

Dina Mistry

NETWORK SCIENTIST · DATA SCIENTIST · INFECTIOUS DISEASE MODELER

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Summary

I am a data scientist with an interdisciplinary background in physics, network science, and infectious disease epidemiology. I have 9 years of experience modeling real world complex systems, contagion phenomena, and human contact networks through data driven methods. My interests lie in developing quantitative methods and tools for data-driven solutions for teams working on customer facing problems and public health issues. I am also committed to diversifying science and have co-founded Diversify NetSci, an annual international meeting to push for diversity, equity, and inclusion in the field of Network Science.

Skills & Expertise

Programming Python, C++, R, SQL, MATLAB, Google BigQuery, Presto
Visualization Matplotlib, d3, Gephi, DataStudio, Looker, Photoshop, Illustrator
Software LaTeX, Git, Linux, MacOS, Microsoft Office

Education

Ph.D. in Physics Boston, MA
NORTHEASTERN UNIVERSITY 01/01/2014 - 01/14/2019
Dissertation on The Heterogeneous Nature of Contagion Phenomena in Complex Networks, *Advisor: Prof. Alessandro Vespignani*

M.Sc. in Physics Boston, MA
NORTHEASTERN UNIVERSITY 09/04/2012 - 01/01/2014

Hon. B.Sc. in Physics & Astronomy, Minor in Mathematics with High Distinction Toronto, Canada
UNIVERSITY OF TORONTO 09/10/2007 - 06/12/2012
Undergraduate Thesis: The Axisymmetric Geometry of Saturn's Magnetic Fields, *Advisor: Prof. Sabine Stanley*

Experience

Twitter Seattle, WA / New York, NY
DATA SCIENTIST II, HOME EXPERIENCE 06/01/2021 - PRESENT

- Lead data scientist working on Identities & Profiles and Home End to End Performance
- Collaborating in cross-functional teams with Product Strategy, Engineering, Trust & Safety, and Data Science
- Supporting cross-functional teams with metric development, opportunity sizing, and analysis on metric trade-off to make product decisions
- Delivering insights on the impact of the Verified Badge in different global markets using network science and causal inference
- Driving analysis into metric coverage and development for the Profile surface to evaluate new features and layouts
- Collaborating to build data quality frameworks, data pipelines, and analytical models using Python and the Google Cloud Platform
- Designing dashboards in Data Studio for reporting and tracking of key performance indicators
- Creating Looker dashboarding tools to help product managers and engineers self service on user data on the Profile surface
- Building data science strategy roadmaps and causal measurement plans for multiple teams to report on shipped product changes
- Creating strategies in cross functional teams to improve transparency and help Twitter users understand who they see online
- Designing large scale online A/B experiments to test new user features and changes to the user interface
- Developing an experimentation playbook to train cross-functional partners in online experimentation, hypothesis testing, & statistical analysis

Institute for Disease Modeling, at the Bill & Melinda Gates Foundation (formerly part of Intellectual Ventures) Seattle, WA

POSTDOCTORAL RESEARCH SCIENTIST , NETWORK EPIDEMIOLOGY AND PANDEMICS 02/04/2019 - 05/31/2021

- Collaborating to model strategies and tradeoffs for school reopening in Washington state and global settings during the COVID-19 pandemic
- Leading modeling of health information campaign strategies to promote mask wearing and social distancing in Dakar, Senegal during COVID-19
- Presenting analysis and modeling methodologies developed as part of the COVID-19 research team at online international conferences
- Engaging with local and state public health officials to develop models and analyses to inform ongoing pandemic control strategies
- Developing an open-source Python package to model testing, tracing, and other interventions for disease transmission in contact networks
- Lead researcher, developer, and maintainer of an open-source Python library to generate diverse data-driven human contact networks for research on public health
- Modeling the role of social trust and the long standing effects of memory of disease risk in acceptance of health (mis)information
- Co-authored academic publications and executive reports on COVID-19 transmission dynamics and evaluation of mitigation strategies
- Collaborating in cross functional teams to develop open source tools for public health research

- Lead developer of adaptive algorithms to generate synthetic contact networks using census and survey data from large diverse countries
- Integrated synthetic contact networks into infectious disease models to describe patterns of human interaction
- Supervised 4 graduate students developing their own algorithms to generate synthetic contact networks
- Implemented MCMC methods and mathematical simulations to infer model parameters and validate against serological data
- Maintenance of a database of synthetic populations for 300 locations worldwide

