

SRINIVASAN VENKATRAMANAN

CONTACT INFO

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Research Interests

Areas: Computational modeling & simulation, Data analytics, Network science, Stochastic processes, Optimization;
Domains: Network epidemiology, Infectious disease forecasting, Human mobility modeling, Invasive species;

Education

2008-2014	Indian Institute of Science	Ph.D. (ECE)
2004-2008	College of Engineering Guindy, Anna University	B.E. (ECE)

Professional Experience

2018 - now	Biocomplexity Institute & Initiative, University of Virginia	Research Scientist
2017-2018	Biocomplexity Institute, Virginia Tech	Computational Health Data Scientist
2015-2017	Biocomplexity Institute, Virginia Tech	Postdoctoral Associate
2014 (May-Nov)	Department of Info. Engg., Chinese Univ. of Hong Kong	Research Assistant
2007 (May-Aug)	Bell Research Labs India	Student Intern

Journal articles

1. **SV**, A. Sadilek, A. Fadikar, C. L. Barrett, M. Biggerstaff, J. Chen, X. Dotiwalla, P. Eastham, B. Gipson, D. Higdon, O. Kucuktunc, A. Lieber, B. L. Lewis, Z. Reynolds, A. Vullikanti, L. Wang, M. Marathe, “*Forecasting influenza activity using machine-learned mobility map*”, accepted to appear in Nature Communications (2020)
2. A.S. Poudel, B.B. Shrestha, M.D. Joshi, R. Muniappan, A. Adiga, **SV**, and P.K. Jha, “*Predicting the current and future potential distribution of an invasive weed *Ageratina adenophora* in Chitwan-Annapurna Landscape, Nepal*”, Mountain Research and Development, 2020
3. A. Adiga, D. Dubhashi, B. Lewis, M. Marathe, **SV**, A. Vullikanti, “*Mathematical Models for COVID-19 Pandemic: A Comparative Analysis*”, Journal of the Indian Institute of Science 100, 793-807 (2020)
4. A. Adiga, J. Chen, M. Marathe, H. Mortveit, **SV**, A. Vullikanti, “*Data-Driven Modeling for Different Stages of Pandemic Response*”, Journal of the Indian Institute of Science 100, 901-915 (2020)
5. J. Chen, A. Vullikanti, S. Hoops, H. Mortveit, B. Lewis, **SV**, W. You, S. Eubank, M. Marathe, C. Barrett, and A. Marathe, “*Medical Costs of Keeping the US Economy Open During COVID-19*”, Scientific reports 10.1 (2020): 1-10
6. P. Sambaturu, P. Bhattacharya, J. Chen, B. Lewis, M. Marathe, **SV**, and A. Vullikanti, “*An automated approach for finding spatio-temporal patterns in disease spread*”, JMIR Public Health Surveill 2020;6(3):e12842
7. S. Eubank, I. Eckstrand, B. Lewis, **SV**, M. Marathe, and C. Barrett, “*Commentary on Ferguson, et al., “Impact of Non-pharmaceutical Interventions (NPIs) to Reduce COVID-19 Mortality and Healthcare Demand”*”, Bulletin of Mathematical Biology 82.4 (2020): 1-7
8. P. Telionis, **SV**, P. Corbett, and B. Lewis, “*Methods for Rapid Mobility Estimation to Support Outbreak Response*”, Health security 18.1 (2020): 1-15
9. **SV**, J. Chen, A. Fadikar, S. Gupta, D. Higdon, B. Lewis, M. Marathe, H. Mortveit, and A. Vullikanti, “*Optimizing spatial allocation of seasonal influenza vaccine under temporal constraints*”, PLOS Computational Biology 15.9 (2019): e1007111
10. **SV**, S. Wu, B. Shi, A. Marathe, M. Marathe, S. Eubank, L. Sah, A.P. Giri, L. Colavito, Nitin S, Sridhar V, Asokan R, R. Muniappan, G. Norton, and A. Adiga, “*Modeling commodity flow in the context of invasive species spread: Study of *Tuta absoluta* in Nepal.*”, Crop Protection 135 (2020): 104736
11. A. Fadikar, D. Higdon, J. Chen, B. Lewis, **SV**, and M. Marathe, “*Calibrating a Stochastic, Agent-Based Model Using Quantile-Based Emulation.*”, SIAM/ASA Journal on Uncertainty Quantification 6, no. 4 (2018): 1685-1706

