Coloma Ballester

PERSONAL INFORMATION

Last name: Ballester
First name: Coloma
Born: July 31, 1963, in Campos, Illes Balears, Spain

Full Professor ('Catedrático de Universidad')
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Universitat Pompeu Fabra
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BIO SKETCH

Coloma Ballester joined the Department of Information and Communication Technologies at Universitat Pompeu Fabra in 1999, where she is a Full Professor (CU) of Applied Mathematics and the coordinator of the Intelligent Multimodal Vision Analysis (previously, Image Processing and Computer Vision) group. From 2013 to 2015 she was scientific director of the Image Group in the Barcelona Media technological research center (now Eurecat). Prior to that, she was Chercheur Associé at Centre National de la Recherche Scientifique (CNRS) in Paris (1998) and assistant professor at the Universitat Illes Balears until 1998. In 1995 she received a PhD in Computer Science from the Universitat Illes Balears, for her thesis "An Affine Invariant Model for Image Segmentation: Mathematical Analysis and Applications". Prior to that she received a MSc degree in Mathématiques Appliquées à l'Ingénierie in 1992 from Université Paris-IX Dauphine for her thesis "On an inverse problem through a nonlinear parabolic PDE". She also holds a degree in Mathematics from Universitat Autònoma de Barcelona.
Her research has been devoted to the development of models and algorithms for image processing and computer vision and to their mathematical analysis. This has led to pioneering publications in variational methods, geometric models, partial differential equations, non-local approaches and data-driven learning strategies for imaging, and to the development of significant contributions to several problems: image segmentation, shape from texture, interpolation and inpainting, mathematical morphology including data structures, object recognition, image

fusion and super-resolution, image restoration and denoising, optical flow and occlusion detection, video interpolation for slow camera motion and temporal super-resolution, de-interlacing, mathematical analysis of the TV flow, visual perception, image colorization, out-of-distribution and anomaly detection, new mathematical models for the geometric and semantic analysis of visual data. She has authored over 75 articles in peer-reviewed high impact-factor journals and top-class international conferences, several best paper awards, and many invited talks and non peer-reviewed publications, receiving, as of September 2022, more than 8300 citations (more than 2900 since 2017) in GS; she holds an h-index of 23. She currently works on theory and applications in image and video analysis, computer vision and applied mathematics, including generative models, unsupervised learning, data representation, geometric and semantic image and video analysis and understanding using multimodal information, cross-modal relationships and understanding, non-local methods for general data comparison and analysis, and she is currently interested in both model-based and data-driven strategies, together with its mathematical analysis. The practical impact includes the development of models and algorithms for multiple applications, some of them available online (more information in www.upf.edu/web/coloma-ballester). She coordinates an international research team at UPF, with external collaborators, that collaborate on long term European and national projects and networks. She has supervised 6 PhD students in the last 8 years, and currently supervising 2 more, mentored 11 postdocs in the last 8 years, and supervised 36 bachelor and master thesis. She has many academic and scientific management responsibilities including invited participation in scientific and program committees, jury of international prizes, research habilitations, to name a few.

CURRENT AND PREVIOUS POSITIONS

Full Professor (CU) of Applied Mathematics November 2021 to present
Department of Information and Communication Technologies
Universitat Pompeu Fabra
Coordinator of the Intelligent Multimodal Vision Analysis (previously, Image Processing and Computer Vision) group

Associate Professor (TU) of Applied Mathematics June 2001 to October 2021
Department of Information and Communication Technologies
Universitat Pompeu Fabra

Scientific director of the Image Group in the Barcelona Media research center (now Eurecat)
. September 2013 to October 2015
Barcelona Media, currently within Eurecat Centre Tecnològic de Catalunya

TEU, in Applied Mathematics September 1999 to May 2001
Department of Information and Communication Technologies
Universitat Pompeu Fabra

Chercheur Associé au CNRS September 1998 to December 1998
Centre National de la Recherche Scientifique (CNRS)
Centre Emile Borel, Institut Henri Poincaré, campus Pierre et Marie Curie, of La Sorbonne, Paris, France.

TEU (Ciencias de la Computación) September 1992 to August 1999
Department of Mathematics and Computer Science
Universitat de les Illes Balears

M.S. internship September 1991 to July 1992
Université Paris-IX Dauphine
Paris, France

TEU (interin position) October 1987 to August 1992
Department of Mathematics and Computer Science
Universitat de les Illes Balears

Assistant Lecturer (Encargado de Curso Nivel C) October 1986 to September 1987

Department of Mathematics and Computer Science
Universitat de les Illes Balears

EDUCATION

Ph.D. in Computer Science — July 1992 to May 1995

'An Affine Invariant Model for Image Segmentation: Mathematical Analysis and Applications'.
Department of Mathematics and Computer Science, Universitat Illes Balears
Supervisors: Vicent Caselles and Jean-Michel Morel
Evaluation Commitee: Pierre-Louis Lions (chair), Luis Alvarez, Tomeu Coll, Tony Lindeberg, and Jayant Shah
Excellent Cum Laude

Master D.E.A. Mathématiques Appliquées à l'Ingénierie — September 1991 to June 1992

Université Paris-IX Dauphine.

Licenciatura (BSc and MSc degrees) in Mathematics — September 1981 to June 1986

Universitat Autònoma de Barcelona.

SCIENTIFIC OUTPUT AND PUBLICATIONS

OVERVIEW AND CITATION METRICS

INDEXED JOURNAL ARTICLES

Overview:

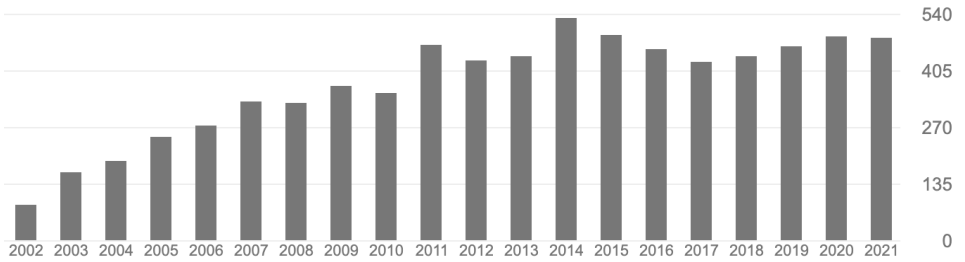
75 articles in **peer-reviewed** high impact-factor journals and top-class international conferences:

- 29 peer-reviewed journal articles, and 3 more (journal articles) submitted:
  - 13 first authorship (12 in Q1, 1 in Q2)
  - 10 senior (last or before-last if co-leadership) authorship peer-reviewed research articles (7 in Q1, 3 in Q2)
  - 6 co-authorship peer-reviewed research articles (4 in Q1, 2 in Q2)
  - 3 more submitted (all Q1)
- 3 invited review journal article (1) and invited book chapters (2)
- 1 book (in proofreading)
- 39 peer-reviewed book chapters and articles in peer-reviewed conference proceedings

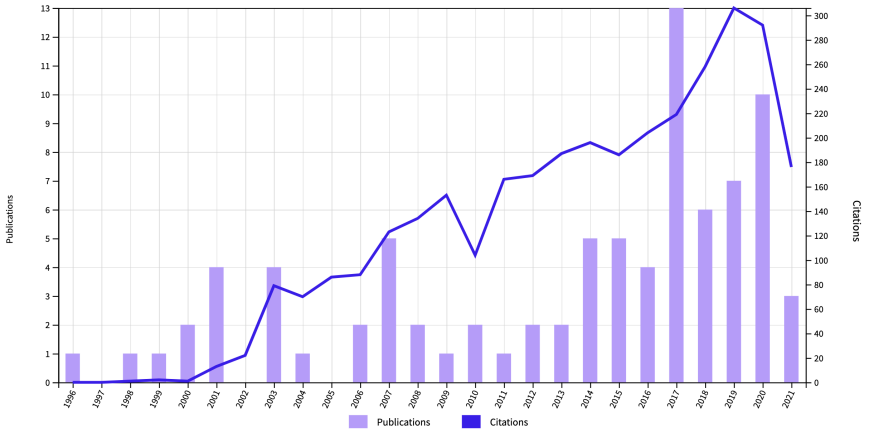
Many invited or not peer-reviewed publications (detailed below)

The (WoS) indexed articles belong to different ISI categories: Applied Mathematics; Mathematics; Computer Science, Artificial Intelligence; Engineering, Electrical & Electronic; Computer Science, Software Engineering; Imaging Science Photographic Technology; Automatic Control Systems; Mathematical Physics.

Citation analysis (Google Scholar). Based on a query to Google Scholar consulted on September 2022,she has **8304 citations**, and an **h-index of 23**.



Citation analysis (Web of Science). Based on a query to Web of Science consulted on October 10th, 2021, she has **3,187 citations (without self-citations)**, and an **h-index of 16**.



JOURNAL ARTICLES

[1] Thomas Batard, Gloria Haro and **Coloma Ballester**. DIP-VBTV: A Color Image Restoration Model Combining a Deep Image Prior and a Vector Bundle Total Variation. SIAM Journal on Imaging Sciences 14, no. 4 (2021): pp. 1816-1847. 2021.

