

Dimitris Arabadjis

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EDUCATION

- **Ph. D. in Computer Systems** National Technical University of Athens, School of Electrical and Computer Engineering, (2007-2015)
Dissertation: *Differential Geometry in Pattern Recognition and Digital Image Processing, with Novel Applications in Biomedical Engineering and Archaeometry*
- **Diploma in Electrical and Computer Engineering** National Technical University of Athens, School of Electrical and Computer Engineering, (2001-2006)
Thesis: *Processing and Analysis of Low-Quality Medical Images*

RESEARCH PROJECTS

- Morphological modelling and inversion of 2D bodies deformations
-National Technical University of Athens (2007-2009)
- Automatic Identification of the Writer of Ancient Inscriptions
-National Technical University of Athens & John Latsis Foundation (2009-2010)
- Identification of geometric prototypes in prehistoric wall-paintings
-National Technical University of Athens & National Archaeological Museum (2009-2012)
- EAGER: New Techniques for Recognition and Visualization of Inscriptions on Papyrological Documents (Funded by the NSF, award no. 1041949)
-National Technical University of Athens & Furman University (2010-2013)
- Quantitative and qualitative analysis of bio-signals
-National Technical University of Athens & University Mental Health Research Institute (2013)
- Modelling of signals Clustering / Grouping methods as sequences of Homology / Cohomology groups.
-National Technical University of Athens (2013 - present)
- Development of an information system for the automatic reconstruction of fragmented archaeological finds
-National Technical University of Athens & John Latsis Foundation (2014-2015)
- Development of an information system for the computational modeling of graphological characteristics towards the automatic writer identification
-National Technical University of Athens & State Scholarships Foundation (2019-2021)

RESEARCH INTERESTS

- **Pattern Recognition** (induction of curve prototypes from partial realizations, 3D objects reconstruction from partial matching of local patches, inversion of 2D deformations, data - grouping through decomposition of similarity relations into acyclic sequences of grouped data)
- **Machine Intelligence** (on-manifold / intrinsic tuning of geometrical models for the representation / identification of continuous data, extrinsic tuning of Neural Network / SVM / Hidden Markov models)
- **Computational Geometry and Topology** (algorithms for the parameterization of multidimensional data, finite approximations of differential forms, indexing of higher order shape complexes (cycles, trees, combinations, triangular simplices, etc.))
- **Computer Vision** (image segmentation, representation and decomposition)
- **Nonlinear Optimization** (Calculus of Variations, Maximum Principle optimization, Dynamic Programming, on-manifold optimization)
- **Signal and Image Processing** (signal/image decomposition into Euclidean and cyclic components)
- **Data Analysis/Grouping/Clustering** (intrinsic relations modelling via learning of the induced transformation manifolds, extrinsic relations modelling via adaptation of Neural Network / SVM / Hidden Markov architectures, clustering/grouping by means of the homology/cohomology groups of the data relations' simplicial complex)

TEACHING EXPERIENCE

- Adjunct Assistant Professor (part-time) in the School of Electrical and Computer Engineering, in the class "Design of Analog Electronic Systems" of the 8th semester
-National Technical University of Athens (2016-2019)
- Lab Assistant in the Department of Civil Engineering and Surveying & Geoinformatics Engineering in the class "Informatics and Programming" of the 1st semester
-Technological Educational Institute of Athens (2017-2018)
- University Scholar in the Department of Civil Engineering in the class "Informatics and Computer Programming" of the 1st semester
-University of West Attica (2018-2019)
- University Scholar in the Department of Electrical & Electronics Engineering in the class "Computer Vision and Pattern Recognition" of the 7th semester
-University of West Attica (2018-2019)
- University Scholar in the Department of Biomedical Engineering in the class "Medical Signal Processing" of the 6th semester (2019) & 7th semester (2020)
-University of West Attica (2018-2020)
- University Scholar in the Department of Biomedical Engineering in the classes "Foundations of Computer Programming" of the 1st Semester and "Computer Programming Techniques" of the 2nd Semester
-University of West Attica (2019-2021)

