Curriculum Vitae

Name: Tom Trigano **Date: XXXXXXX**

1. Personal Details

Permanent Home Address: Shin Ben Zion 40, Rehovot, Israel

Home Telephone Number: +972-8-9362621

Office Telephone Number: +972-8-8519137

Cellular Phone: +972-54-6427316

Electronic Address: thomast@sce.ac.il

Google Scholar h-index: 12 (total), 9 (since 2018)

2. Higher Education

a. Undergraduate and Graduate Studies

Period of Study	Name of Institution and Department	Degree	Year of Approval of Degree
2002-2005	Telecom Paris – Department of Signal and Image Processing	Ph.D.	2005
2000-2001	Paris 6 University – Department of Probability and Statistics	M.Sc. (Applied Probability)	2001
1998-2001	Telecom Paris - Department of Signal and Image Processing	M.Sc. (Electrical Engineering)	2001
1995-1998	Paris 7 University – Department of Mathematics	B.Sc. (Mathematics)	1998

b. Post-Doctoral Studies

Period of Study	Name of Institution, Department and Host	Degree	Year of Approval of Degree
2006-2008	Hebrew University of Jerusalem, department of Statistics Supervisor: Prof. Yaacov. Ritov		Study of alignment semiparametric models (1 paper published)

3. Academic Ranks and Tenure in Institutes of Higher Education

Dates	Name of Institution and Department	Rank/Position
2012 – Present:	SCE, Department of Electrical and Electronics Engineering, Ashdod, Israel	Senior Lecturer
2020-Present	Tel-Aviv University, Department of Biomedical Engineering	Adjunct Lecturer
2018	Politechnic University of Madrid, Department of Telecommunications, Madrid, Spain	Invited Lecturer
2018	Ben Gurion University of the Negev, Department of Biomedical Engineering	Adjunct Lecturer
2017-Present	Afeka College of Engineering, Department of Electrical Engineering	Adjunct Lecturer
2013	Commissariat a l'Energie Atomique, Saclay, France	Invited Researcher
2008-2012	SCE, Department of Electrical and Electronics Engineering, Ashdod, Israel	Lecturer
2006-2008	Hebrew University of Jerusalem, Department of Statistics, Jerusalem, Israel	Post-doctoral fellow Supervisor: Prof. Yaacov Ritov Head of department: Prof. Zvika Gilula
2003-2005	Paris 9 University, Department of Statistics, Paris, France	Teaching Assistant

4. Offices in Academic Administration

Dates	Name of Institution and Department	Rank/Position
2017-Present:	SCE, Department of Electrical and Electronics Engineering, Ashdod, Israel	Member of the curriculum committee of the Electrical Engineering Department

2014-Present	SCE, Department of Electrical and Electronics Engineering, Ashdod, Israel	Member of the teaching committee of the Electrical Engineering Department
2013-2015	SCE, Department of Electrical and Electronics Engineering, Ashdod, Israel	Participated in the development of the M.Sc. program, Department of Electrical Engineering
2010-Present	SCE, Department of Electrical and Electronics Engineering, Ashdod, Israel	Final year project coordinator of the Electrical Engineering department

5. Scholarly Positions and Activities outside the Institution

Professional Associations:

IEEE: Member of IEEE and IEEE signal processing society since 2009

Reviewer (Journals):

2020-Present: Reviewer for Digital Signal Processing

2018-Present: Reviewer for IEEE Access

2018-Present: Reviewer for Journal of Applied Statistics

2018-Present: Reviewer for Computers in Biology and Medecine

2017-Present: Reviewer for Elsevier Signal Processing

2015-Present: Reviewer for IEEE Signal Processing Letters

2015-Present: Reviewer for IET Signal Processing

2015-Present: Reviewer for Nuclear Science and Techniques

2014-Present: Reviewer for Journal of Multivariate Analysis

2010-2011: Reviewer for Advances in Signal Processing

2010-present: Reviewer for Journal of Statistical Planning and Inference

2010-present: Reviewer for Bernoulli

2008-present: Reviewer for IEEE Transactions in Signal Processing

Reviewer (Conference):

2022: Reviewer of the CMIS 2022 Conference

2020-Present: Reviewer of the ICASSP Conference

2020: Reviewer of the MLSP 2020 Conference

2012: Reviewer of the ICPSA 2012 Conference

Ph. D. committee member:

2020: Jury Member of the thesis committee of M. Alejandro Silva Bernardez, Politechnic University of Madrid, Spain

Thesis title: A method for the very early detection of rotor-casing rub in aeroderivative gas turbines

Supervisors: Prof. Alejandro Zarzo, Prof. Juan Manuel Munoz-Guijosa

Chairman at Conferences:

Chairman of the panel "Machine Learning for Time Series Analysis" in 2nd IEEE Machine Learning in Engineering Workshop, 2023, Israel

Chairman of the signal processing panel of the Electro-Magnetic Compatibility 2010 Conference, SCE, Israel

International Conference Organization:

2022-Present: Program Committee member of the International Workshop on Computer Modeling and Intelligent Systems Conference (CMIS 2022 and 2023).

.

