Curriculum Vitae
Tal Shnitzer

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Education

Direct PhD in Electrical Engineering, Technion   *2014 - 2020*
Thesis title: "Operator-Theoretic Approach for Manifold Learning with
Application to Multimodal and Temporal Data Analysis"
Advisor: Prof. Ronen Talmon

B.Sc. in Bio-medical Engineering and Electrical Engineering, Technion   *2008-2013*
Graduated Summa Cum Laude. Final GPA: 96.2, 2nd in class (out of 180).
Student of the Technion Excellence Program

Research Experience and Employment

Postdoctoral Associate, CSAIL MIT   *2021-today*
Postdoc with Prof. Justin Solomon at the Geometric Data Processing Group (GDP)

Research Internship, University of Toronto   *02-05 / 2017*
Working with Prof. Hau-Tieng Wu on diffusion operators for data analysis
Funded by the Canada-Israel Innovation Initiative for Student Mobility

Department of Signal Processing and Algorithms, Rafael   *2012 - 2013*
Student position. Algorithm simulation and sensitivity analysis of navigation
algorithms based on high resolution digital terrain maps.

Head of a software testing team, Philips Healthcare   *2007 - 2009*
Development and manufacturing of CT scanners. Head of cardiac software
testing team.

Teaching and Mentorship Experience

2021-today: Project mentor, *GDP,* MIT. Mentoring 3 UROPs (undergraduate projects).
2012-2019: Tutoring: *Image Processing and Analysis* (graduate international course)
              Introduction to Digital Signal Processing (undergraduate course)
              Visual and Auditory Systems (joint graduate and undergraduate)
              Methods in Analysis of Biological Signals (joint graduate and undergraduate)
2014-2019: Project instructor, *Signal and Image Processing Lab*, Technion. Instructed 11
              undergraduate projects in different fields of signal processing with applications to
              biomedical signals such as EEG, EMG and ECG. Two projects resulted in academic
              papers and one project was mentioned in a special issue of IEEE SPM.
2015-2019: Lab instructor: *Digital Processing of Speech Signals* (undergraduate lab)

Prizes and Scholarships

2021   *Rising Stars in EECS*, Massachusetts Institute of Technology

2021-2022 *Schmidt Postdoc Award for Women in Mathematical and Computing Sciences*
Awarded to 10 Israeli students

2020   *Viterbi Fellowship for Nurturing Future Faculty Members, EE, Technion*

2020   *Zuckerman-CHE Israeli Postdoctoral Scholarship (withdrawn)*
Awarded to 18 Israeli students

2020   *Fulbright Postdoctoral Fellowship (withdrawn)*
Awarded to 16 Israeli students

2018-2020 *Clore Israel Foundation Scholarship*
Awarded to 10 outstanding doctoral students in Israel in all fields of science

2018   *Dvora and Prof. Israel Cederbaum Scholarship, EE Technion*

2017   *Freud Excellence Award, EE Technion*

2017   *Lyon Sachs Technion - University of Toronto Student Collaboration Fund*

2017   *Canada-Israel Innovation Initiative for Student Mobility*
Funding for a 3-month research internship at the University of Toronto

2016,17,19 *Outstanding Teaching Assistant award, Technion*

2016   *SIPL Teaching Award for distinguished project supervisors, EE Technion*

2016   *Boaz Porat Excellence Award, EE Technion*

2015   *Diane and Leonard Sherman Interdisciplinary Excellence Award, Technion*

2014   *Josef and Rina Zipers Excellence Prize, EE Technion*

2014   *Meyer Scholarship for outstanding undergraduate students, EE Technion*

2014   *Applied Materials Excellence Award*

2009-2013 *Technion Program for Excellence (Rothschild Scholars Program)*

Additional Activities and Academic Services

2019-today   Journal and Conference Reviewer: ICML, JMLR, ACHA, IEEE: TSP, TKDE, SIPN

08/2021   Project mentor at the Summer Geometry Institute (SGI) 2021 at MIT.

2018-2020   Organizing committee member of the women in EE forum "WomEE" Technion, aiming to advance women in EE at all career stages.