H1N1 PANDEMIC SCENARIO ANALYSIS

01/04/2015 - 01/23/2019

- Characterized global epidemic spreading patterns across different scenarios
- Analyzed micro-simulations and commercial airline network data using statistical mechanics, network science, and machine learning

SPREADING OF ZIKA VIRUS IN THE AMERICAS (WWW.ZIKA-MODEL.ORG)

01/03/2016 - 05/28/2017

- Developed a stochastic data-driven vector-borne model of the 2016 Zika outbreak in real-time; collaborating with international research groups
- Aided in streamlined analysis pipeline of simulation forecasts for time sensitive reports shared with public health agencies
- Collected, processed, and analyzed daily epidemiological case report data from 40 Pan-American countries for model calibration

COMMITTED ACTIVISTS AND THE RESHAPING OF STATUS-QUO SOCIAL CONSENSUS

05/01/2013 - 10/22/2015

- Developed agent based models of negotiation on conventions and opinion adoption in temporal social networks
- Explored campaign strategies to reduce the time and critical mass needed to drive populations towards consensus

Select Publications

SynthPops: A Generative Model of Synthetic Contact Networks.**D. Mistry**, C. C. Kerr, M. Wu, M. Fisher, R. G. Abey Suriya, A. Thompson, L. A. Skrip, J. A. Cohen, D. J. Klein, and B. M. Althouse. *In preparation.***Python vs. the pandemic: a case study in high-stakes software development.**C. C. Kerr, R. M. Stuart, **D. Mistry**, R. G. Abey Suriya, J. A. Cohen, L. George, M. Jastrzebski, M. Famulare, E. Wenger, D. J. Klein. *SciPy 2022*. 2022. <https://conference.scipy.org/proceedings/scipy2022/pdfs/cliff-kerr.pdf>**Preventing a cluster from becoming a new wave in settings with zero community COVID-19 cases.**R. G. Abey Suriya, D. Delpont, R. M. Stuart, R. Sacks-Davis, C. C. Kerr, **D. Mistry**, D. J. Klein, M. Hellard, and N. Scott. *BMC Infect. Dis.* 22. 1. 1-15. 2022. <https://doi.org/10.1186/s12879-022-07180-1>**Inferring high-resolution human mixing patterns for disease modeling.****D. Mistry**, M. Litvinova, A. Pastore y Piontti, M. Chinazzi, L. Fumanelli, M. F. C. Gomes, S. A. Haque, Q. Liu, K. Mu, X. Xiong, M. E. Halloran, I. M. Longini, S. Merler, M. Ajelli, A. Vespignani. *Nat. Commun.* 12. 323. 2021. <https://doi.org/10.1038/s41467-020-20544-y>**Controlling SARS-CoV-2 via test-trace-quarantine.**C. C. Kerr, **D. Mistry**^{*}, R. M. Stuart^{*}, K. Rosenfeld, G. R. Hart, P. Selvaraj, R. C. Núñez, J. A. Cohen, R. G. Abey Suriya, L. George, B. Hagedorn, M. Jastrzebski, M. Fagalde, J. Duchin, M. Famulare, and D. J. Klein. *Nat. Commun.* 12. 2993. 1-12. 2021. <https://doi.org/10.1038/s41467-021-23276-9>**Estimating and mitigating the risk of COVID-19 epidemic rebound associated with reopening of international borders in Vietnam: a modelling study**Q. D. Pham, R. M. Stuart, T. V. Nyugen, Q. C. Luong, D. Q. Tran, T. Q. Pham, L. T. Phan, T. Q. Dang, D. N. Tran, H. T. Do, **D. Mistry**, D. J. Klein, R. G. Abey Suriya, A. P. Oron, and C. C. Kerr. *Lancet Glob Health.* 9. 7. 916-924. 2021. [https://doi.org/10.1016/S2214-109X\(21\)00103-0](https://doi.org/10.1016/S2214-109X(21)00103-0)**Stepping Back to School: A step-by-step look at COVID introduction, spread, and exportation**D. J. Klein., C. C. Kerr, **D. Mistry**, E. Wenger, J. A. Cohen. 2021. Report on Infohub**Role of masks, testing and contact tracing in preventing COVID-19 resurgences: a case study from New South Wales, Australia**R. M. Stuart, R. G. Abey Suriya, C. C. Kerr, **D. Mistry**, D. J. Klein, R. T. Gray, M. Hellard, N. Scott. *BMJ Open* 11. 4. e045941. 2021. <http://dx.doi.org/10.1136/bmjopen-2020-045941>**Seeding COVID-19 across sub-Saharan Africa: an analysis of reported importation events across 40 countries.**L. A. Skrip, P. Selvaraj, B. Hagedorn, A. L. Ouédraogo, N. Noori, **D. Mistry**, J. Bedson, L. Hébert-Dufresne, S. V. Scarpino, B. M. Althouse. *Am J Trop Med Hyg.* 104. 5. 2021. <https://doi.org/10.4269/ajtmh.20-1502>**Covasim: an agent-based model of COVID-19 dynamics and interventions.**C. C. Kerr, R. M. Stuart^{*}, **D. Mistry**^{*}, R. G. Abey Suriya, G. R. Hart, K. Rosenfeld, P. Selvaraj, R. C. Núñez, B. Hagedorn, L. George, A. Izzo, A. Palmer, D. Delpont, C. Bennette, B. Wagner, S. Chang, J. A. Cohen, J. Panovska-Griffiths, M. Jastrzebski, A. P. Oron, E. Wenger, M. Famulare, D. J. Klein. *PLoS Comput. Biol.* 17. 7. 2021. <https://doi.org/10.1371/journal.pcbi.1009149>**Schools are not islands: Balancing COVID-19 risk and educational benefits using structural and temporal countermeasures**J. A. Cohen, **D. Mistry**, C. C. Kerr, and D. J. Klein. 2020. *Manuscript under review.* Report on medRxiv