[2] Adrià Arbués-Sangüesa, Adrián Martín, Javier Fernández, Gloria Haro, and **Coloma Ballester**. *Towards Soccer Pass Feasibility Maps: the Role of Players' Orientation*. Journal of Sports Sciences. pp.1-14. 2021. (link to the paper). DOI: 10.1080/02640414.2021.1959176

[3] Lara Raad, Maria Oliver, **Coloma Ballester**, Gloria Haro, Enric Meinhardt-Llopis. *On anisotropic optical flow inpainting algorithms*. IPOL Journal, 10. pp. 78–104. 2020. https://doi.org/10.5201/ipol.2020.281 Impact factor (Scopus): CiteScore 2020: 3.1. SJR 2020: 0.359. SNIP 2020: 1.006.

[4] Patricia Vitoria and **Coloma Ballester**. *Automatic Flare Spot Artifacts Detection and Removal in Photographs*. Journal of Mathematical Imaging and Vision. Vol 61 (4), pp 515-533. 2019. DOI: 10.1007/s10851-018-0859-0.

[5] Ferran P. Gamonal, **Coloma Ballester**, Gloria Haro, Enric Meinhardt-Llopis and Roberto P.Palomares. *An Analysis and Speedup of the FALDOI Method for Optical Flow Estimation*. IPOL Journal, 9. pp. 94–123. 2019. https://doi.org/10.5201/ipol.2019.238

[6] Juan Francisco Garamendi, Vanel Lazcano and **Coloma Ballester**, *Joint TV-L1 Optical Flow and Occlusion Estimation.* Image Processing On Line Journal, Vol. 9, pp. 432–452, 2019. doi:10.5201/ipol.2019.118

[7] Vadim Fedorov and **Coloma Ballester**. *An Affine Invariant Patch Similarity*. IPOL Journal, 8. pp. 490–513. 2018. https://doi.org/10.5201/ipol.2018.202

[8] Roberto P.Palomares, Enric Meinhardt-Llopis, **Coloma Ballester** and Gloria Haro. *FAL-DOI: a new minimization strategy for large displacement variational optical flow.* Journal of Mathematical Imaging and Vision, vol. 58 (1), pp. 27-46. 2017.
doi:10.1007/s10851-016-0688-y

[9] Vadim Fedorov and **Coloma Ballester**. *Affine Non-local Means Image Denoising*. IEEE Transactions On Image Processing, Vol. 26 (5), pp. 2137-2148. 2017.
doi:10.1109/TIP.2017.2681421

[10] Maria Oliver, Gloria Haro, Mariella Dimiccoli, Baptiste Mazin, and **Coloma Ballester**. *A Computational Model for Amodal Completion.* Journal of Mathematical Imaging and Vision, vol. 56 (3), pp. 511-534. 2016.
doi:10.1007/s10851-016-0652-x

[11] V. Fedorov, P. Arias, R. Sadek, G. Facciolo and **C. Ballester**. *Linear Multiscale Analysis of Similarities between Images on Riemannian Manifolds: Practical Formula and Affine Covariant Metrics.* SIAM Journal Imaging Sciences (SIIMS), vol 8(3), pp. 2021-2069, 2015.
doi:10.1137/141000002

[12] **C. Ballester**, F. Calderero, V. Caselles, & G. Facciolo. *Multiscale analysis of similarities between images on Riemannian manifolds.* SIAM Journal Multiscale Modeling and Simulation, vol 12(2), pp. 616-649, 2014.
doi:10.1137/130926833

[13] R. Sadek, C. Constantinopoulos, E. Meinhardt, **C. Ballester** and V. Caselles. *On affine invariant descriptors related to SIFT.* SIAM Journal on Imaging Sciences. Vol. 5 (2), 652-687, 2012.
doi:10.1137/100798739

[14] A. Almansa, **C. Ballester**, V. Caselles and G. Haro. *A TV based restoration model with local constraints,* Journal Scientific Computing, Vol 34 (3), pp. 209-236, 2008.
doi:10.1007/s10915-007-9160-x

[15] **C. Ballester**, M. Bertalmío, V. Caselles, L. Garrido, A. Marqués and F. Ranchin, *An Inpainting Based De-interlacing Method,* IEEE Transactions on Image Processing, Vol. 16 (10), pp. 2476-2491, 2007.
doi:10.1109/TIP.2007.903844

[16] **C. Ballester**, V. Caselles, L. Igual and L. Garrido, *Level Lines Selection with Variational Models for Segmentation and Encoding,* Journal of Mathematical Imaging and Vision, Vol 27, no. 1, pp 5-27, 2007.
doi:10.1007/s10851-006-7252-0

[17] **C. Ballester**, V. Caselles, L. Igual, B. Rougé and J. Verdera, *A Variational Model for P+XS Image Fusion.* International Journal of Computer Vision, Vol 69 (1), pp 43-58, 2006.
doi:10.1007/s11263-006-6852-x

[18] V. Caselles, G. Sapiro, A. Solé, **C. Ballester**. *Morse Description and Morphological Encoding of Continuous Data*. SIAM Journal Multiscale Modeling and Simulation, vol. 2, no. 2, pp. 179-209, 2004.
doi:10.1137/S1540345902416557

[19] **C. Ballester**, V. Caselles and P. Monasse, *The Tree of Shapes of an Image*, ESAIM:Control, Optimisation and Calculus of Variations, 9, pp 1-18, 2003.
doi:10.1051/cocv:2002069

[20] **C. Ballester**, V. Caselles and J.Verdera, *Disocclusion by Joint Interpolation of Vector Fields and Gray Levels*. SIAM Journal Multiscale Modeling and Simulation, vol. 2, no. 1, pp 80-123, 2003.
doi:10.1137/S1540345903422458

[21] **C. Ballester**, V.Caselles, B.Rougé and J.Verdera. *Une méthode géométrique de fusion pour des images P+XS*, Bulletin de la Société Française de Photogrammétrie et de Télédétection, Num.169, pages 53-64, 2003. **Chosen one of the 5 best algorithms of P+XS image fusion by the French Spatial Agency CNES**.

[22] **C. Ballester**, M. Bertalmío, V. Caselles, G. Sapiro and J. Verdera, *Filling-In by Joint Interpolation of Vector Fields and Gray Levels*, IEEE Transactions on Image Processing, vol. 10 (8), pp. 1200-1211, 2001.
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[23] **Coloma Ballester** and Vicent Caselles, *The M-components of level sets of continuous functions in WBV*, Publicacions Matematiques, vol. 45 (no 2), pp. 477-527, 2001.
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[24] F. Andreu, **C. Ballester**, V. Caselles and J. M. Mazón, *Minimizing Total Variation Flow*, Differential and Integral Equations, vol. **4 (3)**, pp. 321-360, 2001.

[25] F. Andreu, **C. Ballester**, V. Caselles and J. M. Mazón, *The Dirichlet Problem for the Total Variation Flow*, Journal Functional Analysis, **180**, 347-403, 2001.
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[26] F. Andreu, **C. Ballester**, V. Caselles and J. M. Mazón, *Minimizing Total Variation Flow*, Comptes Rendus Acad. Sciences, t. **311**, Sér. I, 867-872, 2000.
doi:10.1016/S0764-4442(00)01729-8

[27] **C. Ballester**, V. Caselles and M. Gonzalez, *Lower Semicontinuity of the Affine Total Variation used in Image Segmentation*, Rev. Union. Mat. Argentina (N. dedicado a J. Bouillet), vol. 41(1), pp. 41-60, 1999.

[28] **C. Ballester** and M. Gonzalez, *Affine Invariant Texture Segmentation and Shape from Texture by Variational Methods,* Journal of mathematical Imaging and Vision, **9**, (1998), 141-171.
doi:10.1023/A:1008337710072

[29] **C. Ballester** V. Caselles and M. Gonzalez, *Affine invariant segmentation by variational method*, SIAM J. Appl. Math. 56, 294-325, 1996
. doi:10.1137/S003613999426702X

SUBMITTED BOOKS AND JOURNAL PAPERS

[30] Simone Parisotto, Patricia Vitoria, **Coloma Ballester**, Aurélie Bugeau, Suzanne Reynolds and Carola-Bibiane Schönlieb. The Art of Inpainting - A Monograph on Mathematical Methods for the Virtual Restoration of Illuminated Manuscripts. Book. Submitted. 2021.

[31] Joan F. Serracant-Lorenzo, Martí Guasch, and **Coloma Ballester**. Spatio-Temporal Graph Convolutional Networks for Nonverbal Language in Entrepreneurial Pitching Sessions. Submitted, 2021.

[32] Patricia Vitoria, Samuel Hurault, Pablo Musé, and **Coloma Ballester**. Learning meaningful latent variables for multitask representation and image restoration. To be submitted. 2022.

[33] Patricia Vitoria, Lara Raad, and **Coloma Ballester**. Stochastic colorization providing multiple colorization solutions. To be submitted. 2022.

