Amichai Painsky - Curriculum Vitae

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Contact Information

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Education

Tel Aviv University, Tel Aviv, Israel 2012 - 2016

Ph.D. in Statistics
Under the joint supervision of Prof. Saharon Rosset and Prof. Meir Feder
Thesis: Generalized Independent Components Analysis over Finite Alphabets

Tel Aviv University, Tel Aviv, Israel 2011 - 2012

M.Sc. in Statistics
Under the supervision of Prof. Saharon Rosset
Thesis: Exclusive Row Biclustering Using a Combinatorial Auction Approach

Princeton University, Princeton, New Jersey 2008 - 2009

M.Eng. in Electrical Engineering
Under the supervision of Prof. Mung Chiang
Research Field: The interdependence of social and communication networks

Tel Aviv University, Tel Aviv, Israel 2003 - 2007

B.Sc. in Electrical Engineering, *Cum Laude*

Academic Positions

Tel Aviv University, Tel Aviv, Israel 2019 - present

Senior Lecturer (Assistant Professor)
The Industrial Engineering Department

Massachusetts Institute of Technology, Cambridge, Massachusetts 2017 - 2019

Post-doctoral Research Fellow
Hosted by Prof. Gregory Wornell

The Hebrew University, Jerusalem, Israel 2016 - 2019

Post-doctoral Research Fellow
The Israeli Center of Research Excellence in Algorithms (I-CORE ALGO)
Hosted by Prof. Naftali Tishby

Honors and Awards

- HUJI Cyber Security Research Center (H-CSRC) Post-doctoral Grant 2017
- Israeli Center of Research Excellence in Algorithms Post-doctrocal Fellowship 2016
- The Don and Sara Marejn Foundation award for outstanding Ph.D. students 2016
- Weinstein Institute award for outstanding graduates in signal processing 2015
- Outstanding Ph.D. student award, School of Mathematical Sciences 2013
- Brain Return Scholarship, Israeli Center for Returning Scientists 2011
- Dean's List for Outstanding Undergraduate Students (top 5%) 2006-2007

Book Chapters

A. Painsky,
"Quality Assessment and Evaluation Criteria in Supervised Learning",
The Handbook of Machine Learning for Data Science, Springer Publishing, 2023

Journal Publications

S. Anuk, T. Bendory and **A. Painsky**,
"Image Detection using Combinatorial Auction",
IEEE Open Journal of Signal Processing, Aug 2024

R. Feng, S. Kim and **A. Painsky**,
"Tokenization of Distributed Insurance by Auction",
Japanese Journal of Statistics and Data Science, Jul 2024

A. Pinchas, I. Ben-Gal and **A. Painsky**,
"A Comparative Analysis of Discrete Entropy Estimators for Large Alphabet Problems",
Entropy, Special Issue on Information Theory for Data Science, Vol 26, Issue 5, Apr 2024

A. Painsky,
"Confidence Intervals for Parameters of Unobserved Events",
Journal of the American Statistical Association (JASA), Mar 2024

D. Marton and **A. Painsky**,
"Good-Bootstrap: Simultaneous Confidence Intervals for Large Alphabet Distributions",
Journal of Nonparametric Statistics, Feb 2024

Y. Nissenbaum and **A. Painsky**,
"Cross-validated Tree-based Models for Multi-target Learning",
Frontiers in Artificial Intelligence, Vol. 6, Jan 2024

A. Painsky,
"Large Alphabet Inference",
Information and Inference. Vol. 12, Issue 4, Dec 2023

Y. Eppel, M. Kaspi and **A. Painsky**,
"Decision Making for Basketball Clutch Shots: A Data Driven Approach",
Journal of Sports Analytics. Aug 2023

M. Roth, **A. Painsky** and T. Bendory,
"Detecting Non-overlapping Signals with Dynamic Programming",
Entropy, Special Issue on Statistical Methods for Modeling High-Dimensional and Complex Data, Jan 2023

M. Yechezkel, M. Mofaz, **A. Painsky**, T. Patalon, S. Gazit, E. Shmueli and D. Yamin,
"Safety of the Forth Covid-19 BNT162b2 mRNA (second booster) Vaccine: Prospective and Retrospective Cohort Study",
The Lancet Repository Medicine, Oct 2022