- University Scholar in the Department of Informatics and Computer Engineering in the classes «Applications Specific Integrated Circuits» of the 7th Semester and «Advanced Digital Systems Synthesis and Design» of the 8th Semester.
-**University of West Attica (2019-2021)**
- Supplementary teaching in the class “Digital Systems Laboratory” of the 6th semester of the School of Electrical and Computer Engineering.
-**National Technical University of Athens (2007-2016)**
- Supplementary teaching in the class “Introduction to Automatic Control” of the 5th semester of the School of Electrical and Computer Engineering
- **National Technical University of Athens (2015-2018)**
- Supplementary teaching in the class “Design and Development of IT Applications. The Unix System” of the 2nd semester of the School of Naval Architecture and Marine Engineering.
- **National Technical University of Athens (2007-2012)**
- Supplementary teaching in the class “Programming with MATLAB” of the 1st semester of the School of Naval Architecture and Marine Engineering.
- **National Technical University of Athens (2013-2018)**

PUBLICATIONS

Journals

1. C. Papaodysseus, D. Arabadjis, F. Giannopoulos, A.R. Mamatsis, C. Chalatsis, “Analysis Evaluation and Exact Tracking of the Finite Precision Error Generated in Arbitrary Number of Multiplications”, *Mathematics*, vol. 9, no. 11, 2021.
2. D. Arabadjis, F. Giannopoulos, M. Panagopoulos, M. Exarhos, C. Blackwell, C. Papaodysseus, “A general methodology for identifying the writer of codices. Application to the celebrated “twins””, *Journal of Cultural Heritage*, no.39, pp. 186-201, 2019.
3. C. Chalatsis, C. Papaodysseus, D. Arabadjis, F. Giannopoulos, “Finite Precision Error Analysis of Zernike Moments Computation Schemes and a New Efficient, Robust Recursive Algorithm”, *Digital Signal Processing*, vol. 79, no. 8, pp. 75-90, 2018.
4. C.Papaodysseus, S. Zannos, F. Giannopoulos, D. Arabadjis, P. Rousopoulos, X. Stachtea and C. Papageorgiou, “A new approach for the classification of event related potetianls for valid and paradox reasoning”, *Biocybernetics and Biomedical Engineering*, vol. 36, no. 1, 2015.
5. C. Papaodysseus, P. Rousopoulos, F. Giannopoulos, S. Zannos, D. Arabadjis, M. Panagopoulos, E. Kalfa, C. Blackwell, S. Tracy, “Identifying the Writer of Ancient inscriptions and Byzantine Codices. A Novel Approach”, *Computer Vision and Image Understanding*, vol. 121, no. 4, pp. 57-73, 2014.
6. D. Arabadjis, F. Giannopoulos, C. Papaodysseus, S. Zannos, P. Rousopoulos, M. Panagopoulos, C. Blackwell, “New Mathematical and Algorithmic Schemes for Pattern Classification with Application to the Identification of Writers of Important Ancient Documents”, *Pattern Recognition*, Elsevier, vol. 46, no. 8, pp. 2278-2296, 2013.

7. C. Papaodysseus, D. Arabadjis, M. Exarhos, P. Rosuopoulos, S. Zannos, M. Panagopoulos, L. Papazoglou-Manioudaki, "Efficient Solution to the 3D Problem of Automatic Wall Paintings Reassembly", *Computers and Mathematics with Applications*, Elsevier, vol. 64, no.8, pp. 2712-2734, 2012.
8. D.Arabadjis, P.Rousopoulos, C.Papaodysseus, M.Exarhos, M.Panagopoulos, L. Papazoglou - Manioudaki, «Optimization in Differentiable Manifolds in Order to Determine the Method of Construction of Prehistoric Wall-Paintings», *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 33, no. 11, NOVEMBER 2011.
9. P. Rousopoulos, C. Papaodysseus, D.Arabadjis, M.Exarhos, M. Panagopoulos, «Reconstruction of c.1650 B.C. Fragmented Wall Paintings by Exploitation of the Thematic Content», *International Journal of Imaging and Robotics*, volume 5, number S11, 2011.
10. Rousopoulos, P., Papaodysseus, C., Arabadjis, D., Exarhos, M., and Panagopoulos, M. 2010. "Image and pattern analysis for the determination of the method of drawing celebrated Thera wall-paintings circa 1650 B.C." *ACM Journal on Computing and Cultural Heritage*, Vol. 3, Issue 2, p.p. 1-21, Sep. 2010. <http://portal.acm.org/citation.cfm?id=1841318>
11. D. Arabadjis, C. Papaodysseus, P. Rousopoulos, M. Panagopoulos "On The Mathematical Formulation Of The Problem Of Reassembling Fragmented Objects: Two New Theorems", *Journal of Applied Mathematics and Computing*, Springer, Volume 34, Numbers 1-2, 81-100, 2010.
12. Arabadjis, D., Rousopoulos, P., Papaodysseus, C., Panagopoulos, M., Loumou, P., Theodoropoulos, G.; " A General Methodology for the Determination of 2D Bodies Elastic Deformation Invariants: Application to the Automatic Identification of Parasites", *IEEE Transactions on Pattern Analysis and Machine Intelligence* , vol. 32, no.5, pp. 799 - 814, May 2010.

