AMIR R. ASADI

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RESEARCH INTERESTS

- Statistical Machine Learning
- Differential Privacy
- Information Theory
- High-Dimensional Probability and Statistics
- Data Compression

CAREER

- Statistical Laboratory,
  Department of Pure Mathematics and Mathematical Statistics,
  University of Cambridge, Cambridge, UK
  - Leverhulme Early Career Fellow
    Isaac Newton Trust Fellow — Sep. 2023 to present
  - Research Associate — Oct. 2021 to Aug. 2023
    - Mentors: Prof. Po-Ling Loh and Dr. Varun Jog
- Postdoctoral Affiliate of Trinity College — Jan. 2022 to present

EDUCATION

- **Princeton University**, Princeton, New Jersey, USA.
  - 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**, Tehran, Iran. — Sep. 2010 to Aug. 2015
  - B.Sc. in Mathematics

- B.Sc. in Electrical Engineering (Communications)
  - Project Advisor: Prof. Amin Gohari
  - Total GPA: 18.48 out of 20

- **Shahid Ejei High School** (National Organization for Development of Exceptional Talents), Isfahan, Iran. Sep. 2006 to Aug. 2010
  - High School Diploma in Mathematics and Physics

PUBLICATIONS

- **A. R. Asadi** & V. Jog (2024) Rational Differential Privacy *(In Preparation)*
- **A. R. Asadi** & P. Loh (2023) Entropic Regularization of Neural Networks: Self-Similar Approximations. *(Submitted for Publication)*
- **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. *2023 Conference on Learning Theory (COLT).*
- **A. R. Asadi**. (2022) An Entropy-Based Model for Hierarchical Learning. *arXiv preprint arXiv: 2212.14681 (Submitted for Publication)*
- **A. R. Asadi** & E. Abbe. (2022) Maximum Multiscale Entropy and Neural Network Regularization. *(Submitted for Publication)*
- **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), 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) 2017* (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)
- Teaching Assistant Award from the Department of Electrical 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, held on 21 April 2023.
- Co-organizer of the 2nd Cambridge Information Theory Colloquium, to be held on 10 May 2024. http://sigproc.eng.cam.ac.uk/CITC/
- Reviewer for:
  - Journal of Machine Learning Research (JMLR)
  - IEEE Transactions on Information Theory
  - 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

GRADUATE 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

ONLINE COURSES (Coursera)

Course Title	Instructor(s)	Institution	Grade
Python for Everybody	Charles Severance	University of Michigan	P
Python Data Structures	Charles Severance	University of Michigan	P

PROGRAMMING LANGUAGES

- MATLAB
- Python
- C++