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Date of birth: 24th April 1974
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Computer scientist, researcher in Statistical learning,
Computer Vision and Pattern Recognition

EDUCATION

- 2001** ***University of Grenoble, France.***
PH.D IN "SIGNAL, IMAGE, SPEECH AND TELECOM".
Topics: Computer Vision and Signal Processing.
- 1997** ***Physics Engineering School (ENSPS), Strasbourg, France..***
MASTER'S DEGREE IN PHYSICS AND IMAGE & SIGNAL PROCESSING.
- 1996** ***University of Strasbourg, France..***
BACHELOR'S DEGREE IN PHYSICS.

PROFESSIONAL EXPERIENCE

- 2002-
Present** Senior researcher, **University of Geneva, Computer Science Department:**
- Research on statistical data analysis, artificial intelligence, databases and information systems.
 - Developing machine learning and data-mining algorithms (C/C++, Java, Matlab).
 - Designing distributed database architectures for large scale data management and advanced applications.
 - Team management consisting of hiring, motivating and animating a research group of 3-4 people.
 - Managing international R&D projects, defining research directions and obtaining research grants and fundings.
- 2008** Research consultant, **Swiss Federal Institute of Technology (EPFL), MPSPG:**
- Study on large scale information retrieval over distributed networks.
 - Implementation of Java interfaces for large scale multimedia harvesting of Web social networks.
 - Design of OpenMP-based parallel algorithms for multimedia mining (feature extraction, clustering).
- 1998-2002** **Research assistant, CNRS - University of Grenoble (France), Gipsa-Lab:**
- Research in signal processing and computer vision within the "neural network and perception" team.
 - Teaching assistant in Signal Processing, Electronic and Computer Science.
- 1997** **Research assistant, CNRS - University of Strasbourg (France), LSIIT:**
- Fast CDD camera, image processing, computer vision.

Project involvement

- 2002-2014** IM2 - Swiss National Center of Competence in Research (NCCR) on Interactive Multimodal Information Management.
- *gathers the major Swiss contributors in the fields of machine learning, pattern recognition, speech processing, computer vision and human-machine interface (www.im2.ch).*
- *development of new models for data fusion, information retrieval and multimedia classification.*
- *supervision of two PhD students on Statistical Learning and Computer Vision.*
- 2008-2011** PetaMedia - Peer to Peer Tagged Media, European Network of Excellence.
- *consortium including national networks in the Netherlands, Switzerland, UK and Germany in the area of multimedia content analysis (MCA) and social peer-to-peer networks (www.petamedia.eu/).*
- *implementation of Java interfaces for large scale multimedia harvesting of Web social networks.*
- *design of OpenMP-based parallel algorithms for multimedia mining (feature extraction, clustering, ...).*
- 2006-2008** Multimatch - Multilingual/Multimedia Access To Cultural Heritage, European Project.
- *gathers twelve academic and industrial European partners to develop a Multilingual/Multimedia Web Search Engine (www.multimatch.eu).*
- *design and implementation of a Content-based Multimedia Search Engine. Setting up of a Apache Tomcat Web Services providing multimedia search facilities.*
- *supervision of a PhD and a Master student in the field of Multimedia Information Retrieval.*
- 2003-2007** SIMILAR - Seamless integrated multimodal interfaces for learning and augmenting communication in the real world, European Network of Excellence (www.similar.cc).
- *gathers European researchers in the fields of image, speech, human interactions and signal processing.*
- *studies on audio-visual human-machine interfaces.*
- 2002-2005** M4 - MultiModal Meeting Manager, European Project.
- *involves ten European academic partners to develop new algorithms for automatic analysis of audiovisual content (<http://www.dcs.shef.ac.uk/spandh/projects/m4>)*
- *design of video processing algorithms for video structuring, categorization and retrieval.*
- *setting up of a JSP-based Video Search Engine.*
- *supervision of a PhD student on Computer Vision.*
- 2002-2004** Webkit - Intuitive Physical Interfaces for the WWW, European project.
- *eight European academic and industrial partners working on Tangible User Interface (TUI) applications for information search and retrieval (<http://tiny.cc/pkVOP>)*
- *development of dimension reduction and graph optimisation algorithms to explore image collections.*

