Anirudh Sridhar

PhD Student/Researcher in Applied Probability and Statistics
Electrical and Computer Engineering Department, Princeton University

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Education

Princeton University *Princeton, NJ*

PhD in Electrical and Computer Engineering *Sep. 2018 - Current*

- Dissertation topic: *Inference in Cascades and Correlated Networks*, advised by Prof. Miklós Rácz and Prof. H. Vincent Poor

Carnegie Mellon University *Pittsburgh, PA*

Bachelor of Science in Electrical and Computer Engineering *Aug. 2014 - May 2018*

- Honors Research topic: *Deterministic approximation of stochastic games*, advised by Prof. Soummya Kar

Selected Honors & Awards

2021 **Recipient**, Yan Huo '94 Graduate Fellowship in Electrical Engineering
2021 **Spotlight presentation**, 35th Conference on Neural Information Processing Systems (NeurIPS)
2021 **Recipient**, Interdisciplinary Fellowship, Dept. of Electrical & Computer Engineering, Princeton University
2020 **Finalist**, INFORMS-APS Best Student Paper Award (for *Correlated Randomly Growing Graphs*)
2018 **Recipient**, Princeton First-Year Fellowship
2018 **Recipient**, Senior Leadership Award (for work as an EXCEL leader)
2014 **Finalist**, Physics category, Intel International Science & Engineering Fair (ISEF)

Publications

Note: (*) indicates that authors are listed in alphabetical order of last name.

Submitted preprints (available on arXiv)

(P1) The Role of Masks in Mitigating Viral Spread on Networks.
Y. Tian, A. Sridhar, C. W. Wu, S. A. Levin, H. V. Poor, O. Yağan

(P2) Quickest Inference of Network Cascades with Noisy Information.
A. Sridhar, H. V. Poor

(P3) On the Accuracy of Deterministic Models for Viral Spread on Networks.
A. Sridhar, S. Kar

(P4) Mean-field Approximation for Stochastic Population Processes in Networks Under Imperfect Information.
A. Sridhar, S. Kar

Journal publications

(J1) Correlated Randomly Growing Graphs.
(*) *M. Z. Rácz, A. Sridhar*
To appear in *The Annals of Applied Probability*, 2022+.
Finalist for the *INFORMS-APS Best Student Paper Award*, 2020.

(J2) Modeling and Analysis of the Spread of COVID-19 under a Multiple-Strain Model with Mutations.
O. Yağan, A. Sridhar, R. Eletreby, S. A. Levin, J. B. Plotkin, H. V. Poor
Harvard Data Science Review, April 2021.
Part of a *Special Issue on COVID-19*.

Conference papers

(C1) Correlated Stochastic Block Models: Exact Graph Matching with Applications to Recovering Communities.
(*) *M. Z. Rácz, A. Sridhar*
NeurIPS 2021
Selected for a spotlight presentation (top 3% of submissions).

(C2) Leveraging a Multiple-Strain Model with Mutations in Analyzing the Spread of COVID-19.
A. Sridhar, O. Yağan, R. Eletreby, S. A. Levin, J. B. Plotkin, H. V. Poor
ICASSP 2021

(C3) Bayes-Optimal Methods for Finding the Source of a Cascade.
A. Sridhar, H. V. Poor
ICASSP 2021

(C4) Analysis of the Impact of Mask-wearing in Viral Spread: Implications for COVID-19.
Y. Tian, A. Sridhar, O. Yağan, H. V. Poor
American Control Conference 2021

(C5) Sequential Estimation of Network Cascades.
A. Sridhar, H. V. Poor
Asilomar Conference in Signals and Systems 2020

(C6) On Distributed Stochastic Gradient Algorithms for Global Optimization.
B. Swenson, A. Sridhar, H. V. Poor
ICASSP 2020

(C7) Client-CASH: Protecting Master Passwords Against Offline Attacks.
J. Blocki, A. Sridhar
ASIACCS 2016

Selected Talks

Correlated Stochastic Block Models: Graph Matching and Community Recovery

- *NeurIPS*, Dec 2021. (Virtual)
- 20^{th} *Northeast Probability Seminar*, Nov 2021. (Virtual)

Understanding the Impact of Mutations and Mask-wearing in Viral Spread on Networks

- *Networks*, July 2021. (Virtual)
- *ICASSP*, June 2021. (Virtual)

Quickest Estimation of Network Cascades

- *ICASSP*, June 2021. (Virtual)
- *Asilomar Conference on Signals, Systems, and Computers*, Nov 2020. (Virtual)
- *PhD General Examination*, April 2020. (Virtual)

Correlated Randomly Growing Graphs

- *INFORMS Annual Meeting*, Nov 2020. (Virtual)
- *IMS-Bernoulli One World Symposium*, Aug. 2020. (Virtual)
- *PhD General Examination*, April 2020. (Virtual)
- *MIFODS Workshop: Learning Under Complex Structure*, Jan. 2020. (Boston, MA)