12. Q. F. Ying, D. M. Chiu, **SV**, and X. Zhang, “User modeling and usage profiling based on temporal posting behavior in OSNs.”, *Online Social Networks and Media* 8 (2018): 32-41
13. W. Yan, **SV**, and D. M. Chiu, “A Population Model for Academia: Case Study of the Computer Science Community using DBLP Bibliography 1960-2016.”, *IEEE Transactions on Emerging Topics in Computing*, 2018
14. **SV**, B. Lewis, J. Chen, D. Higdon, A. Vullikanti, M. Marathe, “Using data-driven agent-based models for forecasting emerging infectious diseases”, *Epidemics* 22 (2018): 43-49
15. F. S. Tabataba, P. Chakraborty, N. Ramakrishnan, **SV**, J. Chen, B. Lewis, and M. Marathe, “A Framework for Evaluating Epidemic Forecasts”, *BMC Infectious Diseases* 17.1 (2017): 345
16. W. Yan, **SV**, and D. M. Chiu, “Research collaboration and topic trends in Computer Science based on top active authors.”, *PeerJ Computer Science* 2 (2016): e41
17. **SV** and A. Kumar, “Co-Evolution of Content Spread and Popularity in Mobile Opportunistic Networks.”, *IEEE Transactions on Mobile Computing* 13.11 (2014): 2498-2509

Conference and Workshop papers

1. L. Wang, A. Adiga, **SV**, J. Chen, B. Lewis, and M. Marathe, “Examining Deep Learning Models with Multiple Data Sources for COVID-19 Forecasting”, *IEEE BigData Workshop on Data Science in Medicine and Healthcare (DSMH)*, 2020
2. A. S. Peddireddy, D. Xie, P. Patil, M. Wilson, D. Machi, **SV**, B. Klahn, P. Porebski, P. Bhattacharya, S. Dumbre, E. Raymond, and M. Marathe, “From 5Vs to 6Cs: Operationalizing Epidemic Data Management with COVID-19 Surveillance”, *IEEE International Conference on Big Data (Big Data)*, 2020
3. A. Adiga, S. Singh, E. Choo, **SV**, M. Marathe, P. Jha, S. Dhakal, K. Poudel, B. B. Shreshtha, R. Muniappan, S. Mahajan, A. Devkota, A. Adiga, “A Deep Learning Framework for Invasive Species Mapping using High-Resolution Satellite Imagery”, *ASPRS Annual Conference*, 2020
4. P. Sambaturu, B. Adhikari, B. A. Prakash, **SV**, and A. Vullikanti, “Designing Near-Optimal Temporal Interventions to Contain Epidemics”, *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, 2020
5. A. Adiga, **SV**, S. Wu, M. Marathe, S. Eubank, L. P. Sah, A. P. Giri, L. Colavito, R. Muniappan, “Understanding the Role of Seasonal Food Trade Networks in Invasive Species Spread”, *SIAM Workshop of Network Science*, 2019
6. M. Nath, **SV**, B. Kaperick, S. Eubank, M. Marathe, A. Marathe, and A. Adiga, “Using Network Reliability to Understand International Food Trade Dynamics”, *Complex Networks*, 2018
7. Q. F. Ying, D. M. Chiu, **SV**, and X. Zhang, “Profiling OSN Users Based on Temporal Posting Patterns”, *WWW '18 Companion Proceedings of the The Web Conference*, 2018
8. **SV**, S. Wu, B. Shi, A. Marathe, M. Marathe, S. Eubank, L. P. Sah, A. P. Giri, L. Colavito, Nitin S, Sridhar V, Asokan R, R. Muniappan, G. Norton, and A. Adiga, “Towards Robust Models of Food Flows and Their Role in Invasive Species Spread”, *IEEE International Conference on Big Data (IEEE Big Data)*, 2017
9. F. S. Tabataba, M. Hosseinipour, B. Lewis, F. S. Tabataba, **SV**, D. Higdon, J. Chen, and M. Marathe, “Epidemic Forecasting by Combining Agent-Based Models and Smart Beam-Particle Filtering Framework”, *IEEE International Conference on Data Mining (ICDM)*, 2017
10. **SV**, J. Chen, S. Gupta, B. Lewis, M. Marathe, H. Mortveit, and A. Vullikanti, “Spatio-temporal optimization of seasonal vaccination using a metapopulation model of influenza”, *IEEE International Conference on Healthcare Informatics (ICHI)*, 2017
11. **SV**, A. Marathe, S. Eubank, M. Marathe, A. Adiga “Hybrid models for ecological and anthropogenic drivers of pest invasion: Case study of *Tuta Absoluta* in Nepal”, *International Conference on Biodiversity, Climate Change Assessment and Impacts on Livelihood (ICBCL)*, 2017
12. W. Yan, **SV**, and D. M. Chiu, “Get To the Top and Stay There: A Study of Citation Rank Dynamics in Academia”, *Proceedings of the 25th International Conference Companion on World Wide Web (BigScholar)*, 2016
13. A. Adiga, **SV**, and A. Vullikanti, “To delay or not: Temporal Vaccination Games on Networks”, *IEEE INFOCOM* 2016

