

JITHIN K. SREEDHARAN

Department of Computer Science
Purdue University
West Lafayette, IN 47907, USA

Email: jithinks@purdue.edu
Cell: +1 (631) 746-1939
Homepage: <https://www.cs.purdue.edu/~jithinks>

Research Areas

My central research interest is in solving real-world problems in data science with a network perspective. I mostly follow a multifaceted approach of problem solving: theoretical modeling, designing and analyzing low complexity algorithms, and verifying it on real-world data. My research focuses on data mining algorithms for large networks with probabilistic guarantees, statistical modeling, and inference on networks, and distributed techniques for analyzing big network matrices. I am also interested in the application of machine learning and deep learning to various inference problems on networks, and, in general, stochastic modeling of complex systems.

Education

- Doctor of Philosophy in Computer Science** 08/2013 – 12/2016
Institut National de Recherche en Informatique et en Automatique (INRIA) and INRIA-Bell Labs joint lab Sophia Antipolis and Paris, France
Affiliated university: Université Côte d'Azur (Université Nice Sophia Antipolis), France
Thesis title: *Sampling and Inference in Complex Networks*
Advisor: Konstantin Avrachenkov
Thesis jury: Don Towsley, Nelly Litvak, Alain Jean-Marie, Philippe Jacquet
- Master of Science (Engineering)**, Dept. of Electrical Communication Engg. 09/2009 – 07/2012
Indian Institute of Science (IISc), Bangalore, India
Thesis title: *Spectrum Sensing in Cognitive Radios using Distributed Sequential Detection*
Advisor: Vinod Sharma
External reviewer: Shankar Prakriya
- Bachelor of Technology in Electronics and Communication Engineering** 08/2003 – 05/2007
Govt. Model Engineering College - Cochin University of Science and Technology, Kochi, India
Main project title: FPGA Implementation of a Probabilistic Neural Network

Employment

- National Science Foundation Center for Science of Information**
Department of Computer Science, Purdue University, USA
Postdoctoral Research Associate 01/2017 – present
Visiting Research Scholar 04/2016 – 06/2016
Mentors: Wojciech Szpankowski and Ananth Grama
- Designed and executed research on recovering temporal information hidden in the dynamic data of social media and biological systems (protein and brain)
 - Developed an optimal feature selection algorithm and various approximate solutions for it with reduced time and sample complexity
 - Formulated the problem of misinformation spread in online social networks, and designed algorithms for its containment
 - Coordinated a team consisting of three senior professors, three postdoctoral researchers, and instituted research collaboration with an interdisciplinary data science team in quantum computing
 - Resulted in publications (4 conferences - incl. **The Web Conference (WWW)** and **SIGKDD**), 2 journal - incl. **Nature**, 3 in preparation), 4 grant proposals, and 2 open source libraries. Delivered 17 invited research talks (including Google Research and Adobe Research).
- Institut National de Recherche en Informatique et en Automatique (INRIA) and INRIA-Bell Labs joint lab** Sophia Antipolis and Paris, France
Ph.D. Research Fellow, Team MAESTRO (renamed to NEO).
Advisor: Konstantin Avrachenkov

- Designed and analyzed distributed data mining algorithms for graphs to sample, rank, and estimate graph properties
- Developed methods based on reinforcement learning, short random walks, extreme value theory, and spectral graph theory for estimation problems on networked data
- Designed distributed implementation of spectral clustering techniques
- Launched collaborations with researchers from Purdue/CMU (USA), Bell Labs, UFRJ (Brazil), IIT Bombay (India), and IISc Bangalore (India)
- Resulted in publications (5 conferences - incl. **SIGMETRICS** and **INFOCOM**, 3 journals), and 4 open source libraries. Delivered 7 invited research talks

Indian Institute of Science

Bangalore, India

Performance Analysis Lab, Dept. of Electrical Communication Engineering

Research Associate

09/2010 – 04/2013

Advisor: Prof. Vinod Sharma

- Developed and analyzed sequential hypothesis testing algorithms for distributed quickest detection of data anomalies, with various generalizations from parametric to non-parametric setup
- Tested the devised methods in anomaly detection in wireless sensor networks and spectrum sensing in cognitive radios, with aid from Boeing Inc. and Ministry of Communications and Information Technology, Govt. of India
- Resulted in publications (5 conferences, 1 journal), and 2 open source libraries

Robert Bosch

Coimbatore and Bangalore, India

System Engineer, Automotive embedded systems in gasoline engines

08/2007 – 12/2008

- Developed and maintained software for engine control units (ECUs)
- Integrated new device drivers and application software modules into a common platform after rigorous hardware and software testing.