6. Participation in Scholarly Conferences

a. Active Participation

International conferences:

Date	Name of Conference	Place of Conference	Subject of Lecture/Discussion
2023	2nd IEEE Machine Learning in Engineering Workshop	Beer-Sheva, Israel	Deep Learning Methods for Nuclear Spectroscopy
2022	2022 IEEE European Technology and Engineering Management Summit	Bilbao, Spain	Improving Quality of Life through the Engineering Education. Case Study
2020	European Signal Processing Conference (EUSIPCO)	Amsterdam, Netherlands	Efficient Iteratively Rewighted LASSO Algorithm for Cross-Products Penalized Sparse Solutions
2019	17th International Conference on Computer Aided Systems Theory	Las Palmas, Spain	Overcomplete Multiscale Dictionaries for Efficient Representations of ECG Signals
2018	41th International Conference on Telecommunications and Signal Processing	Athens, Greece	Sparse ECG Representation with a Multi-Scale Dictionary Derived from Real-World Signals
2014	European Signal Processing Conference (EUSIPCO)	Lisbon, Portugal	Grouped Sparsity Algorithm for Multichannel Intracardiac ECG Synchronization

2013	IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)	Vancouver, Canada	Cross-Products LASSO
2012	27-th IEEE Convention of Electrical and Electronics Engineers in Israel	Eilat, Israel	Pileup Attenuation for Spectroscopic Signals Using A Sparse Reconstruction
2012	22nd IEEE International Workshop on Machine Learning for Signal Processing (MLSP)	Santander, Spain	Sparse Spectral Analysis Of Atrial Fibrillation Electrograms
2012	European Signal Processing Conference (EUSIPCO)	Bucarest, Romania	Iterated Sparse Reconstruction for Activity Estimation in Nuclear Spectroscopy
2012	10th Latent Variable Analysis and Signal Separation (LVA/ICA)	Tel-Aviv, Israel	Regularized Sparse Representation for Spectrometric Pulse Separation and Counting Rate Estimation
2011	IEEE International Workshop on Statistical Signal Processing (SSP)	Nice, France	On Nonhomogeneous Activity Estimation in Gamma Spectrometry using Sparse Signal Representation
2010	26th IEEE Convention of Electrical and Electronics Engineers in Israel	Eilat, Israel	Sparse Regression Algorithm for Activity Estimation in Gamma Spectrometry
2008	European Signal Processing Conference (EUSIPCO)	Lausanne, Switzerland	Semiparametric Density Estimation of Shifts for alignment of ECG data
2007	2nd Young French Statisticians Association Workshop	Aussois, France	Semiparametric Density Estimation of Shifts
2006	26th International Workshop on Bayesian Inference and Maximum Entropy Methods in Science and Engineering	Paris, France	Nonparametric Bayesian Estimation of Censored counters Intensity from the indicator data
2006	IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)	Toulouse, France	Energy Spectrum Reconstruction for HPGe Detectors Using Analytical Pile-Up Correction
2005	1st Young French Statisticians Association Workshop	Aussois, France	Nonparametric Density Estimation from Indirect Measurements With Application To Pileup Correction

2005	IEEE International Workshop on Statistical Signal Processing (SSP)	Bordeaux, France	Nonparametric Inference for Pile-up Correction in Nuclear Spectrometry
2005	IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)	Philadelphia, USA	Pile-up Correction Algorithms for Nuclear Spectrometry
2003	9th Young Researchers in Nuclear Science Workshop	Aussois, France	Statistical Model of the photonic signals for gamma spectroscopy
2002	NIST Speaker Recognition Workshop	Washington, USA	Description of the ENST Speaker Verification System

Israeli conferences:

Date	Name of Conference	Place of Conference	Subject of Lecture/Discussion
2016	Afeka Unsupervised Machine Learning Workshop	Tel-Aviv, Israel	Sparse Signal Processing of Intracardiac ECG

b. Organization of Conferences and Sessions

Date	Name of Conference	Place of Conference	Subject of Lecture/Discussion	Role
2023	CMIS 2023	Ukraine (on Zoom)	Computer Science and Mechanical Engineering	Member of the program committee
2022	CMIS 2022	Ukraine (on Zoom)	Computer Science and Mechanical Engineering	Member of the program committee
2019	2ND BIOART yearly meeting	SCE	Biomedical Engineering in Education	Chariman of the organizing committee
2010	EMC 2010	SCE	Electromagnetic Compatibility	Chairman of the signal processing panel

7. Invited Lectures/Colloquium Talks

Date	Place of Conference	Name of Forum	Presentation/Comments
2018	Politechnic University of Madrid, Spain	UPM, Department of signal processing	*Image segmentation: reflexions from a signal processing practitioner (4 lectures)*
2016	Ashdod	SCE, Department of Electrical Engineering	*Pile up correction using compressive sensing: theoretical results*

2012	Tel Aviv	Tel Aviv University	*Sparse regression for pile-up attenuation of spectroscopic signals*
2011	Jerusalem	Hebrew University	*Statistical results on post-processed LASSO for activity estimation in Gamma Spectrometry*
2011	Paris, France	Telecom ParisTech and Atomic Energy Commission	*Sparse signal estimation for activity estimation in Gamma Spectrometry*
2009	Paris, France	Telecom ParisTech	*Semiparametric approach for curve alignment with application to ECG data*
2007	Tel Aviv	Tel Aviv University	*Statistical Results for pileup correction methods*
2007	Haifa	Technion	*Statistical Results for pileup correction methods*
2007	Beer-Sheva	Ben Gurion University	*Pileup correction methods for nuclear science*
2006	Jerusalem	Hebrew University, Department of Statistics	*Nonparametric Bayesian Techniques for Counting processes*
2005	Jerusalem	Hebrew University, Department of Statistics	*Gamma spectrometry and pile up correction : probabilistic results*