INVITED REVIEW ARTICLES AND INVITED BOOK CHAPTERS

[34] **Coloma Ballester**, Aurélie Bugeau, Samuel Hurault, Simone Parisotto, Patricia Vitoria. *An Analysis of Generative Methods for Multiple Image Inpainting*. Handbook of Mathematical Models and Algorithms in Computer Vision and Imaging. Springer Nature Book (peer-reviewed). 2022. To appear. https://arxiv.org/pdf/2205.02146.pdf

[35] **Coloma Ballester**, Hernan Carrillo, Michaël Clément, Patricia Vitoria. *Analysis of Different Losses for Deep Learning Image Colorization*. Handbook of Mathematical Models and Algorithms in Computer Vision and Imaging. Springer Nature Book (peer-reviewed). 2021. To appear.
https://arxiv.org/pdf/2204.02980.pdf
Also: **Coloma Ballester**, Aurélie Bugeau, Hernan Carrillo, Michaël Clément, Rémi Giraud, Lara Raad, Patricia Vitoria. *Influence of Color Spaces and Analysis of Different Losses for Deep Learning Image Colorization*. https://arxiv.org/pdf/2204.02850.pdf

[36] **Ballester i Nicolau, C.**, Arias, P., Coll i Vicens, B., Mazón Ruiz, J.M. and Provenzi, E., *L'aportació de Vicent Caselles al món de les matemàtiques i l'aplicació al processament d'imatges*. Butlletí de la Societat Catalana de Matemàtiques. Vol. 33 (1), pp.5-41. 2018. doi:10.2436/20.2002.01.78

PEER-REVIEWED BOOK CHAPTERS

[37] Vanel Lazcano, Felipe Calderero, **Coloma Ballester**. *Comparing different metrics on an anisotropic depth completion model.* International Journal of Hybrid Intelligent Systems, vol. Pre-press, no. Pre-press, pp. 1-13, 2021.

[38] Patricia Vitoria, Joan Sintes, and **Coloma Ballester**. (2019) *Semantic Image Completion Through an Adversarial Strategy*. In: Claudio A. et al. (eds) Computer Vision, Imaging and Computer Graphics Theory and Applications. VISIGRAPP 2019. Communications in Computer and Information Science, vol 1182. pp. 520-542. Springer. 2020.
Chapter DOI:10.1007/978-3-030-41590-7_22 Semantic Image Completion Through an Adversarial Strategy. In: Springer, Cham

[39] Fedorov V., Arias P., Facciolo G., **Ballester C.** (2017) *Exemplar-Based Image Inpainting Using an Affine Invariant Similarity Measure.* In: Braz J. et al. (eds) Computer Vision, Imaging and Computer Graphics Theory and Applications. VISIGRAPP 2016. Communications in Computer and Information Science, vol 693. Springer, Cham. 2017.
doi:https://doi.org/10.1007/978-3-319-64870-5_22

[40] Rezaeirowshan B., **Ballester C.**, Haro G. (2017) *From Occlusion to Global Depth Order, a Monocular Approach.* In: Braz J. et al. (eds) Computer Vision, Imaging and Computer Graphics Theory and Applications. VISIGRAPP 2016. Communications in Computer and Information Science, vol 693. Springer, Cham. 2017.
doi:https://doi.org/10.1007/978-3-319-64870-5_28

PEER-REVIEWED ARTICLES IN CONFERENCE PROCEEDINGS

[41] Marcelo Sanchez, Gil Triginer, **Coloma Ballester**, Lara Raad, Eduard Ramon. Photorealistic Facial Wrinkles Removal. ACCV 2022, Computer Vision for Medical Computing Workshop. 2022.

[42] Alejandro Cartas, **Coloma Ballester**, and Gloria Haro. *A Graph-Based Method for Soccer Action Spotting Using Unsupervised Player Labeling*. Proceedings of the 5th International ACM Multimedia 2022 Workshop on Multimedia Content Analysis in Sports (MMSports '22). October 2022. Pages 93–102. 2022.
https://doi.org/10.1145/3552437.3555691
Core Rank: A*. h-index: 58. h-median-index: 93.

[43] Vanel Lazcano, Felipe Calderero, and **Coloma Ballester**. Biased-Infinity Laplacian Applied to Depth Completion Using a Balanced Anisotropic Metric. International Con-

ference in Communications, Signal Processing, and Systems. In: Lecture Notes in Electrical Engineering book series (LNEE,volume 878), pp. 1048-1055. 2022.

[44] Adrià Arbués-Sangüesa, Adrian Martin, P. Granero, **Coloma Ballester**, and Gloria Haro. Learning Football Body-Orientation as a Matter of Classification. AI for Sports Analytics Workshop at 30th International Joint Conference on Artificial Intelligence (ICJAI-2021). 2021.
https://arxiv.org/abs/2106.00359

[45] Pierrick Chatillon and **Coloma Ballester**. *History-based anomaly detector: an adversarial approach to anomaly detection.* In: Arai K., Kapoor S., Bhatia R. (eds) Intelligent Systems and Applications. IntelliSys 2020. Advances in Intelligent Systems and Computing, vol 1250. pp. 761–776. Springer, Cham. 2020.
https://doi.org/10.1007/978-3-030-55180-3_58

[46] Patricia Vitoria, Lara Raad, and **Coloma Ballester**. *ChromaGAN: Adversarial Picture Colorization with Semantic Class Distribution*. In: Proceedings of the IEEE Winter Conference on Applications of Computer Vision (WACV 2020), pp. 2445-2454. 2020. Paper, Code, Demo.
Core Rank: A. h-index: 54. h-median-index: 87.
Doi: https://doi.ieeecomputersociety.org/10.1109/WACV45572.2020.9093389

[47] Samuel Hurault, **Coloma Ballester**, and Gloria Haro. *Self-Supervised Small Soccer Player Detection and Tracking*. MMSports'20: Proceedings of the 3rd International ACM Workshop on Multimedia Content Analysis in Sports. October 2020. Pages 9–18. 2020.
https://doi.org/10.1145/3422844.3423054
ISBN: 978-1-4503-8149-9
Core Rank: A*. h-index: 58. h-median-index: 93.

[48] Adrià Arbués-Sangüesa, Adrian Martin, Javier Fernandez, **Coloma Ballester**, and Gloria Haro. *Using Player's Body-Orientation to Model Pass Feasibility in Soccer*. Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops, pp. 886-896, 2020. **Second Best Paper Award**. Core Rank: A*. h-index: 73. h-median-index: 110.
doi:10.1109/CVPRW50498.2020.00451

[49] V. Lazcano, F. Calderero, **C. Ballester**. *Depth Image Completion Using Anisotropic Operators.* In: Abraham A. et al. (eds) Proceedings of the 12th International Conference on Soft Computing and Pattern Recognition (SoCPaR 2020). SoCPaR 2020. Advances in Intelligent Systems and Computing, vol 1383. Springer, Cham. https://doi.org/10.1007/978-3-030-73689-7_57

[50] Adrià Arbués-Sangüesa, Adrián Martin, Javier. Fernández, Carlos Rodríguez, Gloria Haro, and **Coloma Ballester**. *Always Look on the Bright Side of the Field: Merging Pose and Contextual Data to Estimate Orientation of Soccer Players.* In Proceedings of the IEEE International Conference on Image Processing (ICIP). pp. 1506-1510. 2020.
Core Rank: A. h-index: 52. h-median-index: 71.
Cites: 0 in Web of Science, 0 in Scopus, 0 in Google Scholar.

[51] Patricia Vitoria and **Coloma Ballester**. *Generative Peer-to-peer Face Hallucination*. Poster presentation. In: CVPR 2019 Women in Computer Vision Workshop. CVPR 2019. June, 2019.
Core Rank: A*. h-index: 73. h-median-index: 110.

[52] P. Vitoria, J. Sintes, and **C. Ballester**. *Semantic Image Inpainting Through Improved Wasserstein Generative Adversarial Networks*. In: Tremeau A, Farinella GM, Braz J. Proceedings of the 14th International Joint Conference on Computer Vision, Imaging

and Computer Graphics Theory and Applications (VISAPP 2019). Volume 4; 2019 Feb 25-27; Prague, Czech Republic. Setúbal: Science and Technology Publications, Lda; 2019. p. 249-260. **Best Student Paper Award**
DOI: 10.5220/0007367902490260 https://arxiv.org/abs/1812.01071

[53] Adrià Arbués-Sangüesa, Gloria Haro, and **Coloma Ballester**. *Multi-Person tracking by multi-scale detection in Basketball scenarios*. Proceedings of the 21st Irish Machine Vision and Image Processing conference (IMVIP 2019). 2019.
DOI 978-0-9934207-4-0
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[54] Adrià Arbués-Sangüesa, **Coloma Ballester**, and Gloria Haro. *Single-Camera Basketball Tracker through Pose and Semantic Feature Fusion*. Proceedings of the International Conference on Artificial Intelligence in Sports (ICAIS), Vol:13, No:7, pp. 410-418. 2019. **Best Paper Award**
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[55] M. Oliver, L. Raad, **C. Ballester** and G. Haro. *Motion Inpainting by an Image-Based Geodesic AMLE Method*. 2018 25th IEEE International Conference on Image Processing (ICIP), Athens, Greece, pp. 2267-2271. 2018. Core Rank: A. h-index: 52. h-median-index: 71.
doi:10.1109/ICIP.2018.8451851

[56] Maria Oliver, Gloria Haro, Vadim Fedorov and **Coloma Ballester**. *L1 Patch-Based Image Partitioning Into Homogeneous Textured Regions*. In Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2018), pp. 1558-1562, 2018.
Core Rank: A. h-index: 86. h-median-index: 145.