14. W. Yan, **SV**, and D. M. Chiu, “*Research Collaboration and Topic Trends in Computer Science - An Analysis Based on UCP Authors*”, Proceedings of the 25th International Conference Companion on World Wide Web (SAVE-SD), 2015
15. Q. F. Ying, **SV**, and D. M. Chiu, “*Modeling and Analysis of Scholar Mobility on Scientific Landscape*”, Proceedings of the 24th International Conference Companion on World Wide Web (BigScholar), 2015
16. **SV** and A. Kumar, “*Competition for Content Spread over Multiple Social Networks*”, Workshop on Social Networks in Science and Engineering (SCINSE’14), co-held with COMSNETS 2014 (Best presentation award)
17. E. Altman, P. Kumar, **SV**, and A. Kumar, “*Competition over Timeline in Social Networks*”, Workshop on Social Network Analysis and Algorithms (SNAA), co-held with IEEE/ACM ASONAM 2013
18. **SV** and A. Kumar, “*Co-evolution of Content Popularity and Delivery in Mobile P2P Networks*”, IEEE INFOCOM, 2012
19. **SV** and A. Kumar, “*Information Dissemination in Socially Aware Networks under the Linear Threshold model*”, National Conference on Communication(NCC), 2011

Technical Reports and Preprints

1. J. Chen, A. Vullikanti, J. Santos, **SV**, S. Hoops, H. Mortveit, B. Lewis, W. You, S. Eubank, M. Marathe, C. Barrett, and A. Marathe, “*Epidemiological and Economic Impact of COVID-19 in the US*”, medRxiv, 2020
2. Z. Mehrab, A. G. Ranga, D. Sarkar, **SV**, Y. Chungbaek, S. Swarup, and M. Marathe “*High resolution proximity statistics as early warning for US universities reopening during COVID-19*”, medRxiv, 2020
3. N. Wu, X. Ben, B. Green, K. Rough, **SV**, M. Marathe, P. Eastham, A. Sadilek, and S. O’Banion, “*Predicting Onset of COVID-19 with Mobility-Augmented SEIR model*”, medRxiv, 2020.
4. A. Adiga, L. Wang, A. Sadilek, A. Tendulkar, **SV**, A. Vullikanti, G. Aggarwal, A. Talekar, X. Ben, J. Chen, B. Lewis, S. Swarup, M. Tambe, and M. Marathe, “*Interplay of global multi-scale human mobility, social distancing, government interventions, and COVID-19 dynamics*”, medRxiv, 2020.
5. A. Adiga, **SV**, J. Schlitt, . . . , C. Barrett, “*Evaluating the impact of international airline suspensions on the early global spread of COVID-19*”, medRxiv, 2020
6. E. A. Heinrichs, J. Sidhu, R. Muniappan, A. Fayad, A. Adiga, A. Marathe, J. Mcnitt, **SV**, “*Pest Risk Assessment of the Fall Armyworm, Spodoptera frugiperda in Egypt*”, Feed the Future Innovation Lab for Integrated Pest Management Technical Report, 2017
7. **SV** and A. Kumar, “*Influence Spread in Social Networks: A Study via a Fluid Limit of the Linear Threshold Model*”, arXiv:1405.7096 (2014)
8. **SV** and A. Kumar, “*New Insights from an Analysis of Social Influence Networks under the Linear Threshold model*”, arXiv:1002.1335 (2010)