8. Research Grants

a. Grants Awarded

Role in Research	**Co-Researchers**	**Topic**	**Funded by/Amount**	**Year**
PI (National Coordinator)	Dr. Irit Juwiler Dr. Kfir Ben Harush Dr. Michal Goldenberg Dr. Guy Ben Hamu Prof. Amir Eliezer Dr. Amos Bardea Dr Ronen Susnik	ERAMUS+ Capacity, BIOART: multidisciplinary curriculum in Bioengineering with emphasis on smart artificial implants. The following journal papers were published in this framework: [2], [3], [4], [6]	European Union (135000 Euros)	2017-2021

	Prof Gur Yaari

b. Submission of Research Pending

Role in Research	Co-Researchers	Topic	Funded by/Amount	Year
PI	Prof. Xiaoying Zheng Dr. Dima Bykhovsky Dr. Yann Sepulcre	Machine-Learning Based Instrumentation for Spectroscopy Signals Denoising and Inference	ISF (300000 NIS)	2023

c. Submissions of Research Proposals-Not Funded

Role in Research	Co-Researchers	Topic	Funded by	Year	Score
Co-Investigastor	Prof David Luengo, Prof. Deirdre Cabooter Dr. Jose Arques, Dr. Irit Juwiler	Machine Learning Models for Active Monitoring of CECs in Inland Waters	Horizon 2020	2021	Passed the first round
PI	Dr. Hen Giladi	High testing throughput for COVID-19 using compressive sensing and metaheuristics-based optimization.	ISF	2020	
PI		Development of Environment-Aware Medical Measurement Devices	MOST	2019	
PI		Development of new statistical signal processing methods for pileup correction in Gamma spectrometry	ISF	2011	

9. Scholarships, Awards and Prizes

2023: Award for Excellence in Teaching, SCE

2018: Award for Excellence in Teaching, SCE

2017: Award for Excellence in Teaching, SCE

2016: Award for Excellence in Teaching, SCE

2009-2012: Sami Shamoon Research Scholarship (30000 NIS)

2006-2008: Golda Meir grant, from the Lady Davis Fellowship Trust - Post-doctoral fellowship

10. Teaching

a. Coursed Taught in Recent Years

Year	Name of Course	Type of Course Lecture/Seminar/Workshop/ Introduction Course (Mandatory)	Degree	Number of Students
2022	Medical Image Processing	Lecture (taught at Tel-Aviv University)	B.Sc.	
2021	Advanced Digital Signal Processing	Lecture (taught at Afeka College of Engineering)	B.Sc.	
2019	Numerical Methods With Python	Lecture (taught at SCE)	B.Sc.	
2019-2021	Introduction to Signal Processing	Lecture (taught at Ben Gurion University and Tel Aviv University)	B.Sc.	
2017-2020	Introduction to Random Signal Processing	Lecture (taught at Afeka College of Engineering)	B.Sc.	
2014-2018	Digital Image Processing	Lecture (taught at SCE)	B.Sc.	
2016	Information Theory	Lecture (taught at SCE)	B.Sc.	
2009-Present	Probability And Statistics	Lecture (taught at SCE)	B.Sc.	
2009-Present	Digital Signal Processing	Lecture (taught at SCE)	B.Sc.	
2008-Present	Signals and Systems	Lecture (taught at SCE and Afeka College of Engineering)	B.Sc.	

b. Supervision of Graduate Students

Name of Student	Title of Thesis	Degree	Date of Completion/in Progress	Students' Achievements
Zikang Chen	Elimination of Pileup using Deep Learning Methods	Ph.D.	In Progress (started in 2023)	[1] in the book chapters list
Ashish Mishra	Spectral detection of Metabolites in	Ph.D.	In Progress (started in 2022)	Joint supervision with Dr Ittai Herrmann from the faculty of Agriculture, Hebrew University of

	herbs			Jerusalem
Uriel Aferiat	Development of an Algorithm for the Analysis of Multichannel ECG Signals	M.Sc.	2018	Thesis defended in 2018, performed in Ariel University Center.

11. <u>Miscellaneous</u>

- I mentor in the summer students from US universities participating to the Onward Israel and Taglit programs for internships based on the internship program in SCE, on ML projects.
- Besides the supervision mentioned above, I have been mentoring more than 40 final year projects at B.Sc. level at SCE, some of them yielding publication in Q1 journals (e.g. [4], [10] and [12] in the publications' list)
- From 2013 to 2014, I contributed to the redaction of the evaluation report of our department for the quality evaluation organized by the Council for Higher Education.
- I participated in 2014 to the creation of the curriculum of the M.Sc. in Electrical Engineering.

12. <u>Professional Experience</u>

<u>2020-2023:</u> Algorithm Developer and statistical consulting at Cardiokol, Airport City, Israel.