[57] Vanel Lazcano, Luis Garrido and **Coloma Ballester**. Jointly Optical Flow and Occlusion Estimation for Images with Large Displacements. In Proceedings of the 13th International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications (VISAPP 2018). Volume 5. pp. 588-595. ISBN: 978-989-758-290-5. 2018.

[58] Patricia Vitoria Carrera, Vadim Fedorov and **Coloma Ballester**. *Spatio-temporal tube segmentation through a video metrics-based patch similarity measure.* Proceedings of the 19th Irish Machine Vision and Image Processing confence (IMVIP 2017), pp. 147-154. ISBN: 978-0-9934207-2-6. 2017.

[59] Maria Oliver, Roberto P.Palomares, **Coloma Ballester** and Gloria Haro. *Spatio-temporal binary video inpainting via threshold dynamics.* In *Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2017)*, pp. 1822-1826. New Orleans, LA. 2017.
Core Rank: A. h-index: 86. h-median-index: 145.
doi:10.1109/ICASSP.2017.7952471

[60] Roberto P.Palomares, Gloria Haro and **Coloma Ballester**. Joint large displacement scene flow and occlusion variational estimation. In *VISAPP: the 12th International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications*, 2017.

[61] Vadim Fedorov, Pablo Arias, Gabriele Facciolo and **Coloma Ballester**. *Affine Invariant Self-Similarity for Exemplar-Based Inpainting.* Proceedings of the 11th Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications (VISAPP 2016). Magnenat-Thalmann N, Richard P, Linsen L, Telea A, Battiato S, Imai F, Braz J 1ed. 2016. pp. 48-58.

[62] Babak Rezaeirowshan, **Coloma Ballester** and Gloria Haro. *Monocular Depth Ordering using Perceptual Occlusion Cues.* Proceedings of the International Conference on Computer Vision and Applications (VISAPP 2016). 2016.

[63] Roberto P.Palomares, Gloria Haro and **Coloma Ballester**. A Rotation-Invariant Regularization Term for Optical Flow Related Problems. In *Proceedings of the 12th Asian Conference on Computer Vision (ACCV 2014)*, pp. 304-319, 2014. doi:https://doi.org/10.1007/978-3-319-16814-2_20

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[65] R. Sadek, **C. Ballester**, L. Garrido, E. Meinhardt and V.Caselles. *Frame interpolation with occlusion detection using a time coherent segmentation* . International Conference on Computer Vision Theory and Applications (VISAPP 2012). Rome, Italy. February 24-26, 2012.

[66] **C.Ballester**, V.Caselles, B.Rougé and J.Verdera. *A Variational Model for P+XS Image Fusion*. Proceedings of the IEEE International Conference in Computer Vision Workshop Variational, Geometric and Level Set Methods in Computer Vision. (Nice, France - October 11-12, 2003).

[67] **C. Ballester**, V. Caselles and J. Verdera, "A variational model for disocclusion", Proceedings 2003 International Conference on Image Processing (Cat. No.03CH37429), vol. 3, pp. III-677-80 vol.2, September 2003. DOI 10.1109/ICIP.2003.1247335.
Core Rank: A. h-index: 52. h-median-index: 71.

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[71] **C. Ballester**, E. Cubero-Castan, M. Gonzalez, J.-M. Morel. *Contrast Invariant Image Intersection.* Advanced Mathematical Methods in Measurement and Instrumentation, pp. 41-55, Esculapio, Bologna, 2000.

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[73] **C. Ballester**, M. Gonzalez. *Texture Segmentation by Variational Methods*. 12th International Conference on Analysis and Optimization of Systems Images, Wavelets and PDEs. Lecture Notes in Control and Information Sciences, vol. 219. Eds. M-O. Berger, R. Deriche, I. Herlin, J-M. Morel. pp. 187-193 Springer. 1996. ISNBN 3-540-76076-8.

[74] **C. Ballester**, V. Caselles, M. Gonzalez. *Affine invariant segmentation by variational methods.* RFIA '94. Neuvième Congrès Reconnaissance des Formes et Intelligence Artificielle, Paris 11-14 Janvier 1994 (AFCET). **SPECIAL MENTION.**

[75] **C. Ballester**, M. Gonzalez.*Affine invariant segmentation by variational methods.* Proceedings of the *VIII Workshop on Image and Multidimensional signal Processing* IEEE Signal Processing Society, pp. 220-221, Cannes, France, Setember 1993.

[76] **C. Ballester**, V. Caselles and M. Gonzalez. *Affine invariant segmentation by variational methods.* Proceedings del VI Spanish Symposium on Pattern Recognition and Image Analysis, Córdoba, Spain. April, 1995.

[77] **C. Ballester**, M. Gonzalez, *Texture discrimination by variational methods*, Second European Conference on Image Processing, Proceedings pp. 251-306, Palma, Spain, September 1995.

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CONFERENCE ABSTRACTS AND CONFERENCES WITHOUT PROCEEDINGS

[79] Alejandro Cartas, Adrià Arbués-Sangüesa, Gloria Haro and **Coloma Ballester**. *Towards Video Summarization: A Temporal Multimodal Method for Action Spotting in Sports Videos*. IROS Workshop: Egocentric vision for interactive perception, learning, and control (EgoVIP 2021). October 2021.

[80] Patricia Vitoria and **Coloma Ballester**. *Towards Artifact-free Images through Perceptual Image Restoration*. Poster presentation. In: ECCV 2018 Workshop and Challenge on Perceptual Image Restoration and Manipulation. ECCV 2018. September 8-14, 2018.

[81] Oliver M., Haro G., Fedorov V., **Ballester, C.**. *L1 Patch-Based Image Partitioning Into Homogeneous Textured Regions.* In: SIAM Conference on Imaging Science, June 5-8, 2018, Bologna (Italy) (Poster presentation) **BEST POSTER AWARD (2nd position)**.

[82] Adrià Arbués-Sangüesa, **Coloma Ballester**, Gloria Haro, Adrián Martin. *Head, Shoulders, Hip and Ball... Hip and Ball! Using Pose Data to Leverage Football Player Orientation.* Top-5 paper in the Sports Analytics Summit (Futbol Club Barcelona). pp. 1-13. November 13th, 2019.

INVITED CONFERENCE TALKS AND INVITED TALKS

[83] *TBA*. Keynote speaker at the International Conference of Scale Space and Variational Methods in Computer Vision (SSVM) 2023. Sardinia (Italy). May 22-25, 2023.

[84] *TBA*. In: LMS/ICMS Symposium: Second Workshop on Analytic and Geometric Approaches to Machine Learning. Bath, United Kingdom. July, 11th to 15th, 2022.

[85] *TBA*. In: 9th International Conference on Image and Signal Processing. Marrakesh (Morocco). June 2022.

[86] *Multiscale analysis of similarity measures and applications*. In: Interfaces Image Analysis and Molecular Life Science (IMOL) Seminar Series. https://imol.uni-frankfurt.de/. Frankfurt am Main, Germany. January 19th, 2022.

[87] *Combining a Deep Image Prior and a Vector Bundle Total Variation Prior for Color Image Restoration*. In: IFIP TC7 Conference on System Modelling and Optimization. Minisymposium: Non-local methods for inverse problems. Quito (Ecuador). August 31st to September 4th, 2021.
https://modemat.epn.edu.ec/ifip_tc7_2021/

[88] *Generative Methods for Some Inverse Problems in Imaging*. In: LMS/ICMS Symposium: Analytic and Geometric Approaches to Machine Learning. Bath (United Kingdom). July 26th to 30th, 2021. https://bathsymposium.ac.uk/symposium/upcoming-symposium-1

[89] *Adversarial strategies for out of distribution and for some inverse problems in imaging.* SIAM-IS virtual seminar series, One World seminar series delivered online focused on Imaging and Inverse problems (IMAGINE). January 20th, 2021. https://sites.google.com/view/oneworldimagine (video)

[90] *Anomaly detection with generative methods*. In: Machine Learning in Astrophysics. March 5th, 2021. http://www.cosmostat.org/events/learning-in-astrophysics-2021

[91] *Adversarial approaches for inverse problems: from image restoration and colorization to anomaly detection*. In: Mathematics and Image Analysis MIA 2021. To be held at Institut Henry Poincaré, campus Pierre et Marie Curie, of La Sorbonne, Paris (France), but finally held fully virtual. Organized by GDR MIA, CNRS France and GAMM Activity Group MSIP, Germany. January 11-13, 2021. http://gdr-mia.math.cnrs.fr/events/fgmia-21/

[92] *Geometric and semantic analysis of visual data: from model-based to data-driven methods.* Universidad Autónoma de Madrid. February 24-25, 2020.