A. Painsky
"Convergence Guarentees for the Good-Turing Estimator",
Journal of Machine Learning Research (JMLR), Vol 23, Issue 27, Sep 2022

Y. Shalev, **A. Painsky** and I. Ben-gal
"Neural Joint Entropy Estimation",
IEEE Transactions on Neural Networks and Learning Systems, Oct 2022

A. Adler, **A. Painsky**,
"Feature Importance in Gradient Boosting Trees with Cross-Validation Feature Selection",
Entropy, Special Issue on Statistical Methods for Complex Systems, May 2022

S. Rosset, R. Heller, **A. Painsky** and E. Aharoni,
"Optimal and Maximin Procedures for Multiple Testing Problems",
Journal of the Royal Statistical Society: Series B, Apr 2022

A. Painsky,
"Generalized Good-Turing Improves Missing Mass Estimation",
Journal of the American Statistical Association (JASA), Jan 2022.

A. Painsky and M. Feder,
"Robust Universal Inference", [**Awarded Editor's Choice Article**]
Entropy, Special Issue on Application of Information Theory in Statistics,
Vol 23, Issue 6, Jun 2021

A. Painsky and G. W. Wornell,
"Bregman Divergence Bounds and Universality Properties of the Logarithmic Loss",
IEEE Transactions on Information Theory, Vol, 66, Issue 3, Mar 2020

A. Painsky, M. Feder and N. Tishby,
"Non-linear Canonical Correlation Analysis: a Compressed Representation Approach",
Entropy, Special Issue on Theory and Applications of Information Theoretic Machine Learning, Vol 22, Issue, 2, Feb 2020

A. Painsky S. Rosset and M. Feder,
"Innovation representation of stochastic processes with application to causal inference",
IEEE Transactions on Information Theory, Vol. 66, Issue 2, Feb 2020

A. Painsky and S. Rosset,
"Lossless Compression of Random Forests",
Journal of Computer Science and Technology, Vol. 34, No. 2, pp. 494-506, Mar 2019

A. Painsky, S. Rosset and M. Feder,
"Linear Independent Component Analysis over Finite Fields: Algorithms and Bounds",
IEEE Transactions on Signal Processing, Vol. 66, Issue 22, Nov 2018

A. Painsky and N. Tishby,
"Gaussian Lower Bound for the Information Bottleneck Limit",
Journal of Machine Learning Research (JMLR), Vol. 18, Issue 1, Apr 2018

A. Painsky and S. Rosset,
"Cross-Validated Variable Selection in Tree-Based Methods Improves Predictive Performance",
IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), Vol. 39, No. 11, pp. 2142-2153, Nov. 2017

A. Painsky, S. Rosset and M. Feder,
"Large Alphabet Source Coding using Independent Component Analysis",
IEEE Transactions on Information Theory, Vol. 63, No. 10, pp. 6514-6529, Oct. 2017

A. Painsky, S. Rosset and M. Feder,
"Generalized Independent Component Analysis over Finite Alphabets",
IEEE Transactions on Information Theory, Vol. 62, No. 2, pp. 1038-1053, Feb. 2016

A. Painsky and S. Rosset,
"Isotonic Modeling with Non-differentiable Loss Functions with Application to Lasso Regularization",
IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), Vol. 38, No. 2, pp. 308-321, Feb. 2016

A. Painsky and S. Rosset,
"Optimal Set Cover Formulation for Exclusive Row Biclustering of Gene Expression",
Journal of Computer Science and Technology, Vol. 29, No. 3, pp. 423-435, Apr. 2014

Competitive Conference Papers (less than 10% acceptance rate)

A. Painsky and S. Rosset,
"Compressing Random Forests",
IEEE 16th International Conference on Data Mining (ICDM), pp. 1131-1136, Dec. 2016

A. Painsky and S. Rosset,
"Exclusive Row Biclustering for Gene Expression Using a Combinatorial Auction Approach",
IEEE 12th International Conference on Data Mining (ICDM), pp. 1056-1061, Dec. 2012

Conference Papers

A. Painsky,
"A Data-Driven Missing Mass Estimation Framework",
IEEE International Symposium on Information Theory (ISIT), Jun 2022