Awarded Grants from the Swiss National Science Foundation

- 2008-2010** SWIFTLink: Machine Learning Strategies for Adaptive Multimedia Navigation
2008-2010 Multimodal fusion for information processing and understanding
2006-2010 Collection Guide: Large scale multimedia information management
2004-2006 Intelligent Multimedia Description Framework

Scientific Interests

- Statistical data analysis/data mining: Components analysis, dimension reduction, clustering, spectral methods, regression/forecasting.
- Machine learning: Stochastic and Bayesian models, kernel-based approaches, Support Vector Machine, ensemble learning, graphical models (Bayesian networks, HMM), semi-supervised learning, multiple classifier fusion.
- Numerical optimization: Stochastic and deterministic methods (Monte Carlo, stochastic gradient descent), linear and quadratic programming, dynamic programming.
- Operational research: Graph theory, minimum spanning tree, shortest path, traveling salesman problem, network flow optimization.
- Databases: Distributed architectures, key-values storage, hashing algorithms, tree-based data structures, large scale data management.
- Information retrieval & natural language processing: Latent Semantic Analysis, probabilistic models, vector space models, text retrieval.
- Signal and image processing, computer vision, pattern recognition: Wavelet and Fourier analysis, image registration, image segmentation, object and activity recognition, tracking, visual cognitive models.

Scientific activities

- Author and co-author of dozens of journal articles and conference communications in the field of pattern recognition, machine learning, computer vision
(see http://viper.unige.ch/doku.php/team:eric_bruno#publications for a complete list).
- Special Session chair for the ACM Conference of Image and Video Retrieval 2009
- Program chair for the 4th International Workshop on Adaptive Multimedia Retrieval, AMR 2006.
- IEEE ICIP 2003 special session co-organizer: *From Visual Models to Semantic Visual Information Retrieval*.
- Referee for a number of scientific journals (IEEE TPAMI, IEEE SP, IEEE TMM, IEEE TKDE, IEEE TCSVT, ...) and conferences (ICIP, ICASSP, ACM CIVR, AMR, ...).
- Expert for PhD and Master defenses in Computer Science.
- Elected member of the Science Faculty Council of the University of Geneva.

Computational Skills

- Programming: **C/C++**, **Java (10+ years of experience)**, C#, Perl, Visual Basic, Fortran.
- Databases: Relational (MySQL, SAP MAXDB), persistent and embedded databases (Oracle Berkeley DB, SQL Lite, Java Derby), XML databases, Java Hibernate.
- Parallel and distributed computation: OpenMP, MPI, High Performance Computing.
- Scientific languages/libraries: **Matlab (10+ years of experience)**, R, Weka, OpenCV, Torch.
- Application server/Web services: Apache, Tomcat, Axis, JSP, SOAP.
- Linux and Windows programming environments.

Teaching/Tutoring Activities

- 2002-** Assistant professor (Maître assistant), Computer science department., Université de Genève:
- *Applied Cybernetics*, 4th years, with Prof. C. Pellegrini and T. Pun.
- *Data Structure*, 1st years, with Dr. S. Marchand-Maillet
- 2001-2002** Assistant professor (Attaché Temporaire d'Enseignement et de Recherche), Ecole Nationale Supérieure d'Electronique et de Radioélectricité de Grenoble:
- *Teaching (around 300h) in the fields of Signal Processing, Electronic and Computer Science.*
- 1998-2001** Teaching assistant (around 150h), Ecole Nationale Supérieure des Ingénieurs Electriciens de Grenoble and Institut Universitaire de Technologie, département Génie Civil, Université Joseph Fourier Grenoble in the fields of Image Processing and Thermodynamic.