[93] *Anomaly detection and Generative Adversarial Networks*. GTTI Seminar, CMLA, ENS Paris Saclay. École Normale Supérieure Paris Saclay. December 18, 2019.

[94] *Nonlocal Data Comparison and Seven Processing and Analysis Applications*. In: Workshop on Nonlocal Methods for Data Processing and Analysis: Theory, Optimisation, and Applications. Milan (Italy). June 2018.

[95] *Similarity Analysis and Applications*. In: International Conference on Scientific Computation and Differential Equations (SciCADE 2017). Bath (United Kingdom). September 11-15, 2017.

[96] *Multiscale analysis of similarities between images on Riemannian manifolds*. Mathematical modelling and analysis of similarities in imaging (III). In: BIOMAT 2017 - Mathematical Models in Biomedical Imaging. Granada. June 12-14, 2017.

[97] *Self-similarity and its variational formulation*. Mathematical modelling and analysis of similarities in imaging (II). In: BIOMAT 2017 - Mathematical Models in Biomedical Imaging. Granada. June 12-14, 2017.

[98] *A tour on image and video analysis; local and nonlocal methods*. Mathematical modelling and analysis of similarities in imaging (I). In: BIOMAT 2017 - Mathematical Models in Biomedical Imaging. Granada. June 12-14, 2017.

[99] *Multiscale analysis of similarities between images on Riemannian manifolds and applications.* Plenary Keynote invited talk. In: International Symposium on Mathematical Morphology (ISMM 2015), Reykjavik (Iceland), May 27-29, 2015.

[100] *On the most preferred scene structure of an image.* Plenary Keynote invited talk. In: International Conference on Approximation Methods and Numerical Modelling in Environment and Natural Resources (MAMERN 2015), Pau (France), June 1-5, 2015.

[101] Vadim Fedorov, and Coloma Ballester, An Affine Invariant Similarity Measure for Non-Local Image Restoration, invited talk in the special session about *New Models for Image Restoration and Enhancement* in the *SIAM Conference in Imaging Science*, Albuquerque, USA, May 23-26, 2016.

[102] Oliver M., Haro G., Dimiccoli M., Baptiste M., Ballester C., A Computational Model of Amodal Completion. SIAM Conference on Imaging Science, minisymposium: Geometry-based Models in Image Processing. May 2016, Albuquerque (New Mexico) USA, May 23-26, 2016.

[103] C. Ballester. *Multiscale analysis of similarities between images on Riemannian manifolds.* Invited talk. Second Workshop on Mathematical Analysis of Images in Bordeaux, Bordeaux (France), April 2014.

[104] C. Ballester, *A TV based restoration model with local constraints*. Plenary keynote invited talk. In: Nonlinear Partial Differential Equations. Burjassot, Spain. May 28-30, 2009.

[105] C. Ballester, *Res a témer, només a comprendre i a fer*. Lliço de graduació pels estudiants de grau de la UPF, Barcelona, July 3, 2015. (Text). (Video).

OTHER PUBLICATIONS

[106] Patricia Vitoria, Lara Raad, and **Coloma Ballester**. *ChromaGAN: An Adversarial Approach for Picture Colorization* Deep Learning Barcelona Symposium 2019 (DLBCN 2019). December 20-21, 2019.

[107] V. Lazcano, F. Calderero, **C. Ballester**. *Interpolation in Manifolds and Applications to Depth Interpolation in Images and Videos.* Accepted for presentation in the International Congress of Mathematics ICM 2018. August 1-9, 2018.

[108] P. Vitoria, **C. Ballester**. *Spatio-temporal tube segmentation through a video metrics-based patch similarity measure*. Annual Catalan Meeting on Computer Vision (ACMCV18). Poster presentation. September 2018, Barcelona (Spain).

[109] M. Oliver, G. Haro, V. Fedorov, **C. Ballester** *L1 Patch-Based Image Partitioning Into Homogeneous Textured Regions*. ACMCV18. Poster presentation. September 2018, Barcelona.

[110] M. Oliver, L. Raad, G. Haro, **C. Ballester**. *Motion Inpainting by an Image-Based Geodesic AMLE Method*. ACMCV18. Poster presentation. September 2018, Barcelona.

[111] Oliver M., Palomares R. P., **Ballester C.**, Haro G., Spatio- temporal binary video inpainting via threshold dynamics. Annual Catalan Meeting on Computer Vision (ACMCV17). Poster presentation. September 2017, Barcelona.

[112] R. P.Palomares, G. Haro, **C. Ballester**, E. Meinhardt-Llopis. *How to improve local optima of optical flow energies using discrete matches*. Annual Catalan Meeting on Computer Vision (ACMCV16). Poster presentation. September 2016. Barcelona (Spain).

[113] Oliver M., Haro G., Dimiccoli M., Baptiste M., **Ballester C.**, *On the most preferred scene structure of an image*. ACMCV16. Poster presentation. September 2016. Barcelona.

[114] R. P.Palomares, G. Haro, **C. Ballester**. *A Rotation-Invariant Regularization Term for Optical Flow Related Problems*. Annual Catalan Meeting on Computer Vision (ACMCV15). Poster presentation. September 2015. Barcelona (Spain).

[115] **C. Ballester**, E. Cubero-Castan, M. Gonzalez and J.M. Morel, *Image intersection and applications to satellite imaging*, preprint, C.M.L.A., No. 9817, Ecole Normale Supérieure de Cachan, 1998.

Software and Datasets

1. Spatio-Temporal Graph Convolutional Networks for Nonverbal Language in Entrepreneurial Pitching Sessions.
   - HumanNoVeLa Dataset: https://bitbucket.org/fserracant/humannovela IPCV - drive
   - Code: https://github.com/fserracant/stgcnnonverbal
2. The Art of Inpainting - A Monograph on Mathematical Methods for the Virtual Restoration of Illuminated Manuscripts.
   - INLUMINA Dataset: https://mach.maths.cam.ac.uk/datasets/inlumina/
   - INLUMINA Software (MATLAB Application): https://mach.maths.cam.ac.uk/software/inlumina/
3. DIP-VBTV: A Color Image Restoration Model Combining a Deep Image Prior and a Vector Bundle Total Variation. Code: https://github.com/tombatard/dip$_v btv$.
4. Self-Supervised Small Soccer Player Detection and Tracking: code.
5. ChromaGAN: Adversarial Picture Colorization with Semantic Class Distribution: code, and demo.
6. On Anisotropic Optical Flow Inpainting Algorithms: code and demo.
7. An Analysis and Speedup of the FALDOI Method for Optical Flow Estimation: code and demo.
8. Flare artifact detection and removal: code.
9. Joint TV-L1 Optical Flow and Occlusion Estimation: code and demo.
10. An Affine Invariant Patch Similarity: code and demo.

Funded Research Projects

Funded Research Projects as Principal Investigator

[1] *Multimodal Video Analysis and Understanding (MuVAU).* Funded by Ministerio de Ciencia e Innovación. Reference: PID2021-127643NB-I00. From: 01/01/2022 to 31/12/2024. Funding: 92.686,0 Euros. Principal Investigators: Gloria Haro and Coloma Ballester.

[2] *Geometric and Semantic Video Analysis.* Funded by Ministerio de Ciencia, Innovación y Universidades). Reference: PGC2018-098625-B-I00. From: 01/01/2019 to 31/12/2021. Funding: 61.952,0 Euros. Principal Investigator: **Coloma Ballester**, Co-PI: Gloria Haro. The aim of the project is the automatic understanding of a 3D dynamic scene from a video sequence of it. In particular, what is the geometric, semantic and acoustic configuration of the recorded scene. The goal is to segment the dynamic scene into different objects, their individual sounds and their trajectories, infer the depth ordering of the scene along time âĂŞ thus the occlusions and disocclusions âĂŞ, complete the occluded objects, and generate new dynamic content. This analysis will be enriched with different types of semantic information depending on the envisaged applications. Low video quality and artifacts are common problems in user-generated videos and we will also tackle this aspect both using model-based and data-driven

strategies. The obtained results in geometric and semantic analysis will be applied to different scenarios such as: the automatization of video post-production, e.g. the deletion or insertion of dynamic objects in video sequences in a way that the final result looks natural and integrated with the rest of the projected scene; sport analysis, where the interest is frequently on player tracking, action recognition or in individually analysing the performance of a certain player; and video augmentation with localization of individual sound sources. Other scenarios that may benefit from our contributions are autonomous navigation and advanced driver assistance systems. The project is interdisciplinary and it is located at the border between research in applied mathematics, artificial intelligence, engineering and technology transfer.