<u>2018-2019:</u> Back-end developer in deep learning solutions, Yoobic, Herzliya, Israel

<u>2015-2018:</u> Algorithm Developer in Computer Vision, Aetrex, Timorim, Israel

<u>2001-2002:</u> R&D Engineer, Dialoca, Belgium.

PUBLICATIONS

A. Ph.D. Dissertation

2005: "Statistical signal processing for spectrometry: application to pileup correction for Gamma spectrometry", Department of Signal and Image Processing, Telecom ParisTech, Paris, France.

Advisors: Prof. Eric Moulines and Dr. Antoine Souloumiac (currently Prof. Antoine Souloumiac).

The dissertation was published in French and contains 160 pages. An appendix in the dissertation is written in English (30 pages) and summarizes the main results.

Two journal papers were written based on the thesis: [19], [20].

The work was presented at several conferences: [16], [17].

A patent (Patents section: [2],[3]) was submitted on the digital implementation of the algorithm detailed in the dissertation.

D. Articles in Refereed Journals

Published

[1] **T. Trigano** and Z. Fradkin, "Fast Algorithm for Time Decay Estimation with Applications to Electrostatic Ion Beam Traps", in Measurement Science and Technology, Vol 34(2), pp. 025701, 2023, https://doi.org/10.1088/1361-6501/ac9c23. (**Q2**, GR 42, IF 2.398).

[2] **T. Trigano** and D. Luengo, "Intracardiac ECG Pulse Localization using Overlapping Block Sparse Reconstruction", in Biomedical Signal Processing and Control, Vol. 73(1), pp. 103921, Jan. 2023,https://doi.org/10.1016/j.bspc.2022.103921 (**Q1**, GR 69, IF 5.076)

[3] M. Khayat, S. Deri, D. Wolf, **T. Trigano**, O. Medalia, K. Ben-Harush, "Biomimetic nuclear lamin fibers with remarkable toughness and stiffness", in International Journal of Biological Macromolecules, Vol 163, pp 2060-2067, Nov. 2020, https://doi.org/10.1016/j.ijbiomac.2020.09.113 (**Q2**, GR 123, IF 8.025, 4 citations).

[4] **T. Trigano**, S. Vaknin and D. Luengo, "Fast Proximal Optimization for Sparse Reconstruction with Dictionaries Based on Translated Waveforms", in Signal Processing, Vol 169(4), paper 107379, April 2020, https://doi.org/10.1016/j.sigpro.2019.107379 (**Q1**, GR 71, IF 4.729, 4 citations).

[5] **T. Trigano** and Y. Bechor, "Fast Background Removal of JPEG Images Based on HSV Polygonal Cuts for a Foot Scanner Device", Journal of Real-Time Image Processing, 17(4), pp. 981-992, 2019, https://doi.org/10.1007/s11554-019-00850-5 (**Q2**, GR 32, IF 2.293, 1 citations).

[6] D. Luengo, D. Meltzer and **T. Trigano**, "An Efficient Method to Learn Overcomplete Multi-Scale Dictionaries of ECG Signals", Applied Science, 8(12), 2018, **https://doi.org/10.3390/app8122569** (**Q2**, GR 105, IF 2.638, 10 citations).

[7] **T. Trigano** and Y. Sepulcre, « Data-driven Parameter Selection in Activity Estimation for Nuclear Spectroscopy » , Signal Processing, 151, 99-106, 2018, https://doi.org/10.1016/j.sigpro.2018.05.006 (**Q1**, GR 71, IF 4.729, 2 citations).

[8] D. Bykhovsky and **T. Trigano**, « Numerical Generation of Compound Random Processes with Arbitrary Autocorrelation Functions », Fluctuations and Noise Letters, Nov. 2017, https://doi.org/10.1142/S0219477518500013 (**Q3**, GR 17, IF 1.31).

[9] **T. Trigano**, I. Shevtsov and D. Luengo, « CoSA : an Accelerated ISTA Algorithm for Dictionaries Based on Translated Waveforms », Signal Processing, 139, 131-135, Oct. 2017, https://doi.org/10.1016/j.sigpro.2017.04.004 (**Q1**, GR 71, IF 4.729, 14 citations).

[10] **T. Trigano** and Y. Cohen, "Intensity Estimation of Spectroscopic Signals with an Improved Sparse Reconstruction Algorithm", IEEE Signal Processing Letters, Vol. 24(5), pp. 530-534, 2017, 10.1109/LSP.2017.2680839 (**Q1**, GR 62, IF 3.201, 8 citations).

[11] **T. Trigano**, Y. Sepulcre and Y. Ritov, "Sparse Reconstruction Algorithm for Nonhomogeneous Counting Rate Estimation", IEEE Transactions in Signal Processing, Vol. 65(2), pp 372-385, 2017, 10.1109/TSP.2016.2620104 (**Q1**, GR 98, IF 4.875, 10 citations).

[12] **T. Trigano**, I. Gildin and Y. Sepulcre, "Pileup Correction Algorithm Using an Iterated Sparse Reconstruction Method", IEEE Signal Processing Letters, Vol. 22(9), pp. 1392-1396, 2015, 10.1109/LSP.2015.2406911 (**Q1**, GR 62, IF 3.201, 12 citations).

