AMIR R. ASADI

Statistical Laboratory,

Centre for Mathematical Sciences,

University of Cambridge,

Cambridge, UK

asadi@statslab.cam.ac.uk

https://amirrezaasadi.com/

Updated in September 2024

RESEARCH INTERESTS

- Machine Learning
- Differential Privacy
- Information Theory
- High-Dimensional Statistics
- Approximation Theory

EMPLOYMENT

- Leverhulme Early Career Fellow and Isaac Newton Trust Fellow

  Statistical Laboratory,
  Department of Pure Mathematics and Mathematical Statistics,
  University of Cambridge   Sep. 2023 to present

- Research Associate

  Statistical Laboratory,
  Department of Pure Mathematics and Mathematical Statistics,
  University of Cambridge

  - Mentors: Prof. Po-Ling Loh and Dr. Varun Jog   Oct. 2021 to Aug. 2023

ACADEMIC AFFILIATION

- Postdoctoral Affiliate

  Trinity College Cambridge   Jan. 2022 to present

EDUCATION

- Princeton University

  - Ph.D. in Electrical and Computer Engineering   Sep. 2017 to July 2021
    * Advisor: Prof. Emmanuel Abbe
    * Dissertation Title:
      "Neural Network Learning: A Multiscale-Entropy and Self-Similarity Approach"
  - M.A. in Electrical Engineering   Sep. 2015 to Sep. 2017
    * Advisors: Prof. Emmanuel Abbe and Prof. Sergio Verdú

∗ GPA: 3.972 out of 4

- Sharif University of Technology
  - B.Sc. in Mathematics
  - B.Sc. in Electrical Engineering (Communications)
    ∗ Project Advisor: Dr. Amin Gohari
    ∗ Total GPA: 18.48 out of 20   Sep. 2010 to Aug. 2015

PUBLICATIONS

- A. Pensia, **A. R. Asadi**, V. Jog & P. Loh. (2024) Simple Binary Hypothesis Testing under Local Differential Privacy and Communication Constraints. *IEEE Transaction on Information Theory.*
- **A. R. Asadi**. (2024) An Entropy-Based Model for Hierarchical Learning. *Journal of Machine Learning Research*, 25(187), pp. 1-45.
- G. Aminian, **A. R. Asadi**, T. Li, A. Beirami, G. Reinert & S. N. Cohen (2024) Generalization Error of the Tilted Empirical Risk. *(Submitted for Publication)*
- **A. R. Asadi** & P. Loh (2024) Entropic Regularization of Neural Networks: Self-Similar Approximations. *Journal of Statistical Planning and Inference*, 233, p.106181.
- **A. R. Asadi** & P. Loh (2023) On the Gibbs Exponential Mechanism and Private Data Generation. *IEEE International Symposium on Information Theory (ISIT) 2023.*
- A. Pensia, **A. R. Asadi**, V. Jog & P. Loh. (2023) Simple Binary Hypothesis Testing under Local Differential Privacy and Communication Constraints. *Conference on Learning Theory (COLT).*
- **A. R. Asadi** & E. Abbe. (2022) Maximum Multiscale Entropy and Neural Network Regularization. *arXiv preprint arXiv:2006.14614*
- **A. R. Asadi** & E. Abbe. (2020) Chaining Meets Chain Rule: Multilevel Entropic Regularization and Training of Neural Networks. *Journal of Machine Learning Research*, 21(139), pp. 1-32.
- **A. R. Asadi**, E. Abbe, & S. Verdú. (2018) Chaining Mutual Information and Tightening Generalization Bounds. *Advances in Neural Information Processing Systems (NeurIPS)*, pp. 7245-7254.
- **A. R. Asadi**, E. Abbe, & S. Verdú, (2017) Compressing Data on Graphs with Clusters. *IEEE International Symposium on Information Theory (ISIT)*, pp. 1583-1587.
- M. Asadi, & **A. R. Asadi**. (2014) On the Failure Probability of Used Coherent Systems. *Communications in Statistics, Theory and Methods*, Vol. 43, pp. 2468-2475.
- **A. R. Asadi** (2013). Problem 96.J with solution, *The Mathematical Gazette*, Vol. 97, No. 539, pp. 345-346, United Kingdom. (Available at `https://www.jstor.org/stable/24496830`.)