[3] *Nonlocal Methods for Arbitrary Data Sources - NoMADS.* H2020 RISE project.
Funded by the European Commission HORIZON 2020 programme, reference H2020-MSCA-RISE-2017, Contract (GA) number 777826 NoMADS.
Start Date: March 1, 2018. End Date: August 31, 2023.
Principal Investigator at UPF: **Coloma Ballester**.
Participants: Universidad Pompeu Fabra, Université de Bordeaux, Université de Caen Normandie, École National Supérieure d'Ingenieurs de Caen, University of Cambridge, Universita degli Studi di Genova, Technion Israel Institute of Technology, Instituto Superior Tecnico Portugal, Politecnico di Milano, The University of Nottingham, École Polytechnique, Universiteit Twente, Université Lyon Claude Bernard, Astrazeneka UK Limited, Mediguide LTD, Camelot Biological Systems SRL, The Mathworks Limited, CLK GMBH, DATEXIM, Clinical Science Systems, WESTFAELISCHE WILHELMS-UNIVERSITAET MUENSTER, TECHNISCHE UNIVERSITEIT DELFT.
Funding: 1.111.500,00 Euros. The main goal of NoMADS is to build a large multidisciplinary network of universities and companies to fill the current gaps between theory and applications of nonlocal methods. In the last years, the trend in data sciences was shifting from model-driven towards data-driven methods. A number of recent data-driven methods make use of self-similarity of patterns within the data by relating information that is not necessarily in a close proximity. These methods are termed as âĂŸnonlocal methodsâĂŹ. The aim of NoMADs is to significantly increase the understanding and applicability of nonlocal methods in a wide range of applications. Our long-term vision is to discover fundamental mathematical principles for the characterization of nonlocal operators, the development of new robust and efficient algorithms, and the implementation of those in high quality software products for real-world applications.
https://cordis.europa.eu/project/id/777826 http://www.uni-muenster.de/NoMADS/index.shtml

[4] *Spanish Network of Machine Learning and Computer Vision for Human Analysis and Robotic Perception / Red Española de Aprendizaje Automático y Visión Artificial para el Análisis de Personas y la Percepción Robótica*. Reference RED2018-102511-T. (Redes Temáticas de Investigación). Funded by Ministerio de Ciencia, Innovación y Universidades. Reference RED2018-102511-T. Participants: Universidad Autónoma Madrid (UAM), Universidad de Córdoba (UCO), Universidad de Granada (UGR), Universidad de Santiago de Compostela (USC), Universidad de Zaragoza (UZ), Universidad Jaume I (UJI), Universidad Politècnica Catalunya (UPC), Universidad Pompeu Fabra (UPF).
Coordinator of the Network: Filiberto Pla Bañón, PI at UPF: **Coloma Ballester**. Funding: 10.000,0 Euros. From: 01/01/2020 to 31/12/2021. This network brings together eight partners with expertise in computer vision and machine learning mostly applied to different aspects of human behaviour analysis and robotic perception. The partners have an extensive experience in their own field of research as demonstrated by the high number of publications in high impact-factor journals and related national and European projects they are involved in. In addition, all of them maintain solid collaborations with both renewed international researchers and the industrial sector. The network offers the unique opportunity to join these partners 1) to share their expertise and knowledge with the goal of complementing efforts in common research lines, and 2) to consolidate their presence in the scientific and industrial arenas, which is critically important in the competitive science and technology at national and international scopes. With these goals, the network will develop a set of actions aimed at promoting the sharing of knowledge and resources between partners, reinforce their network of industrial and academic international collaborations, boosting their visibility at national and international level, and paving the way to collaborate on future joint initiatives. In particular, new fruitful collaborations within and at the intersection between human behaviour analysis

and robotic perception that aims at exploiting the synergic potential of the networks partner expertise will be promoted. An illustrative example of foreseen collaboration is the interplay between first-person (captured through a wearable camera) and third-person vision for both human behaviour analysis and robotic perception. The expected impact will be in terms of high impact factor publications, proposals for academic and industrial doctorates, public data and code, organization of events such as special sessions in international conferences and special issues in international journals, joint proposals of national and European projects. https://www.init.uji.es/reavipero/

[5] *Modelos y técnicas para el análisis y procesamiento de vídeo.* Funded by Ministerio de Economía y Competitividad (MINECO). Reference: TIN2015-70410-C2-1-R From: 01/01/2016 to 31/12/2018. Principal Investigators: Gloria Haro and **Coloma Ballester**. Cuantía de la subvención: 38.720,00 Euros.

[6] *Modelos variacionales para inpainting: Aplicación a la post-producción de video*. Financed by MICINN. Reference MTM2012-30772. From: 01/01/2013 to 31/12/2015. Principal Investigator: **Coloma Ballester**. Cuantía de la subvención: 99.450,00 Euros. This project contributed to the mathematical investigation of smoothness and self-similarity principles in generating natural images, the mathematical formulation and unification of both ideas in a variational form, and its application to develop models and algorithms for image processing tasks. The project was a contribution both to the development of algorithms and their mathematical analysis. The main application of the project was the development of models and algorithms for 2D and 3D image and video editing and manipulation, enabling the deletion and insertion of objects.

[7] *B Grup de Recerca Consolidat, reference 2014 SGR 1301. Grup de Recerca en Processament d'Imatge*, Agència Gestió Ajuts Universitaris i de Recerca, Generalitat de Catalunya. From 01/01/2014 to 30/04/2017. Principal Investigator: **Coloma Ballester**.

[8] *2D-3D conversion from a single camera.* Programa d'Equips d'Innovació EDI. Generalitat de Catalunya. Reference EDI-PILOT-2014-13 From 03/03/2014 to 28/02/2015. Principal Investigator: **Coloma Ballester**. Cuantía de la subvención: 24.000,00 Euros.

[9] PDJ 2014-2016. Contrato de investigación: 1,5 años de contrato postdoc (pagados a J.F. Garamendi en su totalidad). Reference: 22014 PDJ 00038. Renovación con referencia: 2014 PDJR 00011. IP: Juan Francisco Garamendi Bragado. Investigador Responsable-Tutor **Coloma Ballester**. DESDE 01/03/2015 al 30/09/2016.

[10] *B Grup de Recerca Consolidat 2009 SGR 773*, Agència Gestió Ajuts Universitaris i de Recerca, Generalitat de Catalunya. From 29/09/2009 to 31/12/2013. Funding 68640 Euros. Principal Investigators: Vicent Caselles and **Coloma Ballester**.

[11] Girls-In-Lab. Coordinació del Taller de Creació i Foment de l'empreneduria amb la tecnologia per a nenes entre 7-17 anys dins de la jornada 'Girls in Lab' a la UPF. Contrato de Investigación. Financiado por el Institut Català de les Dones. Desde: 19/11/2015 Hasta: 29/11/2015. Principal Investigator: **Coloma Ballester**.

FUNDED RESEARCH PROJECTS AS PARTICIPANT INVESTIGATOR

[12] 'Estudio de duración de tiempos de ingreso hospitalario y en UCI de pacientes con COVID-19 y factores pronóstico para la derivación a la unidad de críticos y fallecimiento'. PI: Ricardo Cao Abad (President of the 'Acción matemática contra el coronavirus', within the Comité Español de Matemáticas (CEMat)).

[13] *AUTOPOST. Deformable Surface Tracking and Alpha Matting for the Automation of Post-production Workflows.* Grant agreement ID: 644629. Funded by H2020-EU.2.1.1.4, European Commission HORIZON 2020 programme. Coordinated by: FUNDACIO EURECAT. Participants: FUNDACIO EURECAT, FUNDACIO BARCELONA MEDIA, FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN-FORSCHUNG E.V. (Germany), MOTO GMBH (Germany), S.A. IMAGES ET CINEMA (belgium), IMCUBE LABS GMBH (Germany), MOVIES BENELUX (Belgium).

Overall budget: 1.092.750 Euros. From 1 January 2015 to 30 June 2016. https://cordis.europa.eu/project/id/644629

[14] *3FLEX: Depth enabled workflow for flexible 2D and multiview video production*. Grant Agreement ID 605181. Research for the benefit of SMEs FP7-SME-2013-1, Fundig by FP7-SME (European Union). Participabts: FUNDACIO EURECAT, UNDACIO BARCELONA MEDIA, IMCUBE LABS GMBH (Germany), SOLUCIONES GRAFICAS POR ORDENADOR SL, IMAGINEER SYSTEMS LTD (UNited Kingdom), - FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN - FORSCHUNG E.V. Overall budget: 1.392.594,66. From 1 November 2013 to 31 January 2016. https://cordis.europa.eu/project/id/605181

[15] *SCENE: Novel scene representations for richer networked media.* Funded by FP7-ICT, UE. Project ref. no. FP7-ICT-2011-7 GA-287639 (Grant agreement ID: 287693). Participants: FUNDACIO EURECAT (Coordinator), IMINDS (Belgium), FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V. (Germany), DEUTSCHE THOMSON OHG (Germany), UNIVERSITAT DES SAARLANDES, ARNOLD & RICHTER CINE TECHNIK GMBH& CO BETRIEBS KG (Germany), FUNDACIO BARCELONA MEDIA, BRAINSTORM MULTIMEDIA S.L., 3DLIZED FRANCE SAS (France), UNIVERSITY OF SURREY (UK), ARRI CINE + VIDEO GERATE GMBH (Austria). Overall budget: 6.459.122 Euros. From 1 November 2011 to 31 October 2014.