Major Publications

- [1] Eric Bruno, Nicolas Moenne-Loccoz, and Stéphane Marchand-Maillet. Design of multimodal dissimilarity spaces for retrieval of multimedia documents. *IEEE Transaction on Pattern Analysis and Machine Intelligence*, 30(9):1520–1533, 2008.
- [2] Stéphane Marchand-Maillet, Eric Bruno, Andreas Nurnberger, and Marcin Detyniecki. *Adaptive Multimedia Retrieval: User, Context and Feedback*. Lecture Notes on Computer Science. Springer-Verlag, 2007.
- [3] Serhiy Kosinov, Éric Bruno, and Stéphane Marchand-Maillet. Spatially-consistent partial matching for intra- and inter-image prototype selection. *Signal Processing: Image Communication, special issue on "Semantic Analysis for Interactive Multimedia Services"*, 2008. (to appear).
- [4] Jana Kludas, Eric Bruno, and Stephane Marchand-Maillet. Can feature information interaction help for information fusion in multimedia problems? *Multimedia Tools and Applications Journal special issue on "Metadata Mining for Image Understanding"*, DOI: 10.1007/s11042-008-0251-y, 2008. DOI: <http://dx.doi.org/10.1007/s11042-008-0251-y>.
- [5] Eric Bruno and Stephane Marchand-Maillet. Multimodal preference aggregation for multimedia information retrieval. *Journal of Multimedia*, 4(5):321–329, 2009.

Miscellaneous

- [6] E. Bruno and D. Pellerin. Robust motion estimation using spatial gabor filters. In *X European Signal Processing Conference*, September 2000.
- [7] E. Bruno and D. Pellerin. Global motion fourier series expansion for video indexing and retrieval. In *Advances in Visual Information System, VISUAL*, pages 327–337, Lyon, November 2000.
- [8] E. Bruno and D. Pellerin. Global motion model based on B-spline wavelets : application to motion estimation and video indexing. In *Proc. of the 2nd Int. Symposium. on Image and Signal Processing and Analysis, ISPA'01*, June 2001.
- [9] E. Bruno and D. Pellerin. Video structuring, indexing and retrieval based on global motion wavelet coefficients. In *Proceedings of International Conference of Pattern Recognition (ICPR)*, Quebec City, Canada, August 2002.
- [10] E. Bruno and D. Pellerin. Video shot detection based on temporal linear prediction of motion. In *Proceedings of the IEEE International Conference on Multimedia and Exposition (ICME)*, Lausanne, Switzerland, August 2002.
- [11] E. Bruno and D. Pellerin. Modélisation du mouvement global sur une base d'ondelettes. application à l'indexation de séquences vidéo. In *Proceedings of the GRETSI'01*, Toulouse, France, September 2001.
- [12] E. Bruno and D. Pellerin. Estimateur de mouvement par banc de filtres de gabor spatiaux. In *Proceedings of ORASIS'99*, Aussois, France, April 1999.
- [13] Eric Bruno, Nicolas Moenne-Loccoz, and Stéphane Marchand-Maillet. Unsupervised event discrimination based on nonlinear temporal modelling of activity. *Pattern Analysis and Application*, 7(4):402–410, December 2004.
- [14] Eric Bruno, Nicolas Moenne-Loccoz, and Stéphane Marchand-Maillet. Asymmetric learning and dissimilarity spaces for content-based retrieval. In *Proc. of International Conference on Image and Video Retrieval (CIVR)*, pages 330–339, Tempe, AZ, July 2006.
- [15] M. Pingault, E. Bruno, and D. Pellerin. A robust multiscale b-spline function decomposition process to motion transparency estimation. *IEEE Transactions on Image Processing*, 12(11):1416– 1426, November 2003.
- [16] E. Bruno and S. Marchand Maillet. Prédiction temporelle de descripteurs visuels pour la mesure de similarité entre vidéos. In *Proceedings of the GRETSI'03*, Paris, France, September 2003.
- [17] E. Bruno and S. Marchand Maillet. Nonlinear temporal modeling for motion-based video overviewing. In *Proceedings of the 3rd Workshop on Content-Based Multimedia Indexing, CBMI'03*, Rennes, France, September 2003.