Fellowships, Awards, and Honors

Postdoctoral fellowship from NSF Science and Technology Center for Science of Information.

Postdoctoral fellowship from UC San Diego Halicioglu Data Science Institute (declined)

ACM SIGMETRICS/PERFORMANCE travel grant 2016.

Best M.Sc.(Engg.) thesis medal - Prof. F. M. Mowdawalla medal - Indian Institute of Science, Bangalore, India.

Ph.D. fellowship from INRIA-Bell Labs joint lab for the entire duration of Ph.D.

Ministry of Human Resources and Development (MHRD), Govt. of India, scholarship for graduate studies.

Publications

- **In all the papers, I am either one of the two main contributors or the main contributor.**
- **The asterisk (*) symbol indicates that the paper follows an alphabetical author-list**
- All the paper titles are clickable links, which will open up a PDF version of the paper.

1. [Feature Selection via a Fourier Framework](#)

Mohsen Heidari, *Jithin K. Sreedharan*, Gil Shamir, and Wojciech Szpankowski
Under review

2. [Temporal Ordered Clustering in Dynamic Networks](#)

Krzysztof Turowski[†], *Jithin K. Sreedharan*[†], and Wojciech Szpankowski; [†]*Equal contribution*
Accepted in *IEEE International Symposium on Information Theory (ISIT), 2020* [Conference proceedings]

3. [Revisiting Parameter Estimation in Biological Networks: Influence of Symmetries](#)

Jithin K. Sreedharan[†], Krzysztof Turowski[†], and Wojciech Szpankowski; [†]*Equal contribution*
In *ACM SIGKDD Conference on Knowledge Discovery and Data Mining, 2019* (poster presentation)
In *BioKDD 2019* – in conjunction with SIGKDD (oral presentation)
Extended version in *IEEE/ACM Transactions on Computational Biology and Bioinformatics, 2020*
[doi:10.1109/TCBB.2020.2980260](https://doi.org/10.1109/TCBB.2020.2980260) [journal paper]