Conferences

13. D. Arabadjis, C. Papaodysseus, A.R. Mamatsis, E. Mamatsi, "Handwriting Classification of Byzantine Codices via Geometric Transformations Induced by Curvature Deformations", *Pattern Recognition. ICPR2021 International Workshops and Challenges*, pp. 141-155, 2021.
14. D. Arabadjis, C. Papaodysseus, S. Zannos, F. Giannopoulos, E. Kalfa, P. Rousopoulos, M. Panagopoulos, C. Blackwell, "A new approach for the identification of writers of important ancient documents", *Digital Signal Processing (DSP), 2013 18th International Conference on*, pp. 1-6, 2013
15. Panayiotis Rousopoulos, Michail Panagopoulos, Constantin Papaodysseus, Fivi Panopoulou, Dimitris Arabadjis, Stephen Tracy, Fotios Giannopoulos, Solomon Zannos, "A new approach for ancient inscriptions' writer identification", *Digital Signal Processing (DSP), 2011 17th International Conference on*, 2011.
16. Constantin Papaodysseus, Panayiotis Rousopoulos, Dimitris Arabadjis, Fivi Panopoulou, Michalis Panagopoulos, "Handwriting automatic classification: Application to ancient Greek inscriptions", *Autonomous and Intelligent Systems (AIS), 2010 International Conference on*, 2010.

17. P Rousopoulos, D Arabadjis, M Panagopoulos, C Papaodysseus, E Papazoglou, "Determination of the method of drawing of prehistoric wall-paintings via original methods of pattern recognition and image analysis", *Image Processing*, 2009 16th IEEE International Conference on, pp. 65-68, 2009.
18. C Papaodysseus, D Arabadjis, M Panagopoulos, P Rousopoulos, M Exarhos, E Papazoglou, Automated reconstruction of fragmented objects using their 3D representation-application to important archaeological finds, *Signal Processing*, 2008. ICSP 2008. 9th International Conference on, pp. 769-772, 2008.
19. D Arabadjis, P Rousopoulos, C Papaodysseus, M Panagopoulos, P Loumou, G Theodoropoulos, Determination of the mechanoelastic properties of parasites via analysis of their microscopic images, *Bioinformatics and BioEngineering*, 2008. IEEE International Conference on, pp. 1-6, 2008.

Book Chapters

20. Galanopoulos, G., Papaodysseus, C., Arabadjis, D., Exarhos, M., "Exploiting 3D digital representations of ancient inscriptions to identify their writer", *Lecture Notes in Computer Science (incl. Lecture Notes in Artificial Intelligence & Lecture Notes in Bioinformatics)*, 7432 LNCS (PART 2), 2012, Pages 188-198.
21. Papaodysseus, C., Rousopoulos, P., Arabadjis, D., Panagopoulos, M., Loumou, P., Theodoropoulos, G, Automatic identification and elastic properties of deformed objects using their microscopic images, *Handbook of Research on Advanced Techniques in Diagnostic Imaging and Biomedical Applications*, 2009, Pages 351-372

TECHNICAL SKILLS

- *Programming* in C/C++ (+ parallel C, parallel programming in Linux clusters with MPI, CUDA), Fortran, Go, Julia, Prolog, Lisp and *scripting* in Matlab, Python, R.
- *Scientific programming software*: Mathematica, Maple.
- *CAD and GAD software*: Meshlab, Geomagic, Polyworks, Rhino.
- *3D scanning, modelling and reverse engineering*.