[13] **T. Trigano**, E. Barat, T. Dautremer and T. Montagu, "Fast Digital Filtering of Spectrometric Data for Pile-Up Correction", IEEE Signal Processing Letters, Vol. 22(7), pp. 973-977, July. 2015, 10.1109/LSP.2014.2377352 (**Q1**, GR 62, IF 3.201, 9 citations).

[14] D. Luengo, S. Monzon, **T. Trigano**, J. Via and A. Artes-Rodrigues, "Blind Analysis of Atrial Fibrillation Electrograms: Sparsity-Aware Formulation", Integrated Computer Aided Engineering, Vol. 22-1, pp.71-85, 2015, https://doi.org/10.3233/ICA-140471 (**Q1**, GR 24, IF 6.137, 18 citations).

[15] Y. Sepulcre, **T. Trigano** and Y. Ritov, "Sparse Regression Algorithm for Counting Rate Estimation in Nuclear Spectrometry", IEEE Transactions on Signal Processing, Vol 61(17), 4347-4359, September, 2013, 10.1109/TSP.2013.2264811 (**Q1**, GR 98, IF 4.875, 27 citations).

Papers published after last promotion

Papers published before last promotion

[16] R. Goot, **T. Trigano**, S. Tapuchi and J. Gavan, "Adaptative Allocation of Power Transmission for HAPs", in Annals of Telecommunications, Vol 67, 1-7, June 2012, https://doi.org/10.1007/s12243-012-0303-1 (**Q2**, GR 24, IF 1.901, 3 citations).

[17] J. Gavan, **T. Trigano**, S. Tapuchi and A. Kuperman, "Mitigation of Mobile Radio Parasitic Radiations Effect: a Review", in Journal of Communication Engineering Systems, Vol 2(1), 1-11 2012, **Q4**.

[18] **T. Trigano**, U. Isserles and Y. Ritov, "Semiparametric curve alignment and shift density estimation for biological data", IEEE Transactions in Signal Processing, Vol 59(5), 1970-1984, May, 2011, 10.1109/TSP.2011.2113179 (**Q1**, GR 98, IF 4.875, 27 citations).

[19] **T. Trigano**, T. Montagu, E. Moulines, F. Roueff and A. Souloumiac, "Statistical Pile-Up Correction Method for HPGe Detectors", IEEE Transactions on Signal Processing, Vol 55(10), 4871-4881, 2008, 10.1109/TSP.2007.896300 (**Q1**, GR 98, IF 4.875, 22 citations).

[20] E. Moulines, F. Roueff, A. Souloumiac and **T. Trigano**, 2007, "Nonparametric Inference about Photon Energy from Indirect Measurements", Bernoulli 13(2), 365-388, 2007, 10.3150/07-BEJ5184 (**Q1**, GR 41, IF 1.68, 13 citations)

Contributions in the publications:

- In all the papers on which I am the first author, I performed all the numerical experiments, wrote more than 70% of the paper and contributed to the theoretical results.

- In [15], I contributed equally with the first author on the theoretical results, numerical experiments and writing.
- In [3], [8] I performed the statistical analysis and wrote the associated section of the paper
- In [6], [8], [14], [16], [17], [20] I was responsible of the ML/algorithmic parts and the experiments. I also wrote a significant part of the paper.

E. Articles or Chapters in Scientific Books (which are not Conference Proceedings)

Published

[1] Z. Chen, X. Kong, X. Zheng, Y. Zhu and **T. Trigano**, ″Parallel pileup correction for nuclear spectrometric data on many-core accelerators″, in Smart Computing and Communications, M. Liu, Z. Liu and C. Zhang (eds), Lecture Notes in Computer Science, vol. 13828, pp 258-267, Springer, 2022, https://doi.org/10.1007/978-3-031-28124-2_24

[2] D. Meltzer, D. Luengo and **T. Trigano**, "ECG-based Biometric Recognition", in Teaching and Subjects on Biomedical Engineering, pp 157-171, Acco CV, Leuven, Belgium, 2021

[3] D. Luengo, D. Oses and **T. Trigano**, "Digital Signal Processing of ECG and PCG signals", in Teaching and Subjects on Biomedical Engineering, pp 132-156, Acco CV, Leuven, Belgium, 2021

[4] D. Luengo, D. Meltzer and **T. Trigano**, "Overcomplete Multiscale Dictionaries for Efficient Representations of ECG Signals", in Computer Aided Systems Theory, Moreno-Díaz, R., Pichler, F., Quesada-Arencibia, A. (eds), Lecture Notes in Computer Science, vol. 12014, pp 331-338, 2020, https://doi.org/10.1007/978-3-030-45096-0_41 (1 citation)

[5] **T. Trigano** and Y. Sepulcre, "Regularized Sparse Representation for Spectrometric Pulse Separation and Counting Rate Estimation", in Latent Variable Analysis and Source Separation, Theis, F., Cichocki, A., Yeredor, A., Zibulevsky, M. (eds),
Lecture Notes in Computer Science, Vol 7191, 188-195, 2012, https://doi.org/10.1007/978-3-642-28551-6_24

Published after last promotion

Published before last promotion

[6] **T. Trigano**, U. Isserles, T. Montagu and Y. Ritov, "Semiparametric curve alignment and shift density estimation : ECG data processing revisited", in Signal Processing, S. Miron (Ed), InTechOpen, pp. 217-240, 2010, https://doi.org/10.5772/8526 (2 citations)

- In all the contributions on which I am the first author, I performed all the numerical experiments, wrote more than 70% of the paper and contributed to the theoretical results.
- In [1-4], the authors contributed equally.

