4ABM @ ICLR 2023, SpatialEpi @ SIGSPATIAL 2023 Multiple

Reviewer

Mason IDIA Predoctoral Fellowship June 2023

Journal Reviewer

PLOS Digital Health, Sustainable and Resilient Infrastructure, Epidemics Multiple

Public Relations and Technical Support

PREVENT Symposium (NSF funded) [prevent-symposium.org] 2021
 National Symposium on Predicting Emergence of Virulent Entities by Novel Technologies

Co-organizer (Fundraising Committee)

BPDM Workshop @ KDD [site.dataminingshop.com]

2017, 2018

Data science workshop co-located with KDD for underrepresented minorities. To fund the travel costs of participants, I built partnerships with large technology companies.

President

Artificial Intelligence & Control Systems Student Group [giscia.github.io]

2013

Organized workshops and talks introducing artificial intelligence to undergraduates.

Outreach and Social.....

Mentor

Explore CS Research [girlsendcoded.eecs.umich.edu]

Sep. 2023–April 2024

Research mentorship for two University of Michigan undergraduate students.

Datathon Judge

Hacklytics 2022 [hacklytics.io]

Feb. 2022

Data science hackathon organized by Data Science at Georgia Tech.

Mentor, Computer Science

Research Experience for Peruvian Undergraduates (REPU) [repuprogram.org]

Sept. 2020–April 2021

Mentored a prospective graduate student in CS to complete a small research project.

Mentor

Sisay Mentoring [sisay-mentores.org]

Oct. 2017–March 2018

Mentored exceptional undergraduate students from Peru to start a career as researchers.

Technical Leader

DataKind San Francisco–Bay Area [datakind.org/chapters/datakind-sf]

Dec. 2016–Jul. 2017

Led data visualization efforts to develop an ecology analytics system for Conservation International.

Project Manager

Project Management Chapter at National University of Engineering [facebook.com/ProyectaUNI]

2011–2014

Led teams of ~10 people on two projects: (1) a Christmas charity event for children in need, and (2) a project management training cost-free course for undergraduate students.

Mentoring

- Ruipu Li (CS MS student at University of Michigan). Fall 2023–Present.
- Hersh Vora (CS BS student at University of Michigan). Fall 2023–Present.
- Mehmed Uludag (CS BS student at University of Michigan). Winter 2023–Present.
- Zhi Cao (CS BS student at University of Michigan). Winter 2023–Present.
- Zhiyuan Zhao (CS PhD student at Georgia Tech). Fall 2022–Fall 2023.
- Rishi Raman (CS BS student at Georgia Tech). Summer 2022–Spring 2023.
- Srikar Balusu (CS BS student at Georgia Tech). Spring 2022–Spring 2023.
- Gautham Gururajan (CS MS student at Georgia Tech). Fall 2021–Spring 2022.
- Suchet Sapre (CS BS student at Georgia Tech). Fall 2021.
- Mira Patel (AE BS student at Georgia Tech). Summer 2021.
- Juan Carlos Barbaran-Meza (visiting student at Georgia Tech). Fall 2020–Spring 2021. Now: ML engineer at Ferreyros.
- Pulak Agarwal (CS BS student at Georgia Tech). Summer 2020–Fall 2022. Now: software engineer at Amazon.
- Javen Ho (ECE BS student at Georgia Tech). Summer 2020–Spring 2021.

Last update: March 2024