Mean-field Approximation for Stochastic Population Processes on Networks

- *49th Probability Summer School*, July 2019. (Saint-Flour, France)
- *Invited talk, Dept of Electrical & Computer Engineering, Carnegie Mellon*, Dec 2018. (Pittsburgh, PA)
- *Invited talk, Dept of Operations Research and Financial Engineering at Princeton University*, Nov 2018. (Princeton, NJ)
- *Summer Undergraduate Research Symposium, Carnegie Mellon University*, July 2017 (Pittsburgh, PA)

Client-CASH: Protecting Master Passwords

- *ASIACCS*, May 2016. (Xi'an, China)

Teaching and Service

Graduate Student Committee, Electrical & Computer Engineering Department — *Princeton, NJ*

Committee member — *Nov. 2021 - Current*

- Served as a liason between the graduate student body and the director of graduate studies
- Organized social and professional events in the department

ORF 526: Probability Theory (Princeton University) — *Princeton, NJ*

Teaching Assistant — *Sep. 2021 - Current*

- An introductory course in graduate probability which includes the central limit theorem, martingales and Brownian motion.
- Held office hours, graded homework and taught a few lectures.

Accelerated Natural Language Processing course (Machine Learning University, Amazon) — *Virtual*

Instructor — *July 2021*

- Taught over 180 students the fundamentals of Natural Language Processing in a three day course.
- Topics included introductory machine learning, neural networks, RNNs, LSTMs and Transformers.
- Students also completed a final project involving Amazon product reviews.
- Student body included interns, software developers, and managers.

ELE 201: Information Signals (Princeton University) — *Princeton, NJ*

Head Graduate Teaching Assistant — *Feb 2020 - Dec 2020*

- Designed and taught content for a first undergraduate course in signal processing.
- Created innovative content for online teaching settings.
- Graded assignments and supervised other TAs.

21-127 Concepts of Mathematics (Carnegie Mellon)

Pittsburgh, PA

EXCEL Leader

Sep 2015 - May 2018

- Designed and taught course content for Concepts of Mathematics, a proof-based mathematics course for first-year undergraduates.
- Focused on improving student study skills and building student work ethic in a collaborative learning environment.
- Planned weekly review sessions for 25 students each semester.
- Team lead for the 6 other EXCEL leaders for the course.

Carnegie Mellon Academic Development

Pittsburgh, PA

EXCEL and SI Head Supervisor

Jan. 2017 - May 2018

- Hired, trained and supervised about 50 student EXCEL and Supplemental Instruction (SI) leaders who taught a variety of courses in engineering, mathematics and the sciences.
- Handled various administrative tasks for the SI and EXCEL programs, such as enrollment logistics and evaluating employees.
- Instructor for 99-251 Fundamentals of Supplemental Instruction.
- Received a ***Senior Leadership Award*** for my work as an EXCEL Head Supervisor.

Further Professional Experience

Amazon (Machine Learning University)

Virtual

Applied Scientist Intern (manager: Brent Werness)

June 2021 - Aug. 2021

- Developed a 2 week course on Probabilistic Graphical Models, tailored towards software developers and internal researchers. Topics include the fundamentals of Bayesian inference, Markov Chain Monte Carlo (MCMC) and Bayesian neural networks (e.g., variational auto-encoders (VAE)).
- Created content for lecture slides and designed a comprehensive final project for students showcasing how one can use probabilistic machine learning for large data analysis.
- Taught a 3 day introductory Natural Language Processing course with over 180 students including interns, full-time software developers as well as managers.

École Polytechnique Fédérale de Lausanne (EPFL), Department of Information and Computer Sciences

Lausanne, Switzerland

Research Assistant (supervisor: Prof. Elisa Celis)

June 2018 - Aug. 2018

- Studied the influence of individual attributes on link formation in social networks and used the findings to improve models of network formation.
- Analysis done on the AddHealth dataset, which has tracked the physical health, mental health and social connections of a set of individuals for over 20 years.

Argonne National Laboratory, Advanced Photon Source

Lemont, IL

Summer Undergraduate Laboratory Intern (supervisor: Ned Arnold)

June 2016 - Aug 2016

- Designed an optimized embedded controller to correct the Advanced Photon Source synchotron beam.
- Implemented the controller on a digital signal processing chip and evaluated its performance.

References

Professor Miklós Z. Rácz

Assistant Professor, Department of Operations Research and Financial Engineering, Princeton University

- Email: mracz@princeton.edu

Professor H. Vincent Poor

Michael Henry Strater University Professor of Electrical Engineering, Princeton University

- Email: poor@princeton.edu

Professor Soummya Kar

Professor, Department of Electrical and Computer Engineering, Carnegie Mellon University

- Email: soummyak@andrew.cmu.edu