

Vitae

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Appointments

2005- Consultant. TechFrame — Information Systems, Lisboa, Portugal.
2005- *Professor com Nomeação Definitiva* (Tenure). Electrical and Computer Eng. (ECE) Dep., IST.
1993- Researcher. Signal and Image Processing Group, ISR.
2000-05 *Professor Auxiliar* (Assistant Professor). ECE Dep., IST.
2001-02 Consultant. Computer Science Lab., XEROX Palo Alto Research Center, CA, USA.
1994-00 Visiting Scholar (Summers). ECE Dep., Carnegie Mellon University (CMU), PA, USA.
1993-00 *Assistente* (Lecturer). ECE Dep., IST.
1990-93 *Assistente Estagiário* (Lecturer). ECE Dep., IST.
1988-93 Researcher. Neural Networks Group, Institute for Systems and Computer Engineering (INESC).
1989-90 *Monitor* (Teaching Assistant). ECE Dep., IST.
1987-89 *Monitor* (Teaching Assistant). Dep. of Mathematics, IST.
1987-88 Junior Researcher. Center for Signal Analysis and Processing (CAPS), IST.
1986-88 Junior Researcher. VLSI Group, INESC.

Education

2000 Doutoramento (PhD), Electrical and Computer Engineering, IST.
1993 Mestrado (MSc), Electrical and Computer Engineering, IST.
1989 Engenheiro Electrotécnico e de Computadores, IST.

Teaching Experience

2001- Graduate level (PhD) course *Statistical and Computational Models in Vision*.
2000- Graduate (MSc) courses on Image Processing, Computer Vision, and Multimedia Signal Processing.
1989- Undergraduate courses on Optimization, Signal Processing, Dynamical Systems, and Automatic Control.
1987-89 Undergraduate courses on Mathematical Analysis.

Research Grants

2007- PI in Foundation for Science and Technology (FCT) project *MODI – 3D Models from 2D Images*.
2007- FCT project *SIPM – Signal and Image Processing on Manifolds*.
2007- FCT project *DELKETI – Development and Learning of Kernels for Text and Images*.
2007- European project *SIMBAD – Beyond Features: Similarity-Based Pattern Analysis and Recognition*.
2005- TechFrame project *Automatic Trademark Retrieval*.
2002-05 PI in FCT project *AMA – Automatic Modeling of Architecture*.
2001-02 XEROX Palo Alto Research Center project *Digital Voices*.
2000-03 FCT project *3D Modeling from Video*.
1994-99 CMU project *Content-Based Video Processing*.
1991-93 European project *ACTS – Auditory/Connectionist Techniques for Speech*.
1988-91 European project *HINT – Heterogeneous Integration Architecture for Intelligent Control Systems*.
1987-88 CAPS project *Control Systems for Ocean Robotics*.
1986-88 INESC project *Gatearrays*.

IST/ISR Activities

2005-07 Member of the Directive Board of ISR.
2000-04 Member of the IST ECE Scientific Committee for Graduate Education.
1994-00 Member of the IST ECE Coordinating Committee for Education.

Editorial Activities

2006- TC member, *Int. Conf. on Image Analysis and Recognition*.
2004- TC member, *IEEE Int. Conf. on Image Processing (ICIP)*.
2004 TC member, *IEEE Int. Workshop on Multimedia Signal Processing (MMSP)*, Siena, Italy.
2004 Publications Chair, *IEEE Sig. Proc. Advances in Wireless Communications*, Lisboa, Portugal.
2003 TC member, *Energy Min. Methods in Computer Vision and Pattern Recognition*, Lisboa, Portugal.
1996- Reviewer for journals *IEEE Transactions on Image Processing*, *IEEE Trans. Medical Imaging*, *IEEE Trans. Circuits and Systems*, *IEEE Trans. Robotics*, *KLUWER Int. Journal of Computer Vision*.
1996- Reviewer for conferences *ICIP*, *MMSP*, *IEEE Conf. on Computer Vision and Pattern Recognition*.
1991-94 Reviewer for journals *Neural Computation*, *IEEE Transactions on Neural Networks*.

Research Interests

The ultimate goal of my research is to make computers capture the third dimension by seeking the simplest interpretation of a video clip. I am mainly interested in statistical and information-theoretic models for computer vision and image analysis, as well as in efficient algorithms to perform inference with respect to those models. Application areas are in virtual reality — automatic generation of unseen panoramic views and complete 3D models — and digital video — content-based representations suitable for compression, addressing, and nonlinear editing.

