

Mauricio Á. Álvarez

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Education

PhD in Computer Science, University of Manchester Third year: 2010
Masters in Electrical Engineering, Universidad Tecnológica de Pereira, Colombia 2006
In my masters thesis, *Dimensionality Reduction of Dynamic Features using Markov processes for automatic identification of pathologies in biosignals*, I proposed a combination between Hidden Markov Models and different versions of Principal Component Analysis to reduce the dimensionality of features varying through time. I applied the method to the detection of abnormalities in ECG signals and voice signals. Thesis Grade: *Outstanding*. Average Grade: 4.9/5.
Electronic Engineering, Universidad Nacional de Colombia, Colombia 2004
In my undergraduate thesis, *Small Vocabulary Speech Recognition using Hidden Markov Models*, I explored several parametric feature extraction methods (MFCC, LPCC, PLP, PLP-RASTA) oriented to speech recognition. Thesis Grade: *Meritorious*. Average Grade: 4.6/5. *Ranked 1st*.

Research interests

I am interested in machine learning in general, its interplay with mathematics and statistics and its applications. In particular, my research interests include probabilistic models, kernel methods and stochastic processes.

Publications

M. Álvarez, D. Luengo and N.D. Lawrence. *Latent Force Models*, in D. van Dyk and M. Welling (Eds.), Proceedings of The Twelfth International Conference on Artificial Intelligence and Statistics (AISTATS) 2009, JMLR: W&CP 5, pp. 9-16, Clearwater Beach, Florida, April 16-18, 2009, (Oral presentation).

M. Álvarez and N.D. Lawrence. *Sparse Convolved Gaussian Processes for Multi-output Regression*, in D. Koller, D. Schuurmans, Y. Bengio and L. Bottou (Eds), Advances in Neural Information Processing Systems 21, pp 57-64, 2009.

M. Álvarez and N.D. Lawrence. *Sparse Multi-Output Gaussian Processes*, PASCAL 2008 Workshop on Approximate Inference in Stochastic Processes and Dynamical Systems, Cumberland Lodge, May 27th-29th, 2008. A video of this talk is available at videolectures.net

M. Álvarez and R. Henao. *Hidden Markov Bayesian Principal Component Analysis*. Proceedings of the 14th International Conference on Neural Information Processing (ICONIP2007). 13-16 November, 2007, Kitakyushu, Japan.

M. Álvarez, R. Henao and A. Orozco. *Myocardial Ischemia Detection using Hidden Markov Principal Component Analysis*. IFMBE Proceedings. Volume 18. IV Latin American Congress on Biomedical Engineering, Bioengineering Solutions for Latin America Health. Part 1, p 99-103, Springer.

M. Álvarez, R. Henao and G. Castellanos. *Dimensionality Reduction of Dynamic Features using HMM and Latent Variable Observation Models* (in spanish). XI Symposium of Signal Processing, Images and Artificial Vision IEEE Signal Processing Society, Colombian Chapter, Bogota, Colombia, September 13-15, 2006 (Best Research Paper Award).

- M. Álvarez and R. Henao. *Probabilistic Kernel Principal Component Analysis through Time*, in I. King et al. (Eds.), Proceedings of The 13th International Conference on Neural Information Processing, Lecture Notes in Computer Science, vol. 4232, pp. 747-754, Springer-Verlag.
- M. Álvarez, R. Henao and G. Castellanos, J.I. Godino-Llorente, A. Orozco. *Kernel Principal Component Analysis through Time for Voice Disorder Classification*. Proceedings of The 28th International Conference of the IEEE Engineering in Medicine and Biology, New York, USA, p.5511-5514.
- A. Orozco, M. Álvarez, E. Guijarro and G. Castellanos. *Identification of Spike Sources Using Proximity Analysis through Hidden Markov Models*. Proceedings of The 28th International Conference of the IEEE Engineering in Medicine and Biology Society. New York, USA, p. 5555-5558.
- A. Orozco, C. Guarnizo, M. Álvarez, G. Castellanos and E. Guijarro. *Spike Source Identification Using Artificial Intelligence Techniques*. Proceedings of The 3rd IEE International Seminar on Medical Applications of Signal Processing. IEE Signal Processing. London, UK, 2005.
- B.J. Restrepo, M. Álvarez and R. Henao. *Comparison between generative and discriminative approaches for classification of seismic events* (in Spanish). Scientia et Technica 37, p. 109-114, December 2007. ISSN 0122-1701.
- D. Giraldo, M. Álvarez and C. Guarnizo. *Adaptive Control using Pole Placement* (in Spanish). Scientia et Technica 30, p. 105-110, May 2006. ISSN 0122-1701.

Honors and Awards

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| Runner-Up to the Best Paper, 2009 Research Student's Symposium,
School of Computer Science, University of Manchester | 2009 |
| Overseas Research Student Award (ORSA) | 2007-present |
| University of Manchester School of Computer Science Studentship | 2007-present |
| Scholarship for Graduate Studies, Universidad Nacional de Colombia | 2004 |
| Undergraduate Student with Honors, Universidad Nacional de Colombia | 2004 |
| Best ECAES Score in Electronic Engineering | 2003 |
| Distinction granted by The Ministry of National Education of Colombia. ECAES is an annual general exam applied to undergraduate students from Colombian universities who are about to complete their degree. Distinctions are given to the first ten scores. | |
| Scholarship for Undergraduate Studies, Universidad Nacional de Colombia | 1998 |

Work experience

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| Auxiliary Professor, Electrical Engineering, Universidad Tecnológica de Pereira | 2006-2007 |
| In Colombia, auxiliary professorships are the first position when pursuing an academic career. I was involved in teaching and in research activities. I was in charged of courses related to signal theory and analog electronics. I participated in the research projects <i>Stochastic Variability Analysis for Pathology Detection over Electrocardiographic and Voice Records</i> and <i>Automatic Classification of Seismic Events</i> , both financed by the Research and Extension Center of Universidad Tecnológica de Pereira. | |
| Research Assistant, Universidad Tecnológica de Pereira | 2005-2006 |
| I took part in the project <i>Automatic Classification System of Physiological Events using Bioelectrical Patterns as a support for Parkinson's Disease and Other Neurological Disorders</i> , co-financed by the Colombian Institute for the Development of Science and Technology (COLCIENCIAS), the Research and Extension Center of the Universidad Tecnológica de Pereira and the Instituto de Salud Carlos III, Ministerio de Sanidad y Consumo, Spain. | |

Computer skills

Programming Languages: C, Pascal, Fortran 77, Fortran 90/95, C++ Builder, Delphi, MatLab, Assembler, VHDL.

Operating systems: MS Windows, Linux, MAC OS X.

Other activities

Visiting scientist to the Department of Empirical Inference, Max Planck Institute for Biological Cybernetics working with Dr. Jan Peters and Prof. Dr. Bernhard Schölkopf from 28/09/2009 to 04/12/09.

Co-organizer of the workshop “Kernels for multiple outputs and Multi-task Learning: Frequentist and Bayesian Points of View” at NIPS 2009 (see <http://intranet.cs.man.ac.uk/mlo/mock09/>).

Co-organizer of the workshop “Statistics and Machine Learning Interface Meeting” (see <http://intranet.cs.man.ac.uk/mlo/slim09/>).

Reviewer for IEEE Signal Processing Letters, Journal of Neuroscience Methods, Computational Statistics and Data Analysis, Quarterly Journal of the Royal Meteorological Society.

Publications Chair AISTATS 2010.

Publications Chair AISTATS 2009.

Reviewer for ICML 2009.

Volunteering at NIPS 2008.