- [18] B. Janvier, E. Bruno, and S. Marchand Maillet. Information-theoretic framework for the joint temporal partitioning and representation of video data. In *Proceedings of the 3rd Workshop on Content-Based Multimedia Indexing, CBMI'03*, Rennes, France, September 2003.
- [19] Eric Bruno, Jana Kludas, and Stéphane Marchand-Maillet. Combining multimodal preferences for multimedia information retrieval. In *Proc. of International Workshop on Multimedia Information Retrieval*, Augsburg, Germany, 2007.
- [20] Eric Bruno, Nicolas Moenne-Loccoz, and Stéphane Marchand Maillet. Learning user queries in multimodal dissimilarity spaces. In *Proceedings of the 3rd International Workshop on Adaptive Multimedia Retrieval, AMR'05*, Glasgow, UK, July 2005.
- [21] Eric Bruno, Nicolas Moenne-Loccoz, and Stéphane Marchand Maillet. Interactive video retrieval based on multimodal dissimilarity representation. In *Proceedings of the Machine Learning Techniques for Processing Multimedia Content- ICML workshop, MLMM'05*, Bonn, Germany, August 2005.
- [22] E. Bruno and D. Pellerin. Robust motion estimation using spatial gabor-like filters. *Signal Processing*, 82(2):297–309, February 2002.
- [23] Eric Bruno. *De l'estimation locale à l'estimation globale du mouvement dans les séquences d'images*. PhD thesis, Université Joseph Fourier Grenoble, Laboratoire des Images et des Signaux, 2001.
- [24] Bruno Janvier, Eric Bruno, Stéphane Marchand Maillet, and Thierry Pun. A contextual model for semantic video structuring. In *13th European Signal Processing Conference, EUSIPCO'05*, Antalya, Turkey, September 2005.
- [25] Bruno Janvier, Éric Bruno, Stéphane Marchand-Maillet, and Thierry Pun. Information-theoretic temporal segmentation of videos and applications: multiscale keyframe selection and transition detection. *Multimedia Tools and Applications*, 30:273–288, 2006.
- [26] Bruno Janvier, Eric Bruno, Stéphane Marchand Maillet, and Thierry Pun. Performance evaluation of a contextual news story segmentation algorithm. In *Proc. SPIE Vol. 6073, 60730X, Multimedia Content Analysis, Management, and Retrieval*, volume 6073, San Jose, CA, January 2006.
- [27] Stéphane Marchand-Maillet and Eric Bruno. Collection guiding: A new framework for handling large multimedia collections. In *First Workshop on Audio-visual Content And Information Visualization In Digital Libraries, AVIVDiLib05*, Cortona, Italy, May 2005.
- [28] Nicolas Moenne-Loccoz, Eric Bruno, and Stéphane Marchand-Maillet. Video content representation as salient regions of activity. In *International Conference on Image and Video Retrieval*, Dublin, Ireland, 2004.
- [29] Nicolas Moenne-Loccoz, Bruno Janvier, Eric Bruno, and Stéphane Marchand-Maillet. Managing video at large. In *ACM SIGMOD Workshop on Computer Vision meets Databases*, Paris, France, 2004.
- [30] Nicolas Moenne-Loccoz, Eric Bruno, and Stéphane Marchand-Maillet. Knowledge-based detection of events in video streams from salient regions of activities. *Pattern Analysis and Applications*, 7(4):422–429, December 2004.
- [31] Nicolas Moenne-Loccoz, Bruno Janvier, Stéphane Marchand-Maillet, and Eric Bruno. An integrating framework for the management of video collections. In *First Workshop on Machine Learning and Multimodal Interaction*, volume MLMI'04, Lecture Notes in Computer Science 3361, Martigny, Switzerland, 2004.
- [32] Nicolas Moëne-Loccoz, Bruno Janvier, Stéphane Marchand-Maillet, and Eric Bruno. Handling temporal heterogeneous data for content-based management of large video collections. *Multimedia Tools and Applications*, 31:309–325, 2006.
- [33] Nicolas Moenne-Loccoz, Eric Bruno, and Stéphane Marchand-Maillet. Local feature trajectories for efficient event-based indexing of video sequences. In *Proc. of International Conference on Image and Video Retrieval (CIVR)*, pages 82–91, Tempe, AZ, July 2006.
- [34] Jana Kludas, Eric Bruno, and Stéphane Marchand-Maillet. Information fusion in multimedia information retrieval. In *Proc. of International Workshop on Adaptive Multimedia Retrieval*, Paris, France, July 2007.
- [35] Donn Morrison, Stéphane Marchand-Maillet, and Eric Bruno. Automatic image annotation with relevance feedback and latent semantic analysis. In *Proc. of International Workshop on Adaptive Multimedia Retrieval*, Paris, France, July 2007.
- [36] Donn Morrison, Stéphane Marchand-Maillet, and Eric Bruno. Hierarchical long-term learning for automatic image annotation. In *Proc. of International Conference on Semantics and Digital Media Technologies*, Paris, France, December 2007.

