

# 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 & P. Loh (2023) Hierarchical Generation of Private Synthetic Data. (*In Preparation*)
- **A. R. Asadi** & V. Jog (2023) 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.  
<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 INTERSHIPS 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)**

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

### **ONLINE COURSES (Coursera)**

<b>Course Title</b>	<b>Instructor(s)</b>	<b>Institution</b>	<b>Grade</b>
Python for Everybody	Charles Severance	University of Michigan	<i>P</i>
Python Data Structures	Charles Severance	University of Michigan	<i>P</i>

### **PROGRAMMING LANGUAGES**

- MATLAB
- Python
- C++