4. [Inferring Temporal Information from a Snapshot of a Dynamic Network](#)
Jithin K. Sreedharan[†], Abram Magner[†], Ananth Grama, and Wojciech Szpankowski; [†]*Equal contribution*
Nature Scientific Reports, 10 pages (and 20 pages supplementary material), 2019; impact factor: 4.61
 Technical details with theoretical analysis and proofs are in the *supplementary material*
[doi:10.1038/s41598-019-38912-0](https://doi.org/10.1038/s41598-019-38912-0) [Journal paper]
5. [TIMES: Temporal Information Maximally Extracted from Structures](#)
 Abram Magner[†], *Jithin K. Sreedharan*[†], Ananth Grama, and Wojciech Szpankowski; [†]*Equal contribution*
 In *Proc. of the 2018 World Wide Web Conference (WWW'18)*, pages 389-398, 2018
Acceptance rate: 14.8%; selected for oral presentation in the main conference
[doi:10.1145/3178876.3186105](https://doi.org/10.1145/3178876.3186105) [Conference proceedings]
- *6. [Revisiting Random Walk based Sampling in Networks: Evasion of Burn-in Period and Frequent Regenerations](#)
 Konstantin Avrachenkov, Vivek S. Borkar, Arun Kadavankandy and *Jithin K. Sreedharan*
Computational Social Networks (Springer International Publishing), 5(1), 19 pages, 2018
[doi:10.1186/s40649-018-0051-0](https://doi.org/10.1186/s40649-018-0051-0) [Journal paper]
- *7. [Hamiltonian System Approach to Eigenvalue-Eigenvector Problem in Networks](#)
 Konstantin Avrachenkov, Philippe Jacquet and *Jithin K. Sreedharan*
 In *Proc. of the 10th IEEE International Workshop on Multidimensional (nD) Systems (nDS)*, pages 1-6, 2017
[doi:10.1109/NDS.2017.8070631](https://doi.org/10.1109/NDS.2017.8070631) [Workshop proceedings]
8. [Recovery of Vertex Orderings in Dynamic Graphs](#)
 Abram Magner, Ananth Grama, *Jithin K. Sreedharan* and Wojciech Szpankowski
 In *Proc. of the IEEE International Symposium on Information Theory (ISIT)*, pages 1563-1567, 2017
[doi:10.1109/ISIT.2017.8006792](https://doi.org/10.1109/ISIT.2017.8006792) [Conference proceedings]
- *9. [Inference in OSNs via Lightweight Partial Crawls](#)
 Konstantin Avrachenkov, Bruno Ribeiro and *Jithin K. Sreedharan*
 - *SIGMETRICS Performance Evaluation Review*, 44(1), pages 165-177, 2016
[doi:10.1145/2964791.2901477](https://doi.org/10.1145/2964791.2901477) [Journal paper]
 - In *Proc. of the 2016 ACM SIGMETRICS/IFIP International Conference on Measurement and Modeling of Computer Science (SIGMETRICS '16)*, pages 165-177, 2016
Acceptance rate: 13.5%; selected for oral presentation in the main conference.
[doi:10.1145/2896377.2901477](https://doi.org/10.1145/2896377.2901477) [Conference proceedings]
- *10. [Distributed Spectral Decomposition in Networks by Complex Diffusion and Quantum Random Walk](#)
 Konstantin Avrachenkov, Philippe Jacquet and *Jithin K. Sreedharan*
 In *Proc. of the 35th Annual IEEE International Conference on Computer Communication (INFOCOM'16)*, pages 1-9, 2016
Acceptance rate: 18.25%; selected for oral presentation in the main conference.
[doi:10.1109/INFOCOM.2016.7524376](https://doi.org/10.1109/INFOCOM.2016.7524376) [Conference proceedings]
- *11. [Comparison of Random Walk Based Techniques for Estimating Network Averages](#)
 Konstantin Avrachenkov, Vivek S. Borkar, Arun Kadavankandy and *Jithin K. Sreedharan*
Springer LNCS, 5th International Conference on Computational Social Networks (CSoNet), vol 9795, pages 27-38, 2016
[doi:10.1007/978-3-319-42345-6_3](https://doi.org/10.1007/978-3-319-42345-6_3) [Conference proceedings]
- *12. [Distribution and Dependence of Extremes in Network Sampling Processes](#)
 Konstantin Avrachenkov, Natalia M. Markovich and *Jithin K. Sreedharan*
Computational Social Networks (Springer International Publishing), 2(1), 21 pages, 2015
[doi:10.1186/s40649-015-0018-3](https://doi.org/10.1186/s40649-015-0018-3) [Journal paper]
13. [Spectrum Sensing using Distributed Sequential Detection via Noisy Reporting MAC](#)
Jithin K. Sreedharan and Vinod Sharma
Signal Processing (Elsevier & EURASIP), vol 106, pages 159-173, 2015; impact factor: 3.47
[doi:10.1016/j.sigpro.2014.07.009](https://doi.org/10.1016/j.sigpro.2014.07.009) [Journal paper]
14. [Nonparametric Distributed Sequential Detection via Universal Source Coding](#)
Jithin K. Sreedharan and Vinod Sharma

In *Proc. of the 2013 IEEE Information Theory and Applications Workshop (ITA)*, pages 1-7, 2013
doi:10.1109/ITA.2013.6502977 [Workshop proceedings]

15. [Spectrum Sensing via Universal Source Coding](#)

Jithin K. Sreedharan and Vinod Sharma

In *Proc. of the 2012 IEEE Global Communications Conference (GLOBECOM)*, pages 1507-1512, 2012
doi:10.1109/GLOCOM.2012.6503327 [Conference proceedings]