Invited Talks and Posters

1. “*Computational Modeling and Data Strategies for Predicting and Responding to Pandemics*”, Intelligent Health Inspired Summit, May 2020
2. “*Estimating Global direct importation risk for COVID-19*”, Pandemic Prediction and Forecasting Science & Technology workgroup, Feb 2020
3. P. Corbett, **SV**, B. Lewis, “*CDC Aedes Forecasting Challenge: Historical Average and Ecological Niche Modeling*”, Vector-borne disease forecasting workshop, Feb 2020
4. **SV**, L. Wang, A. Fadikar, B. Lewis, J. Chen, H. Carscadden, P. Sambaturu, A. Vullikanti, and M. Marathe “*Multi-model Multi-target Approaches for Forecasting Seasonal Influenza in the United States*”, CSTE/CDC Seasonal Influenza Forecasting Workshop, Aug 2019
5. “*Computing for Health: In silico approaches for health sciences*”, IISc. Bangalore, Jan 2019
6. **SV**, J. Chen, A. Fadikar, B. Lewis, M. Marathe, S. Gupta, H. Mortveit, and A. Vullikanti “*Exploring optimal vaccine allocation using a national model of influenza*”, UNC Going Viral Symposium, Apr 2018 (Best poster award)
7. “*iFlu, e-Flu: where from and where to?*”, Virginia Tech Schiffert Health Center, Mar 2018

8. “Resource optimization problems using a mathematical model of influenza”, 6th Annual MIDAS Outreach Conference, Harvard T.H. Chan School of Public Health, Nov 2017
9. **SV**, A. Adiga, A. Marathe, S. Eubank, M. Marathe, and R. Muniappan, “Towards an Integrated Network-based Approach to Modeling the Dynamics of Invasive Plant Pests”, poster presented at KDD 2016 Workshop on Data Science for Food, Energy and Water, 2016
10. “Modeling in the Time of Ebola: Using HPC Simulations to Understand Infectious Disease Dynamics”, IISc. Bangalore and IIT Madras, Feb 2016
11. “Ebola Forecasting Challenge: Team Virginia Tech”, NIH/RAPIDD Ebola Forecasting Challenge workshop, Feb 2016
12. **SV**, J. Chen, B. Lewis, A. Vullikanti, and M. Marathe, “Calibration and Forecasting Framework for Infectious Diseases”, International Symposium for Next Generation Infrastructure (ISNGI), Sep 2015
13. “Delay-Cost Optimal Coupon Delivery in Mobile Opportunistic Networks”, High Dimensional Network Analytics Workshop, IISc. Bangalore, Dec 2013
14. **SV** and A. Kumar, “Influence Spread in Social Networks”, TechVista - Microsoft Research India, Jan 2010

Funding

- Co-PI: RAPID: COVID-19 Response Support: Building Synthetic Multi-scale Networks, National Science Foundation, (\$173,640), National Science Foundation (NSF), 2020-2021
- Co-PI: RAPID: Collaborative: Transfer Learning Techniques for Better Response to COVID-19 in the US, National Science Foundation (NSF), (\$25,000), 2020-2021
- Co-PI: Smart Targeting and Optimization for the Mitigation and Prevention of Influenza (STOMP-flu). Center for Disease Control and Prevention (CDC) (\$454,427, 2019-2020)
- Co-PI: Network-based Mobility Modeling for Complex Humanitarian Emergencies. Global Infectious Diseases Institute, University of Virginia (\$98,750, 2019-2020)
- Co-PI: AccuWeather License to Use, Market and Resell 4-Week Influenza Forecast. AccuWeather (\$55,000, 2018-2019)
- Co-PI: Assessment of Invasive Alien Species Distribution in the Chitwan-Annapurna-Landscape (CHAL) Region, Nepal. United States Agency for International Development (USAID) (\$135,458, 2018-2019)
- Postdoc/Key personnel: A High-resolution Interaction Based Approach to Modeling the Spread of Agricultural Invasive Species. United States Agency for International Development (USAID) (\$1,000,000, 2015-2019)