F. Articles in Conference Proceedings

All the conference papers went under a review process of two to five reviewers. Most of them underwent correction requirements. In all the papers below my contributions were significant in all aspects

Published

[1] D. Luengo, A. Treytl, P. Arras, K. Kornijenko, G. Tabunshchyk and **T. Trigano**, ``Improving Quality of Life through the Engineering Education. Case Study'', Proceedings of E-TEMS, 9-11 March 2022, Bilbao, Spain, pp 190-195, 2022. 10.1109/E-TEMS53558.2022.9944453

[2] D. Luengo, J. Via and **T. Trigano**, "Efficient Iteratively Rewighted LASSO Algorithm for Cross-Products Penalized Sparse Solutions", Proceedings of EURASIP Conference in Signal Processing (EUSIPCO, Qualis rank: B1), 18-21 January 2021, Amsterdam, Netherlands, 5 pages, 2020, 10.23919/Eusipco47968.2020.9287804 (GS: 3 citations)

[3] D. Luengo, D. Meltzer and **T. Trigano**, "Sparse ECG Representation with a Multi-Scale Dictionary Derived from Real-World Signals", 41th International Conference on Telecommunications and Signal Processing, 04-06 July 2018, Athens, Greece, 4 pages, 2018, 0.1109/TSP.2018.8441329 (GS: 6 citations)

[4] **T. Trigano**, V. Kolesnikov, D. Luengo Garcia and A. Artes_Rodrigues, "Grouped Sparsity Algorithm for Multichannel Intracardiac ECG Synchronization", Proceedings of EURASIP Conference in Signal Processing (EUSIPCO, Qualis rank: B1), 01-05 September 2014, Lisbon, Portugal, 2014, https://ieeexplore.ieee.org/document/6952547 (GS: 12 citations)

[5] D. Luengo Garcia, J. Via, S. Monzon, **T. Trigano** and A. Artes-Rodrigues, "Cross-Products LASSO", in IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 26-31 May 2013, Vancouver, Canada, 5 pages, 2013, 10.1109/ICASSP.2013.6638840 (GS: 18 citations, Qualis rank: A1)

[6] M. Lopatin, N. Moskovitch, **T. Trigano** and Y. Sepulcre, "Pileup Attenuation for Spectroscopic Signals Using A Sparse Reconstruction", in Proceedings of 27-th IEEE Convention of Electrical and Electronics Engineers in Israel, 14-17 November 2012, Eilat, Israel, 5 pages, 2012, 10.1109/EEEI.2012.6377045 (GS: 5 citations)

[7] S. Monzon, D. Luengo Garcia, **T. Trigano** and A. Artes-Rodrigues, "Sparse Spectral Analysis Of Atrial Fibrillation Electrograms", in 2012 IEEE International Workshop on Machine Learning for Signal Processing, 23-26 September 2012, Santander, Spain, 5 pages, 2012, 10.1109/MLSP.2012.6349721 (GS: 23 citations)

Published after last promotion

Published before last promotion

[8] Y. Sepulcre and **T. Trigano**, "Iterated Sparse Reconstruction for Activity Estimation in Nuclear Spectroscopy", Proceedings of EURASIP Conference in Signal Processing (EUSIPCO, Qualis rank: B1), 27-31 August 2012, Bucharest, Romania, 5 pages, 2012, https://ieeexplore.ieee.org/document/6334066 (GS: 1 citation)

[9] **T. Trigano**, Y. Sepulcre, M. Roitman and U. Aferiat, "On Nonhomogeneous Activity Estimation in Gamma Spectrometry using Sparse Signal Representation", in 2011 IEEE Statistical Signal Processing Workshop (SSP), 28-30 June 2011, Nice, France, 649-652, 2011. 10.1109/SSP.2011.5967784 (GS: 12 citations)

[10] **T. Trigano**, Y. Sepulcre, M. Tal and Y. Mashiach, "Sparse Regression Algorithm for Activity Estimation in Gamma Spectrometry", in Proceedings of 26th IEEE Convention of Electrical and Electronics Engineers in Israel, 17-20 November 2010, Eilat, Israel, 268-272, 2010, 10.1109/EEEI.2010.5661973 (GS: 3 citations)

[11] **T. Trigano**, U. Isserles and Y. Ritov, "Semiparametric Density Estimation of Shifts for alignment of ECG data", in EURASIP Signal Processing Conference (EUSIPCO, Qualis rank: B1), August 25-29 2008, Lausanne, Switzerland, 1-5, 2008 https://www.eurasip.org/Proceedings/Eusipco/Eusipco2008/papers/1569101580.pdf (GS: 3 citations)

[12] T. Dautremer, E. Barat and **T. Trigano**, "Nonparametric Bayesian Estimation of Censored counters Intensity from the indicator data", AIP Conference Proceedings, Vol 872(485), International Workshop on Bayesian Inference and Maximum Entropy Methods in Science and Engineering, Paris, France, 8 pages, 2006, https://doi.org/10.1063/1.2423310 (GS: 2 citations)