Besides image analysis, my other research interests include machine learning, statistical signal processing, and nonlinear systems.

Students, Thesis, and Scientific Committees

I am currently advising one PhD student and four MSc students. I have advised one MSc student and the graduation projects of several students. Two of these projects received the IST prize for the best project in ECE. I have been member of the Thesis Committees of several MSc candidates and PhD candidates, including two abroad: at Monash University, Australia, and Universitat Autònoma de Barcelona, Spain. I was member of the Committee of Promotion to Professor of one candidate at Monash University.

Patents or Disclosures

- [P1] “System and Method for Generating a Three-dimensional Model from a Two-dimensional Image Sequence,” P. Aguiar and J. Moura, US Patent and Trademark Office, S.N.6,740,488 , July 6, 2004.
- [P2] “Modulator For Musically-Oriented Acoustic Communications,” C. Lopes, H. Haussecker, and P. Aguiar, patent filed with US Patent and Trademark Office, May, 2002.

Selected Publications

- [1] “Joint segmentation of moving object and estimation of background in low-light video using relaxation,” P. Aguiar and J. Moura, *IEEE Int. Conf. Image Processing*, San Antonio, USA, 2007.
- [2] “Software modems for underwater sensor networks,” R. Jurdak, P. Aguiar, P. Baldi, and C. Lopes, *IEEE/OES OCEANS*, Aberdeen, Scotland, 2007.
- [3] “Unsupervised simultaneous registration and exposure correction,” P. Aguiar, *IEEE Int. Conf. on Image Processing*, Atlanta GA, USA, 2006.
- [4] “Global Motion Estimation: Feature-based, Featureless, or Both?!” R. Guerreiro and P. Aguiar, in *Image Analysis and Recognition*, No. 4141 *Lecture Notes Computer Science*, Springer-Verlag, 2006.
- [5] “Orientation in Manhattan: Equiprojective Classes and Sequential Estimation,” A. Martins, P. Aguiar, and M. Figueiredo, *IEEE Trans. Pattern Analysis and Machine Intelligence*, 27:5, 2005.
- [6] “Featureless global alignment of multiple images,” B. Pires and P. Aguiar, *IEEE Int. Conf. on Image Processing*, Genova, Italy, 2005.
- [7] “Figure-Ground Segmentation from Occlusion,” P. Aguiar and J. Moura, *IEEE Transactions on Image Processing*, 14:8, 2005.
- [8] “Content-based Image Sequence Representation,” P. Aguiar, R. Jasinschi, J. Moura, and C. Pluempitiriyawej, in *Digital Image Sequence Processing: Compression and Analysis*, CRC Press, 2004.
- [9] “Complete 3D models from video: a global approach,” B. Gonçalves and P. Aguiar, *IEEE Int. Conf. on Image Processing*, Singapore, 2004.
- [10] “Rank 1 Weighted Factorization for 3D Structure Recovery: Algorithms and Performance Analysis,” P. Aguiar and J. Moura, *IEEE Trans. on Pattern Analysis and Machine Intelligence*, 25:9, 2003.
- [11] “Navigating in Manhattan: 3D orientation from video without correspondences,” A. Martins, P. Aguiar and M. Figueiredo, *IEEE Int. Conf. on Image Processing*, Barcelona, Spain, 2003.
- [12] “Estimation of Rank Deficient Matrices from Partial Observations: Two-Step Iterative Algorithms,” R. Guerreiro and P. Aguiar, in *Energy Minimization Methods in Computer Vision and Pattern Recognition*. No. 2683 in *Lecture Notes in Computer Science*, Springer-Verlag, 2003.
- [13] “Acoustic Modems for Ubiquitous Computing,” C. Lopes and P. Aguiar, *IEEE Pervasive Computing Magazine*, 2:3, 2003.
- [14] “3D structure from video streams with partially overlapping images,” R. Guerreiro and P. Aguiar, *IEEE Int. Conf. on Image Processing*, Rochester NY, USA, 2002.
- [15] “Three-dimensional Modeling from Two-dimensional Video,” P. Aguiar and J. Moura, *IEEE Transactions on Image Processing*, 10:10, 2001.
- [16] “Image motion estimation — convergence and error analysis,” P. Aguiar and J. Moura, *IEEE Int. Conf. on Image Processing*, Thessaloniki, Greece, 2001.
- [17] “Systems with Exponential Eigenfunctions and Exponential-input/Constant-output Operators,” P. Aguiar and F. Garcia, *IEEE Signal Processing Letters*, 7:8, 2000.