- [37] Nicolas Moenne-Loccoz, Eric Bruno, and Stéphane Marchand-Maillet. Interactive retrieval of video sequences from local feature dynamics. In *Proceedings of the 3rd International Workshop on Adaptive Multimedia Retrieval, AMR'05*, Glasgow, UK, July 2005.
- [38] Nicolas Moenne-Loccoz, Eric Bruno, and Stéphane Marchand-Maillet. Interactive partial matching of video sequences in large collections. In *IEEE International Conference on Image Processing (ICIP'05)*, Genova, Italy, 2005.
- [39] Eniko Szekely, Eric Bruno, and Stéphane Marchand-Maillet. Clustered multidimensional scaling for exploration in information retrieval. In *Proc. of International Conference on the Theory of Information Retrieval*, October 2007.
- [40] Eniko Szekely, Eric Bruno, and Stéphane Marchand-Maillet. Clustered multidimensional scaling for exploration in information retrieval. In *1st International Conference on the Theory of Information Retrieval (ICTIR'07)*, pages 95–104, Budapest, Hungary, 2007.
- [41] Donn Morrison, Stéphane Marchand-Maillet, and Eric Bruno. Semantic clustering of images using patterns of relevance feedback. In *Proceedings of the 6th International Workshop on Content-based Multimedia Indexing (CBMI'2008)*, London, UK, 2008.
- [42] Donn Morrison, Eric Bruno, and Stéphane Marchand-Maillet. Capturing the semantics of user interaction: A review and case study. In *Emergent Web Intelligence*. Springer, 2009.
- [43] Jana Kludas, Eric Bruno, and Stéphane Marchand-Maillet. Exploiting synergistic and redundant features for multimedia document classification. In *32nd Annual Conference of the German Classification Society - Advances in Data Analysis, Data Handling and Business Intelligence (Gfkl 2008)*, Hamburg, Germany, 2008.
- [44] Jana Kludas, Eric Bruno, and Stéphane Marchand-Maillet. Can feature information interaction help for information fusion in multimedia problems? In *First International Workshop on Metadata Mining for Image Understanding*, pages 23–33, Funchal, Madeira, 2008.
- [45] Jana Kludas, Stéphane Marchand-Maillet, and Eric Bruno. Exploiting document feature interactions for efficient information fusion in high dimensional spaces. In *Proceedings of the First International Workshops on Image Processing Theory, Tools and Applications (IPTA'2008)*, Sousse, Tunisia, November 2008. (invited).
- [46] Eric Bruno and Stéphane Marchand-Maillet. Multiview clustering: a late fusion approach using latent models. In *Proceedings of the 32nd ACM Special Interest Group on Information Retrieval Conference, SIGIR 09*, Boston, USA, 2009.
- [47] Eniko Szekely, Eric Bruno, and Stéphane Marchand-Maillet. Unsupervised discriminant embedding in cluster spaces. In *International Conference on Knowledge Discovery and Information Retrieval (KDIR'09)*, Madeira, Portugal, October 6-8 2009.
- [48] Eniko Szekely, Eric Bruno, and Stéphane Marchand-Maillet. Distance transformation for effective dimension reduction of high-dimensional data. In *1st International Workshop on Topological Learning (in conjunction with the 18th International Symposium on Methodologies for Intelligent Systems)*, Prague, Czech Republic, September 14 2009.
- [49] Donn Morrison, Stéphane Marchand-Maillet, and Eric Bruno. Modelling long-term relevance feedback. In *Proceedings of the ECIR Workshop on Information Retrieval over Social Networks*, Toulouse, FR, April 6th 2009.
- [50] Donn Morrison, Stéphane Marchand-Maillet, and Eric Bruno. Tagcaptcha: Annotating images with captchas. In *Proceedings of the Human Computation Workshop (HCOMP2009) - co-located with ACM-KDD 2009*, Paris, FR, June 28th 2009.
- [51] Stéphane Marchand-Maillet, Eniko Szekely, and Eric Bruno. Optimizing strategies for the exploration of social-networks and associated data collections. In *Proceedings of the International Workshop on Image Analysis for Multimedia Interactive Services (WIAMIS'09) - Special session on "People, Pixels, Peers: Interactive Content in Social Networks"*, London, UK, 2009. (invited).