2018   Young Female Leaders in Science 2-day workshop

Publication List

Refereed journal papers

Graph of graphs analysis for multiplexed data with application to imaging mass cytometry
Y.-W. E. Lin, T. Shnitzer, R. Talmon, F. Villarroel-Espindola, S. Desai, K. Schalper, Y. Kluger
PLoS Computational Biology, 17.3: e1008741, 2021

Diffusion Maps Kalman Filter for a Class of Systems with Gradient Flows
T. Shnitzer, R. Talmon, J. J. Slotine
IEEE Transactions on Signal Processing, 68: 2739-2753, 2020

Layer and cell specific recruitment dynamics during epileptic seizures in-vivo
F. Aeed, T. Shnitzer, R. Talmon, Y. Schiller
Annals of Neurology 87.1: 97-115, 2020

Recovering Hidden Components in Multimodal Data with Composite Diffusion Operators
T. Shnitzer, M. Ben-Chen. L. Guibas, R. Talmon, H.T. Wu
SIAM Journal on Mathematics of Data Science, 1.3: 588-616, 2019

Manifold Learning with Contracting Observers for Data-driven Time-series Analysis
T. Shnitzer, R. Talmon, J. J. Slotine
IEEE Transactions on Signal Processing, 65.4: 904-918, 2017

Direction Modulation of Muscle Synergies in a Hand-Reaching Task
S. Israely, G. Leisman, C. Machluf, T. Shnitzer, E. Carmeli
IEEE Transactions on Neural Systems and Rehabilitation Engineering, 25.12: 2427-2440, 2017

Refereed papers in conference proceedings

Log-Euclidean Signatures for Intrinsic Distances Between Unaligned Datasets
T. Shnitzer, M. Yurochkin, K. Greenewald, J. Solomon
Accepted to the 39th International Conference on Machine Learning (ICML 2022), Jul 2022

Diffusion Maps Particle Filter
L. Forster, A. Schmidt, W. Kellermann, T. Shnitzer, R. Talmon
27th European Signal Processing Conference (EUSIPCO), IEEE, 2019

Alternating Diffusion Maps for Dementia Severity Assessment
T. Shnitzer, M. Rapaport, N. Cohen, N. Yarovinsky, R. Talmon, J. Aharon-Peretz
Oral presentation at ICASSP'17, pp. 831-835, 2017

Submitted papers

Spatiotemporal Analysis Using Riemannian Composition of Diffusion Operators
T. Shnitzer, H.T. Wu, R. Talmon
Submitted Jan 2022

Book chapters

Manifold Learning for Data-Driven Dynamical System Analysis
T. Shnitzer, R. Talmon, J. J. Slotine
The Koopman Operator in Systems and Control: Theory, Numerics and Applications, Springer, 359-382, 2020

Diffusion Operators for Multimodal Data Analysis
T. Shnitzer, R. R. Lederman, G.-R. Liu, R. Talmon, H.-T. Wu
Handbook of Numerical analysis: Processing, Analyzing and Learning of Images, Shapes and Forms, part 2, Elsevier, 1-39, 2019

Conference abstracts

Automatic Segmentation of Twin Regions in Mo-Di Placentae Based on Geometric Analysis of Spatiotemporal BOLD MRI Signals
T. Shnitzer, S. M. Abulnaga, C. Bibbo, P. E. Grant, P. Golland, J. Solomon, E. A. Turk
ISMRM, London, May 2022

EEG-based geometric modeling and analysis of cognitive deterioration in patients with possible and probable Alzheimer's disease
T. Shnitzer, N. Yarovinsky, R. Talmon, J. Aharon-Peretz
Neurology Apr 2017, 88 (16 Supplement) P1.098

EEG-based geometric modeling and analysis of cognitive deterioration in AD
T. Shnitzer, N. Yarovinsky, R. Talmon, J. Aharon-Peretz
Student presentation at The 24th Tel-Aviv University Alzheimer's Disease Conference in collaboration with the University of California, June 2016

Rapid Imaging of Three-Dimensional Samples Using Light Field Microscopy
T. Shnitzer, L. Tsur, A. Marom, S. Shoham
Poster presentation at the 6th Israel Live Imaging Forum (ILIF), March, 2012