[13] **T. Trigano**, F. Roueff, E. Moulines, A. Souloumiac and T. Montagu, "Energy Spectrum Reconstruction for HPGe Detectors Using Analytical Pile-Up Correction", Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 14-19 May 2006, Toulouse, France, Volume 3, III-VII, 2006, 10.1109/ICASSP.2006.1660723 (GS: 1 citation, Qualis rank: A1)

[14] **T. Trigano**, F. Roueff, A. Souloumiac and E. Moulines, "Nonparametric Inference for Pile-up Correction in Nuclear Spectrometry", IEEE Statistical Signal Processing Workshop (SSP), 17-20 July 2005, Bordeaux, France, 754-750, 2005, 10.1109/SSP.2005.1628693. (GS: 2 citations)

[15] **T. Trigano**, E. Barat, T. Dautremer and A. Souloumiac, "Pile-up Correction Algorithms for Nuclear Spectrometry", Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP, Qualis rank: A1), 23-23 March 2005, Philadelphia, USA, iv/441 – iv/444, 2005, 10.1109/ICASSP.2005.1416040. (GS: 16 citations)

[16] **T. Trigano**, D. Mostefa and G. Chollet, "Implementation of a classification tree in a ASV system", Proceedings of the COST-275 Workshop, Paris, 6 pages, 2002.

[17] **T. Trigano**, D. Mostefa, G. Chollet and D. Petrovska, "Description of the ENST Speaker Verification System", NIST Speaker Recognition Workshop, Washington, 5 pages, 2002.

Accepted For Publication

G. Other Scientific Publications

Patents

[1] L. Schwartz, **T. Trigano**, Y. Bechor. "Process to isolate object of interest in image", US Patent US10417772B2, https://patents.google.com/patent/US10417772B2/en, 2019

[2] Y. Mashiach, M. Tal, **T. Trigano** and Y. Sepulcre, "A method of improving the precision of counting rate estimation of radioactive sources", Israeli patent IL209613A0, 30 pages, 2011.

[3] E. Barat, T. Dautremer, **T. Trigano** and T. Brisset, "Measurement and treatment of a signal comprising stacks of elementary pulses", US patent 11579757, 40 pages, 2008.

[4] E. Barat, T. Dautremer, **T. Trigano** and T. Brisset, "System and apparatus of processing of a signal consisting in pileups of individual pulses", European patent 2005773039, 49 pages, 2007.

Technical reports

[1] **T. Trigano**, "Deconvolution methods for discrete histograms: multiplicative gradient algorithm for denoising energy spectra", CEA Saclay, Technical Report 05-031, 29 pages, 2005.

[2] **T. Trigano**, "Numerical inversion of the Laplace transform: application for pileup correction of continuous-time signals for spectrometry", CEA Saclay, Technical Report 04-015, 44 pages, 2004.

[3] E. Barat, T. Dautremer and **T. Trigano**, "Stochastic modeling for the photonic signal: pileup correction algorithm for discrete-time signals from spectrometry", CEA Saclay, Technical Report 03-018, 44 pages, 2003.

H. Other Publications

Course booklets:

[1] **T. Trigano** and Dima Bykhovsky, "Digital Signal Processing", course booklet for "Digital Signal Processing" taught at SCE, 120 pages, 2023 (Hebrew).

[2] **T. Trigano,** "Digital Image Processing", course booklet for "Medical Image Processing 1" taught at Tel-Aviv University, 132 pages, 2022 (English).

[3] **T. Trigano,** "Mathematical Methods Using Python", course booklet for "Numerical Methods with Python" taught at SCE, 84 pages, 2019 (English).

[4] **T. Trigano**, "Introduction to random processes", course booklet for "Random Signals" taught at Afeka, 81 pages, 2018 (Hebrew).

[5] **T. Trigano**, "Information Theory", course booklet for "Information Theory" taught at SCE, 98 pages, 2017 (Hebrew).

[7] **T. Trigano**, "Signals and Systems", course booklet for "Signals and Systems" taught at SCE, 98 pages, 2016 (Hebrew).

[8] **T. Trigano**, O. Ben Harush and M. Nanikashvili "Introduction to Probability and Statistics", course booklet for "Probability and Statistics" taught at SCE, 134 pages, 2011 (Hebrew).

I. Submitted Publications

Submitted Journal Publications:

T. Trigano, S. Talala and D, Luengo, “Adaptive Trend Filtering for ECG Denoising and Delineation”, submitted to IEEE Journal of Biomedical and Health Informatics (Q1, IF 7.01, GR 80), Jan. 2023.

J. Summary of my Activities and Future Plans

[*the bibliography references appearing in this research statement refer to the journal articles appearing in this file*]

I have being working at SCE right after my postdoctoral studies in the Hebrew University, in the department of Electrical Engineering of the Ashdod Campus. I hold the position of Lecturer from 2009 to 2012, and was appointed to senior lecturer from 2012. I also am an adjunct lecturer at Afeka College of Engineering since 2017, at Ben-Gurion University since 2018 and at Tel-Aviv University since 2020. I have been serving in several administrative duties in the department of Electrical Engineering of SCE, and am currently the coordinator of the final-year projects at B.Sc level (since 2010), and a member of the teaching committee and the curriculum committee. I have been an invited researcher in 2013 at the Commissariat a l'Energie Atomique (French equivalent of the Kamag), France, and an invited lecturer in 2018 at the Polytechnic University of Madrid (UPM), Spain. During my collaboration with Prof. Luengo from Madrid university I got involved in an ERASMUS+ Capacity project which led to the development of new curricula and courses in three departments at SCE, along with publications. I was the national coordinator of this project in Israel, during which I worked closely with researchers from Holon Institute of Technology and Bar Ilan University, and overall with more than twenty researchers of different institutions in Spain, Austria, Belgium, and Ukraine.