A. Painsky,
"Refined Convergence Rates of the Good-Turing Estimator",
IEEE Information Theory Workshop (ITW), Oct 2021

A. Painsky and G. W. Wornell,
"On the Universality of the Logistic Loss Function",
IEEE International Symposium on Information Theory (ISIT), pp. 936-940, Jul. 2018

A. Painsky, S. Rosset and M. Feder,
"Binary Independent Component Analysis: Theory, Bounds and Algorithms",

IEEE International Workshop on Machine Learning for Signal Processing (MLSP), pp. 1-6, Sep. 2016

A. Painsky, S. Rosset and M. Feder,
"A simple and Efficient Approach for Adaptive Entropy Coding over Large Alphabets",
Data Compression Conference (DCC), pp. 369-378, Apr. 2016

A. Painsky, S. Rosset and M. Feder,
"Universal Compression of Memoryless Sources over Large Alphabets via Independent Component Analysis",
Data Compression Conference (DCC), pp. 213-222, Apr. 2015

A. Painsky, S. Rosset and M. Feder,
"Generalized Binary Independent Component Analysis",
IEEE International Symposium on Information Theory (ISIT), pp. 1326-1330, Jul. 2014

A. Painsky, S. Rosset and M. Feder,
"Memoryless Representation of Markov Processes",
IEEE International Symposium on Information Theory (ISIT), pp. 2294-2298, Jul. 2013

A. Painsky,
"First Order Multiple Hypothesis Tracking for the Global Nearest Neighbor Data Correlation Approach",
IEEE Sensor Data Fusion (SDF) Workshop, pp. 773-784, Sep. 2010

Patents

A. Freiberger, D. Izhaky, **A. Painsky**, A. Shamir, Z. Bendet, O. Steinberg and A. Tamir,
"Apparatus and Method for Analyzing Driving data",
US Patent 13/972,134, commercialized at Verisk, Aug. 2012

A. Freiberger, D. Izhaky, **A. Painsky**, A. Shamir, Z. Bendet, O. Steinberg and A. Tamir,
"Apparatus and Method for Detecting Driving data",
US Patent 13/964,568, commercialized at Verisk, Aug. 2012

A. Painsky,
"Data Fusion Method for High Computational Load ",
US Patent 8,805,648, commercialized at 4-D Security Solutions, Jun. 2011

A. Painsky,
"System and Method for Multi-target Tracking",
US Patent 13/651,090, commercialized at 4-D Security Solutions, May 2010

Research Grants

- ISF Grant 963/21 for $250,000 (sole PI) 2021-2025
- ISF Young Faculty Equipment Grant 3354/21 for $50,000 (sole PI) 2021-2025
- TAU Data Science Core Research Grant for $62,000 (co-PI with Tamir Bendory) 2020-2021

Teaching

Lecturer at Tel Aviv University

- Introduction to Machine Learning 2021 - present
- Statistical Inference and Learning (Graduate Level) 2021 - present

- Statistical Foundations of Data Science 2020 - present
- Learning Theory (Graduate Level) 2023
- Statistics 2019, 2020
- Digital Signal Processing (TAU International Program) 2015
- Digital Signal Processing 2012 - 2014

Service

Journal Editorship

- Entropy – special issue on Statistical Methods for Complex Systems 2020 - 2022
- Entropy – special issue on Information and Data Science 2022 - Present

Journal Editorial Board Membership

- Journal of Machine Learning Research (JMLR) 2019 - present

Scientific Committee

- The Israel Statistics and Data Science Association Annual Conference 2023

Technical Program Committee

- IEEE International Conference on Data Mining 2019,2021
- IEEE International Symposium on Information Theory 2020

Professional Experience

DRW, Tel Aviv, Israel 2019 - present

Statistical Research - Consultant

Statistical modeling, inference and machine learning research in algorithmic trading.

Sensomatix Ltd, Ramat Gan, Israel 2011 - 2012

Researcher

Statistical modeling, data mining and machine learning research in the field of Usage Based Car Insurance

4-D Security Solutions, South Plainfield, New Jersey 2009 - 2011

Advanced Algorithms Lead

Research and development of machine learning algorithms for a large-scale surveillance system, deployed in New York's and New Jersey's major airports

Freescale Semiconductors, Hertzelia, Israel 2006 - 2008

Communications Algorithms Engineer

Development and implementation of signal processing algorithms for third and forth generation wireless communication devices