Outreach

- COVID-19 Modeling Support for Virginia Department of Health, Biocomplexity COVID-19 Response Team, <https://www.vdh.virginia.gov/coronavirus/covid-19-data-insights/>
- “Flattening the Curve”, Mini Med School Special Podcast: COVID-19 Charlottesville, 24 Jun 2020
- Panel member on “Rural Populations and Infectious Disease Transmission: Implications for COVID-19”, George Mason University, 9 Jun 2020
- J. Chen, S. Levin, S. Eubank, H. Mortveit, **SV**, A. Vullikanti, and M. Marathe “Networked Epidemiology for COVID-19”, SIAM News, 1 Jun 2020
- “Governor Northam, University of Virginia Biocomplexity Institute, RAND Corporation Present Infectious Disease Modeling on Impact of COVID-19 Mitigations in Virginia”, Office of the Governor, 14 Apr 2020
- “Modeling the Spread of Epidemics”, The Pragati Podcast, 25 Mar 2020
- Panel member on “Batten Hour: Multidisciplinary perspectives on the coronavirus”, UVA Batten School of Leadership & Public Policy, 24 Feb 2020
- “To predict Flu’s spread, modelers turn to weather forecasts”, UVA Today, 18 Feb 2020
- “Using weather forecasts to predict flu activity”, AccuWeather Press, 28 Jan 2020
- “Researchers utilize holistic approach to predict severity of influenza season”, Cavalier Daily, 16 Jan 2020
- “UVA Researchers Harnessing Big Data’s Power to Fight the Flu”, UVA Today, 25 Oct 2019

- “*Modelling epidemics: the maths behind disease outbreaks*”, Elsevier, Feb 2019
- “*Researchers at Virginia Tech’s Biocomplexity Institute work to forecast flu*”, Collegiate Times, 19 Feb 2018
- “*Virginia Tech flu forecasting technology to be used by AccuWeather*”, WSLS10, 6 Dec 2017
- “*Virginia Tech researchers develop computer model to predict Zika movement*”, WSET, 21 Jun 2016

Community Activities

- Editorial Board: Frontiers Big Data - Data Analytics for Social Impact
- Co-organizer: epiDAMIK 3.0: The 3rd International workshop on Epidemiology meets Data Mining and Knowledge discovery, coheld with SIGKDD 2020
- Delphi panel member for Epidemic Forecasting Reporting Guidelines (EPI-FORGE)
- TPC Member: COMSNETS (2015, 2016), IJCAI (2020, 2021), AAMAS 2021, AAAI 2021
- Conference Reviewer: SPCOM 2016, INFOCOM 2019
- Journal Reviewer: IEEE Transactions on Mobile Computing, IEEE Transactions on Information Theory, Elsevier Theoretical Computer Science, PLOS Currents: Outbreaks, Springer Artificial Intelligence Review, Epidemiology & Infection, Health Security, Elsevier Ecological Informatics, Elsevier Ecological Modeling, Simulation Modeling Practice & Theory, PLOS One, Health Affairs, PNAS, American Journal of Tropical Medicine & Hygiene, BMJ Open, F1000, PLOS Computational Biology, Journal of Theoretical Biology, Frontiers, Nature Scientific Reports, Journal of the Indian Institute of Science, PLOS One, Applied Soft Computing, Vaccine

Mentoring

Graduate students

- Akhil Peddireddy (2019-20) - Real-time database for multi-modal spatiotemporal influenza surveillance

Undergrad interns

- Andrew Murphy (Summer 2019) - Hierarchical seasonal autoregressive models for influenza forecasting
- Patrick Corbett (Spring 2019) - Forecasting Aedes mosquito abundance in United States
- Ethan Ludwick (Summer 2018) - Machine learning and satellite imagery to map *C. odorata* in Nepal
- Kingsley Nwosu Jr. (Summer 2017) - Computational Methods for stockpile allocation during epidemics
- Asia Taylor (Summer 2017) - Assessing the resolution of Influenza surveillance datasets in the US