My research focuses mainly on statistical signal processing and applications of compressive sensing and machine learning tools, specifically for signals stemming from point processes sample paths (Shot-Noise model and its derivatives). Applications in which such signals are encountered are numerous, and my two main areas of investigation are in nuclear spectroscopy and biomedical signals.

Development of new methods for nuclear spectroscopy signals: nuclear spectroscopy signals appear frequently in security applications, decommissioning and medical imaging. For all these applications, it is of critical interest to estimate precisely the activity of radioactive sources, and to identify them, and the signal is often modeled by a filtered Poisson process. During my post-doctoral stay at the Hebrew University, I developed a time-domain model to consider gamma spectroscopic signals as a sparse regression problem, and developed an algorithm based on a thresholded version of LASSO to estimate precisely the activity of a radioactive source, even at very high counting rates. The main difficulty was to illustrate mathematically how such an approach could hold, as it is well known from compressive sensing theory that sparse reconstruction is possible only when drastic conditions on the dictionary used hold. We showed in [15] that under mild conditions, relating the intensity and the sampling frequency of the device, the activity could be estimated precisely even if standard conditions on the dictionary did not hold in practice in the case of a homogeneous Poisson process. We implemented various estimate with different sparse methods, and later on extended the previous result in the non-homogeneous setting [11], by plugging the estimated arrival times into a nonparametric estimation of the activity. Furthermore, we showed in [12] that this methodology could be beneficial for pile-up

correction in this framework, and provided empirical proofs that the obtained energy spectra were less distorted once the iterative reconstruction had been applied (an application example can also be found in [3]). The last remaining obstacle was the computational time, since the signals recorded in the field are usually very large. Thus, I developed in [4,9] a fast algorithm for solving the related optimization procedures on very larges signals (more than several millions points), based on the use of Fast Fourier Transforms in proximal methods, which allows now to process large dataset in a very short time, without any other memory use than the one necessary to load the signal itself. The method proposed in [4] has also the advantage to be faster by about two decades than the standard optimization programming, and can be applied for a wide class of sparse optimization problems which satisfy an homogeneity condition.

Statistical signal processing for biomedical signals: In my ongoing collaboration with Prof. Luengo, we developed algorithms to investigate atrial fibrillation in intracardiac ECG, recorded during operation procedures. The recorded signals in this topic are different mainly in two points: contrary to spectroscopic signals, they do not overlap due to physiological constraints. Second, they are recorded using a multi-electrode catheter, which results in a multichannel signal where all pulses are roughly synchronized. Electrode motion noise also makes some peaks less obvious in the recordings, and an additional difficulty is the lack of data making the use of deep learning methods irrelevant. Based on these considerations, we developed a novel algorithm based on a version of the grouped LASSO with overlapping groups, and investigated its properties in [2]. The proposed algorithm was shown to locate the peaks in intracardiac ECG recordings very efficiently; furthermore, we showed that it could be implemented efficiently using an acceleration of the ADMM also presented in [2]. This algorithm could therefore be implemented in medical devices used for monitoring the heart activity during invasive procedures.

Besides these two main research directions, I also collaborate with colleagues from SCE on the development of signal processing algorithms for inference, whether for nuclear physics experiments [1] or Raman spectroscopy [3].

Future research directions: I intend to pursue my research in these topics, and also to investigate the use of machine learning / signal processing tools on agriculture-related problems, as detailed below:

Regarding the use of compressive sensing and ML techniques in nuclear spectroscopy, it is clear that a lot remains to be done. Indeed, recent findings in the field show that even if time-domain approaches improve significantly the state of the art, they are less performant at very high counting rate. A change of paradigm is therefore necessary. A couple of years ago I started collaborating with Prof. Jonathan Manton from the university of Melbourne on the matter. The main objective in the long-run is to develop new mathematical tools to either improve the existing algorithm, or to better assess their performances. I also started in 2022 to collaborate on with Prof. Xiaoying Zheng from the Shanghai Advanced Research Institute, to introduce Deep Neural Networks (DNNs) in Nuclear Instrumentation Devices with

GPUs for pile-up correction. Though the data acquisition in this field is very challenging, this lead can yield promising results.

In the field of biological signals, I intend to continue my ongoing collaboration with Prof. Luengo to develop statistical signal processing tools to better take into consideration the physiological constraints into the sparsity penalties commonly used. In the next step, I will work on the automatic AF identification based on auxiliary recordings (speech, breathing, etc.) at early stages

Due to an ongoing collaboration between SCE and the faculty of Agriculture of the Hebrew University, I started collaborating with Dr. Ittai Hermann on the automatic assessment of metabolites of leaves and spices, based on hyperspectral and standard imaging. My aim is to see how the previously developed methods could help to obtain precise results for industrial production.