Modelling the impact of reducing control measures on the COVID-19 pandemic in a low transmission setting

N. Scott, A. Palmer, D. Delpont, R. Abeyesuriya, R. M. Stuart, C. C. Kerr, **D. Mistry**, D. J. Klein, R. Sacks-Davis, K. Heath, S. W. Hainsworth, A. Pedrana, M. Stooze, D. Wilson, M. E. Hellard. *Med J Aust.* Online 2020 <https://doi.org/10.5694/mja2.50845>

Determining the optimal strategy for reopening schools, work and society in the UK: balancing earlier opening and the impact of test and trace strategies with the risk of occurrence of a secondary COVID-19 pandemic wave.

J. Panovska-Griffiths, C. C. Kerr, R. M. Stuart, **D. Mistry**, D. J. Klein, R. M. Viner, C. Bonell. *Lancet Child Adolesc Health.* 2020. [https://doi.org/10.1016/S2352-4642\(20\)30250-9](https://doi.org/10.1016/S2352-4642(20)30250-9)

Spread of infectious disease and social awareness as parasitic contagions on clustered networks.

L. Hébert-Dufresne, **D. Mistry**, B. M. Althouse. *Phys. Rev. Res.* 2. 3. 2020. <https://link.aps.org/doi/10.1103/PhysRevResearch.2.033306>

Quantifying the risk of Zika virus local transmission in the continental US during the 2015-2016 ZIKV epidemic.

K. Sun, Q. Zhang, A. Pastore-Piontti, M. Chinazzi, **D. Mistry**, N. E. Dean, D. P. Rojas, S. Merler, P. Poletti, L. Rossi, M. E. Halloran, I. M. Longini, A. Vespignani. *BioMed Central Medicine.* 16. 1. 195. 2018. <https://doi.org/10.1186/s12916-018-1185-5>

Spreading of Zika virus in the Americas.

Q. Zhang, K. Sun, M. Chinazzi, A. Pastore-Piontti, N. E. Dean, D. P. Rojas, S. Merler, **D. Mistry**, P. Poletti, L. Rossi, M. Bray, M. E. Halloran, I. M. Longini, A. Vespignani. *Proceedings of the National Academy of Sciences.* 114. 22. E4334-E4343. 2017. <https://doi.org/10.1073/pnas.1620161114>

Committed activists and the reshaping of status-quo social consensus.