[16] For a lifetime of 18 months and because the PI/grant recipient (Vicent Caselles) passed away, acting as PI substitute (after applying for this extension proposing a research plan to finish some of the started research projects with the hired postdocs) in: *ERC Grant Project: INPAINTING: Inpainting Tools for Video Post-production. Variational Theory and Fast Algorithms.* (Grant agreement ID: 319899). Funded by FP7-IDEAS-ERC. From 01/04/2013 to 30/09/2014. Granted budget during these 18 months: 515.054,69 euros.

[17] *Modelos matemáticos en procesamiento de imágenes y aplicaciones a la síntesis de vistas*, MICINN, referencia MTM2009-08171. From 01-10-2009 to 31-12-2012. Principal Investigator: Vicent Caselles. Overall budget: 94.000 euros

[18] *i3media: Tecnologias para la creación y gestión automatizada de contenidos audiovisuales inteligentes*. Reference CENIT 2007-1012, Programa CENIT del MCYT. Desde: 01/01/2007 Hasta: 31/12/2010. Coordinator: Mediapro. Participants: Mediapro, Alcatel.Lucent, Havas Media, Telefónica I+D, Activa Multimedia, CCRTV-SSGG, TV3, Infospeech, Fonetics, STT, Brainstorm, Noufer. Coordinated by Mediapro Overall budget: 20.000 euros.

[19] FINE: Free-viewpoint Immersive Networked Experience. Reference: FINE248020, FP7-ICT-2009-4, Euopean Union. Coordinator: MEDIAPRODUCCION SL. Participants: Mediaproducción SL, Bitmanagement Software GMBH, Kungliga Tekniska Hoegskolan, Universiteit Hasselt, Fundació Barcelona Media Universitat Pompeu Fabra, Retevisión I S.A., Tracab, EVS Broadcast Equipment. Responsible: Mediaproducción, S.L.. Overall budget total: 2.879.399 euros. From: 01/04/2010 To 1/07/2013. https://cordis.europa.eu/project/id/248020/fr

[20] *Modelos matemáticos en procesamiento de imágenes y vídeo*, MEC, referencia MTM2006-14836. From 01-10-2006 to 30-09-2009. Overall budget: 90.000 euros Investigador responsable: Vicent Caselles.

[21] IP-RACINE: Integrated Project - Research Area CINE. Reference: IST-511316. Funded by: FP6- IST-2 European Commission in the area of Multimedia Content and Tools as part of its Information Society Technologies (IST) programme. Funding: 100000

euros. Participating: Universitat Pompeu Fabra (Coordinator), Thomson Broadcast Solutions Nederland BV, Deutsche Thomson-Brandt GmbH, Pandora International Ltd, FilmLight Ltd, EVS Broadcast Equipment, Barco n.v, Limburgs Universitair Centrum, Joanneum Research Forschungsgesellschaft mbH, University of Glasgow, Fondazione Scuola di San Giorgio, Fundació Universitat Pompeu Fabra, MediaPro, Digitale Video Systeme, Brainstorm. Duration 42 months. From 01-10-04 to 31-03-2008. Principal Investigator: Josep Blat.

[22] *Modelos matemáticos en procesamiento de imágenes*, Comisión Interministerial de Ciencia y Tecnologí a (CICYT), Reference BFM2003-02125. From 01-01-2004 to 31-12-2006. Principal Investigator: Vicent Caselles.

[23] *Speed-FX "Very high resolution real-time graphic interaction for the media industries.* European Project: IST-2001-34337, European Commission in the area of Multimedia Content and Tools as part of its Information Society Technologies (IST) programme. From 01/05/2002 to 30/04/2004. Principal Investigator: Josep Blat. 3,5 millones de euros.

[24] *Restauration morphologique d'image satellitaires.* Centre Nacional d'Études Spatiales (CNES, Toulouse, Francia). From 01/09/2002 to 01/09/2003. Cuantía total: 20.626,81.

[25] *EDP's geométricas: análisis de imágenes y propiedades de simetría*, Reference BFM2000-0962-C02-01. From 01-01-2001 to 19-12-2003. Principal Coordinator in France: Jean-Michel Morel, coordinator at UIB: Vicent Caselles.

[26] *EDP's geométricas: análisis de imágenes y propiedades de simetría*. PICS Project, CNRS, France. From 19-12-1997 to 19-12-2000. Coordinator in France: Jean-Michel Morel, coordinator at UIB: Vicent Caselles.

[27] *Viscosity Solutions and their Applications* (FMRXCT98-0234BDCN). Training and Mobility Research European Network. From 01-01-1998 to 31-12-2001. Principal coordinator: Pierre-Louis Lions. Spanish coordinator: Vicent Caselles.

[28] *Procesamiento de la información visual, segmentación, análisis de imágenes 3D y aplicaciones biomédicas*, DGICYT (PB94-1174). Desde 01-07-95 hasta 01-07-98. Investigador principal: Vicent Caselles.

[29] *Análisis Matemático y Numérico del Tratamiento de Imágenes*, Acciones Integradas Hipano-Francesas, Picasso. Desde 01-01-97 a 31-12-97. Coordinador principal: Vicent Caselles Costa.

[30] *Mathematical Modelling of Image Processing* (ERBCHRXCT930095). Proyecto Europeo de Capital Humano y Movilidad. Desde 01-10-93 hasta 31-12-95. Coordinador principal: Josep Blat.

[31] *Análisis Matemático y Numérico del Tratamiento de Imágenes*. Acciones Integradas Hispano-Francesas. Desde 01-01-93 a 31-12-93. Coordinador principal: Josep Blat.

[32] *Análisis Matemático y Numérico del Tratamiento de Imágenes.* Acciones Integradas Hispano-Francesas. Desde 01-01-92 a 31-12-92. Coordinador principal: Josep Blat.

[33] *Análisis Matemático y Numérico del Tratamiento de Imágenes*. Acciones Integradas Hispano-Francesas. Desde 01-01-91 a 31-12-91. Coordinador principal: Josep Blat.

[34] *Modelos matemáticos no lineales en el Tratamiento de Imágenes*, CICYT (PB94-1174). Desde 06-08-91 a 06-08-93.

CONTRACTS, TECHNOLOGICAL OR TRANSFER MERITS

[35] Scientific director of the Image Group in the Barcelona Media technological research center (now Eurecat). Under a contract artículo 83 LOU of the UPF. From Sep. 2013 to Abril 2015.

[36] Participation as consultant in the 3FLEX project of the European Comission. Under a contract artículo 83 LOU of the UPF. From 29/05/2014 to 28/05/2016.

[37] Coordination of Taller de creació I foment de l'emprenedoria amb tecnologia per a nenes entre 7-17 anys, Girls-In-Lab. Contract funded by Institut Català de les Dones. Under a contract artículo 83 LOU of the UPF. From 19/11/2015 to 29/11/2015.

[38] Collaboration with Fundació Barcelona Media and INDO in a project of 3D reconstruction of glasses frames from different images. April - May 2014.

LONG TERM VISITS

1991 - 1992 (1 year): Ceremade, Université de Paris-Dauphine, Paris, France.

1998-99 (4 months): Institut Henri Poincaré, Université, campus Pierre et Marie Curie, Université de La Sorbonne, Paris, France.

HONORS, INTERNATIONAL AWARDS

- 2020. **Second Best Paper Award** at CVPR 2020 Workshops. Adrià Arbués-Sangüesa, Adrian Martin, Javier Fernandez, Coloma Ballester and Gloria Haro. *Using Player's Body-Orientation to Model Pass Feasibility in Soccer*. CVPR 2020 Workshops. 2020.
  paper Core Rank: A*. h-index: 73. h-median-index: 110.
- 2019. **Best Paper Award** at ICAIS 2019. Adrià Arbués-Sangüesa, **Coloma Ballester**, and Gloria Haro. *Single-Camera Basketball Tracker through Pose and Semantic Feature Fusion*. ICAIS 2019.
  https://arxiv.org/abs/1906.02042
- 2019. **Best Student Paper Award** at VISAPP 2019. P. Vitoria, J. Sintes, and **C. Ballester**. *Semantic Image Inpainting Through Improved Wasserstein Generative Adversarial Networks*. To appear in Proceedings of the 14th International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications (VISAPP 2019, Prague). 2019.
  https://arxiv.org/abs/1812.01071
- 2018 **Best Poster Award (2nd position)** at SIAM Conference on Imaging Science, June 2018.
- 2003 **Chosen one of the 5 best algorithms of P+XS image fusion by the French Spatial Agency CNES**: A Variational Model for P+XS Image Fusion.
- 1994 **SPECIAL MENTION.** for the work *Affine invariant segmentation by variational methods.* At: RFIA '94.Neuvième Congrès Reconnaissance des Formes et Intelligence Artificielle, Paris 11-14 Janvier 1994.
- 2018 Universitat Pompeu Fabra (Social Council): Prize for the Teaching Activities within the Undergraduate Degree Audiovisual Systems Engineering. September 2018. This prize was given by the maximum board of the University whose responsibility is to secure and oversee the social implication of the University and its community.