16. [Novel Algorithms for Distributed Sequential Hypothesis Testing](#)

K. S. Jithin and Vinod Sharma

In *Proc. of the 49th IEEE Annual Allerton Conference on Communication, Control, and Computing*, pages 1529-1536, 2011
doi:10.1109/Allerton.2011.6120349 [Conference proceedings]

17. [A Novel Algorithm for Cooperative Distributed Sequential Spectrum Sensing in Cognitive Radio](#)

Jithin K. Sreedharan and Vinod Sharma

In *Proc. of the IEEE Wireless Communications and Networking Conference (WCNC)*, pages 1881-1886, 2011
doi:10.1109/WCNC.2011.5779420 [Conference proceedings]

18. [Cooperative Distributed Sequential Spectrum Sensing](#)

K. S. Jithin, Vinod Sharma, and Raghav Gopalarathnam

In *Proc. of the IEEE National Conference on Communication (NCC)*, pages 1-5, 2011
doi:10.1109/NCC.2011.5734763 [Conference proceedings]

Public presentations

Invited Talks

- Indian Institute of Technology - Delhi, India, July 2020
- Singapore University of Technology and Design, Singapore, May 2020
- Google, Pittsburgh, USA, March 2020
- Wadhvani AI, Mumbai, India, January 2020
- Google Research, Mountain View, USA, November 2019
- Eindhoven University of Technology (TU/e), Eindhoven, Netherlands, May 2019
- Indian Institute of Science, Bangalore, India, April 2019
- Indian Institute of Technology - Madras, India, April 2019
- Indian Institute of Technology - Bombay, India, April 2019
- International Institute of Information Technology, Hyderabad, India, April 2019
- Indian Institute of Technology - Palakkad, India, April 2019
- Indian Institute of Technology - Roorkee, India, February 2019
- Adobe Research, Bangalore, India, May 2018
- Bell Labs Murray Hill, NJ, USA, June 2017
- Dept. of Computer Science, Purdue University, USA, May 2017
- INRIA-Bell Labs common lab seminar, Paris, France, December 2015
- Bell Labs Future X Days, Paris, France, June 2015
- INRIA-Bell Labs common lab seminar, Paris, France, Jan 2015

Conference/Workshop Talks

- SIGKDD, Anchorage, USA, August 2019
- BioKDD, Anchorage, USA, August 2019
- The Web Conference WWW, Lyon, France, April 2018
- SIGMETRICS, Juan-les-Pins, France, June 2016
- INFOCOM, San Fransisco, USA, April 2016
- IEEE Workshop on Complex Networks and their Applications, Marrakech, Morocco, Nov 2014
- INRIA internal seminar series, Sophia Antipolis, France, April 2014
- WCNC, Cancun, Mexico, March 2011

- National Conference on Communication, Bangalore, India, December 2010

Community Service

- COVID-19 modeling and prediction for Indiana state, U.S.A., and Kerala state, India.
- Reviewer: ICDM, NeurIPS, SIGMETRICS, KDD, ISIT, ISMB/ECCB, Performance Evaluation, ACM Transactions on Modeling and Performance Evaluation of Computing Systems, IEEE Transactions on Information Theory, Algorithmica, ACM/IEEE Transactions on Networking, IEEE Transactions on Systems, Man, and Cybernetics: Systems, Physica A, IEEE Transactions on Network Science and Engineering

Computational Skills

Languages: Python, C++, Matlab, R

Machine learning: PyTorch, TensorFlow, Scikit-learn

Data analytics: Numpy, Pandas, Scipy, Matplotlib, Jupyter Notebook, Gurobi Optimizer

References

- | | |
|--|---|
| 1. Prof. Wojciech Szpankowski
Distinguished Professor of Computer Science
Purdue University
West Lafayette, USA
Email: spa@cs.purdue.edu
Phone: +1 765 494 6703 | 2. Dr. Konstantin Avrachenkov
Director of Research
INRIA
Sophia Antipolis, France
Email: k.avrachenkov@inria.fr
Phone: +33 4 92 38 77 51 |
|--|---|

More references available upon request.