- Ph.D. Dissertation:

  A. R. Asadi (2021) *Neural Network Learning: A Multiscale-Entropy and Self-Similarity Approach*, Princeton University.

AWARDS AND HONOURS

- Leverhulme Early Career Fellowship from the Leverhulme Trust and the Isaac Newton Trust (2023-present)
- Teaching Assistant Award from the Department of Electrical and Computer Engineering at Princeton University (2019)
- Anthony Ephremides Fellowship from the Graduate School at Princeton University (2016)
- Iranian Mathematical Olympiad Bronze Medal (2009)
- Winner of the *Tournament of Towns*: International mathematical contest certified by the Russian Academy of Sciences (2009)
- Membership of the Iranian National Elite Foundation (2009-present)

TALKS

- Department of Mathematical Sciences, Durham University, UK, May 2023
- Department of Mathematics and Statistics, Lancaster University, UK, Feb. 2023
- Statistical Laboratory, University of Cambridge, UK, Feb. 2023
- Department of Computer Science, ETH Zürich, Switzerland, Feb. 2021
- NSF-Simons Collaboration on the Theoretical Foundations of Deep Learning, Dec. 2020
- Department of EECS, Massachusetts Institute of Technology, Dec. 2020
- Center for Data Science, New York University, June 2020
- Laboratoire de Physique, École Normale Supérieure, Paris, May 2020
- Department of Statistical Sciences, University of Toronto, Canada, Apr. 2020
- Department of Engineering, University of Cambridge, UK, Mar. 2020
- Institute for Advanced Study, Princeton, New Jersey, Oct. 2019
  (Available at https://youtu.be/YdYXpaE3Tm0)
- Microsoft Research AI, Redmond, Washington, Sep. 2019

PROFESSIONAL SERVICES

- Co-organizer of the 1st Cambridge Information Theory Colloquium, 21 April 2023.
- Co-organizer of the 2nd Cambridge Information Theory Colloquium, 10 May 2024.
  http://sigproc.eng.cam.ac.uk/CITC/
- Member of the Organizing Committee of the 2025 London Symposium on Information Theory, to be held on 14-16 May.
- Reviewer for:
  - Journal of Machine Learning Research (JMLR)
  - IEEE Transactions on Information Theory
  - Journal of Statistical Planning and Inference
  - Journal of Selected Areas on Information Theory (JSAIT)
  - Conference on Neural Information Processing Systems (NeurIPS)
  - Conference on Learning Theory (COLT)
  - International Symposium on Information Theory (ISIT)
  - International Conference on Machine Learning (ICML)
  - International Conference on Learning Representations (ICLR)
  - Information Theory Workshop (ITW)
  - Conference on Information Sciences and Systems (CISS)
  - Notices of the American Mathematical Society
  - Conference on Uncertainty in Artificial Intelligence (UAI)

RESEARCH INTERNSHIPS AND VISITS

- Institute of Network Coding, The Chinese University of Hong Kong, Hong Kong, Summer 2014
  - Advisor: Prof. Raymond Yeung
  - Title: Some Schemes for File Dissemination in Networks Employing Linear Network Coding

- Microsoft Research AI, Redmond, Washington, USA, Sep. 2019
  - Host: Prof. Sebastien Bubeck

TEACHING ASSISTANTSHIPS (Princeton University)

- Transmission and Compression of Information (ELE\APC 486), Spring 2017-2018
  - Instructor: Prof. Emmanuel Abbe

- Probability in High Dimension (ORF\APC 550), Fall 2018-2019
  - Instructor: Prof. Ramon van Handel

COURSES (Princeton University)

Course Title	Instructor(s)	Grade
Information Theory	Sergio Verdú	A^+
Lossless Data Compression	Sergio Verdú	A^+
Coding Theory and Random Graphs	Emmanuel Abbe	A^+
Theoretical Machine Learning	Elad Hazan	A
Probability in High Dimension	Ramon van Handel	A
Probability Theory	Ovidiu Calin	A
Theory of Detection and Estimation	Paul Cuff	A
Random Graphs and Networks	Emmanuel Abbe	A
Sparsity, Structure and Inference	Yuxin Chen	A
Theory of Algorithms	Robert Tarjan	A
Information Theory and Machine Learning (Seminar)	Emmanuel Abbe	P
Random Processes in Information Systems	Sergio Verdú	A^-
New Directions in Theoretical Machine Learning	Sanjeev Arora	AUD
The Probabilistic Method	Noga Alon	AUD
Theory of Detection and Estimation	Sergio Verdú	AUD
Introduction to Statistical Mechanics	Salvatore Torquato & Roberto Car	AUD

PROGRAMMING LANGUAGES

- MATLAB
- Python
- C++