D. Mistry, Q. Zhang, N. Perra, A. Baronchelli. *Phys. Rev. E.* 92. 042805. 2015. <https://doi.org/10.1103/PhysRevE.92.042805>

Select Presentations

NSF PREPARE Workshop: Social, Behavioral, Economic and Governance

NETWORKS ALL AROUND: SOCIAL CONTACT PATTERNS AND WHAT THEY CAN TELL US ABOUT COVID-19 CONTROL AND INTERVENTIONS

Virtual

06/25/2021

Center for Statistics and Quantitative Infectious Diseases, Fred Hutch Cancer Research Center & University of Florida

NETWORK EPIDEMIOLOGY & COVID-19

Virtual

05/05/2021

COVID Modeling Panel, National Institute of Statistical Sciences

COVASIM: AN OPEN SOURCE AGENT-BASED MODEL OF COVID-19 TRANSMISSION AND CONTROL

Virtual

12/16/2020

Modelling the spread and impact of COVID-19, Graz Schumpeter Centre

COVASIM: AN OPEN SOURCE AGENT-BASED MODEL OF COVID-19 TRANSMISSION AND CONTROL

Virtual

12/10/2020

Women in Network Science Seminar, University of Washington

NETWORK EPIDEMIOLOGY AND COVID-19

Virtual

RECORDING: [HTTPS://YOUTU.BE/D00J7T5AKPU](https://youtu.be/D00J7T5AKPU)

12/09/2020

Data and Methods Brown Bag, University of Washington

SYNTHPOPS: SOCIAL CONTACT NETWORK MODELING FOR THE COVID-19 PANDEMIC

Virtual

11/18/2020

Institute for Pure and Applied Mathematics (IPAM)

PANELIST, MATHEMATICAL MODELS IN UNDERSTANDING COVID-19: SCIENCE COMMUNICATION

Virtual

08/13/2020

International Conference on Complex Networks

A DATA-DRIVEN APPROACH TO INFER SOCIAL CONTACT NETWORKS IN INFECTIOUS DISEASE MODELING

Boston, MA

03/05/2018

Conference on Complex Systems

THE INFLUENCE OF CULTURAL AND SOCIETAL DIVERSITY ON EPIDEMIC SPREADING

Cancun, Mexico

09/19/2017

Open Source Software

Core Developer

SYNTHPOPS: PYTHON, PYPI | [HTTP://SYNTHPOPS.ORG/](http://synthpops.org/)

03/09/2020 - Present

Developer

COVASIM: PYTHON, PYPI | [HTTPS://COVASIM.ORG](https://covasim.org)

03/15/2020 - Present

Select Service & Leadership

2022	Program Committee , SIAM Workshop on Network Science	(Online)
2022	Co-Chair , Diversify Netsci, NetSci	(Online) Shanghai, China
2021	Parallel Session Chair , Networks 2021	(Online)
2020	Panel Moderator: Decolonizing Global Health , IDM Diversity, Equity, & Inclusion Committee	(Online) Seattle, WA
2020	Co-Chair , Diversify Netsci, NetSci	(Online) Rome, Italy
2020	Co-Organizer , The Confusions of a Young Scientist, NetSci 2020	(Virtual) Rome, Italy
2019	Co-Organizer , Inaugural Diversify NetSci, NetSci 2019	Burlington, VT
2018	Program Committee, Art of Networks reception and Society of Young Network Scientists (SYNS) pre-conference event organizer , International Conference on Complex Networks	Boston, MA
2019-2022	Chair , Society for Young Network Scientists (SYNS)	International
2017	Professional Development Workshop Organizer , Dept. of Physics, Northeastern University	Boston, MA
2014-2016	Physics Graduate Student Representative , Northeastern University	Boston, MA
2011-2012	Vice President of Academic Affairs , Physics & Astronomy Student Union, University of Toronto	Toronto, Canada

Awards & Honors

2014 - 2018	Graduate Research Assistantship Award , Department of Physics, Northeastern University	Boston, MA
2015	Summer Institute in Statistics and Modeling in Infectious Diseases Scholarship , 7th Annual Summer Institute, University of Washington	Seattle, WA
2012-2014	Teaching Assistantship Award , Dept. of Physics, Northeastern University	Boston, MA
2012	Marie Skłodowska-Curie Association Undergraduate Scholarship , for academic excellence in Physics, University of Toronto	Toronto, Canada
2012	Anna & Alex Beverly Memorial Fellowship , for future graduate studies, University of Toronto	Toronto, Canada
2008-2012	Dean's List of Scholars , Faculty of Arts & Science, University of Toronto	Toronto, Canada
2011	Undergraduate Summer Reward Award , highly competitive award from the Natural Sciences & Engineering Research Council of Canada, University of Toronto	Toronto, Canada
2007	Top Scholar's Scholarship , Faculty of Arts & Science, University of Toronto	Toronto, Canada
2007	President's Entrance Scholarship , Faculty of Arts & Science, University of Toronto	Toronto, Canada