- 2008 Universitat Pompeu Fabra Medal. For the Service as Dean of the Computer Science Studies, Polytechnic School (ESUP), now Engineering School. December 2008.
- 2008 Universitat Pompeu Fabra (Social Council): Teaching Initiative Prize to the Escuela Politècnica Superior (ESUP, Polytechnic School). September 2008. Funding: 6000 euros. http://www.upf.edu/enoticies/0809/0926.html. 'For the first year course "Introduction to the University", introducing first-year students to the structure, organization and services of the School and the University; to the working methodology, to study techniques and problem-solving strategies and to their professional prospects'.

RESEARCH ACREDITATIONS

- Advanced research accreditation as: Profesor Catedrático de Universidad (Full Professor), A1-MATEMÁTICAS, de la rama de conocimiento CIENCIAS por la Agencia Nacional Nacional de Evaluación de la Calidad y Acreditación (ANECA). December 2020.
- 3 Spanish Research 'Sexenios' (recognition of research achievements over a 6-year period). The last one ending in 2016 and thus I'm about to apply for the 4th one.
- 3 Autonomic Research 'Sexenios'. Recognition of research achievements over a 6-year period, 3 periods, AQU (Catalan Agency for Quality in Academia).

ACADEMIC ACREDITATIONS

- 6 Spanish Teaching 'Quinquenios' (recognition of teaching achievements over a 5-year period).
- 6 Autonomic Teaching 'Quinquenios' (recognition of teaching achievements over a 5-year period, AQU).

SUPERVISED PHD THESES AND MENTORING

Supervised PhD Thesis

[1] **Adrià Arbués-Sangüesa**. *A Journey of Computer Vision in Sports: from Tracking to Orientation-based Metrics.* 08/10/2021. Excellent. Co-supervision with G. Haro.

[2] **Patricia Vitoria**. *On Data-driven Models for Image Restoration.* 09/07/21. Excellent Cum Laude. Currently researcher at Huawei Zurich Research Centre, in January 2022 postdoc at Paris Descartes University.

[3] **Maria Oliver**. *Scene Understanding from Image and Video: Segmentation, Depth Configuration and Inpainting.* 17/10/2018. Excellent Cum Laude. Currently Postdoctoral Researcher at Gipsa-Lab of the Institute of Technology, University of Grenoble.

[4] **Roberto P.Palomares**. *Optical flow related problems.* 06/04/2017. Excellent Cum Laude. Currently Lead Data Scientist/Associate at McKinsey& Company.

[5] **Vadim Fedorov**. *Affine Invariant Image Comparison and Its Applications.* 11/10/2016. Excellent Cum Laude.
Currently Co-founder at Vision Arcanum. Previously, Co-founder and CTO at Rational Pixels.

[6] **Vanel Lazcano**. *Some Problems in Depth Enhanced Video Processing.* 04/02/2016. Excellent Cum Laude.
Currently Associate Professor at Universidad Mayor, Chile.

[7] **Pritam Mishra**. *Cross-modal relationships and understanding.* 01/02/2022-present.

[8] **Marcelo Sánchez Ortega**. *Real-time skin treatment simulation*. Industrial PhD with Crisalix https://www.crisalix.com/es. 01/10/2022-present.

Supervised Master thesis (a selection of the last ones)

[1] Marcelo Sánchez Ortega. *Photorealistic Facial Wrinkles Removal.* 2021-2022.

[2] Víctor Ubieto Nogales. *A novel Learning Database for Sign Language Animation Synthesis from Quaternion estimations*. 2021-2022.

[3] Igor Ugarte Molinet. *Self-supervised learning of multimodal representations in food recipes*. 2021-2022.

[4] Robin Boëzennec. *Video Analysis and related applications based on Space-Time Correspondence as a Contrastive Random Walk.* École Nationale des Ponts et Chaussées. Paris. France. May 20 - August 31. 2021.

[5] Pierrick Chatillon. *Towards video inpainting: joint inpainting of motion and dynamic shapes with deep learning techniques*. École Normale Supérieure Paris-Saclay, France, ARPE PhD training. October 2019-July 2020.

[6] Samuel Hurault. *Multi-person tracking and event detection in soccer and basketball scenarios*. École Normale Supérieure Paris-Saclay, France, ARPE PhD training. October 2019-July 2020.

[7] Amit Srivastava. *Non-discriminating recommendations and rankings in Explainable Recommender Systems.* Master on Intelligent Interactive Systems. September 2020.

[8] Claudia Baca Pérez. *Automatically counting rows and seats in sport stadiums and culture venues.* 2019-2020. In agreement with Mobile Media Content - 3D Digital Venue http://www.3ddigitalvenue.com/

[9] Joan Francesc Serracant Lorenzo. *Is there a link between non verbal communication and firm financing success?* 2019-2020.

[10] Pierrick Chatillon. *Anomaly Detection with GANs*. Master M2 MVA Mathématiques, Vision, Apprentissage. École Normale Supérieure Cachan. Paris-Saclay. September 23th, 2019.

[11] Jui Ting Lu. *Solving a PDE providing a multiscale comparison of images*. Université Claude Bernard LYON 1. September 4th, 2019.

[12] Christoph Heidelmann, *Automatic Lens Flare Artifacts Detection in Stereo Images via a Deep Learning Approach.* (co-supervision together with Prof. Daniel Cremers,, from Technische Universität München (TUM), and Patricia Vitoria). 2018-2019.

[13] Ferran Pérez Gamonal. *Sparse to dense optical flow estimation via Deep Learning techniques*. 2018-2019.

[14] Joan Sintes. *Image Completion through improved Wasserstein Generative Adversarial Networks*. Master in Computer Vision, joint master of UAB, UOC, UPC and UPF. 20/09/2018.

[15] Àlex Palomo. *On Video Template Matching and Transform Estimation using Deep Learning Techniques*. Master in Computer Vision, joint master of UAB, UOC, UPC and UPF. 20/09/2018. In agreement with Rational Pixels company https://index.co/company/rationalpixels.

[16] Patricia Vitoria. *Video Metrics, Patch-based Comparison and Applications*. Technical University of Munich (TUM). Co-supervised with Daniel Cremers, from Technische Universität München (TUM). 15/07/2017.

[17] Enric Corona. *3D pose estimation for symmetric and nonsymmetric objects*. Master in Intelligent Interactive Systems. UPF. September 2017.

[18] Onofre Martorell. *Sparse to dense optical flow with occlusion estimation*.Master in Computer Vision, joint master of UAB, UOC, UPC and UPF. 217/09/2017.

[19] Lucie Acosta. *New mathematical morphology filter based on tree of shapes*. Signal Image Communication and Multimedia. University Grenoble. July 2017.

Seventeen Bachelor thesis supervised in the last five years, plus two more ongoing. Some of them with awards, e.g., 'Air pollutant concentrations prediction using multimodal data regression', Carles Anton, Premio Cátedra UNESCO ESCI-UPF al mejor Trabajo Final de Grado sobre temas de Bienestar Planetario, en su primera edición el curso 2018-2019.

Post-Doctoral Mentoring since 2013

- Alejandro Cartas, currently postdoc at our IMVA-UPF group.
- Thomas Batard. Currently at Centro de Investigación en Matemáticas (CIMAT), México.
- Lara Raad. Currently Associate Professor at ESIEE.
- Mariella Dimiccoli. Then granted with a Ramon y Cajal Grant. Currently Senior researcher at IRI.
- Baptiste Mazin. Currently at Intuitive, Switzerland.
- Juan Francisco Garamendi. Currently working at our group after several years in companies.
- Felipe Calderero. Currently Director of Data Science at Novartis.
- Rida Sadek. Currently Senior Data Scientist at Simplr.
- Vadim Fedorov. Currently Co-founder at Vision Arcanum.
- Pablo Arias. Currently at CMLA, ENS Paris-Saclay.
- Gloria Haro. Currently Serra Húnter associate professor at UPF.

TEACHING EXPERIENCE

Universitat Pompeu Fabra

- Design/creation, coordination and teaching of the 6-ECTS Master course *Optimization and Inference techniques in Computer Vision* of the inter-university Master in Computer Vision organized by four universities in Barcelona (Universitat Autònoma de Barcelona, Universitat Oberta de Catalunya, Universitat Politècnica de Catalunya and Universitat Pompeu Fabra), 2013–2014, 2014–2015, 2015–2016, 2016–2017, 2017–2018, 2018–2019, 2019–2020, 2020–2021.
- Design/creation, coordination and teaching, jointly with G. Haro, of the 6-ECTS Master course *3D Vision* of the inter-university Master in Computer Vision organized by four universities in Barcelona (Universitat Autònoma de Barcelona, Universitat Oberta de Catalunya, Universi- tat Polit'ecnica de Catalunya and Universitat Pompeu Fabra), 2013–2014, 2014–2015, 2015–2016, 2016–2017, 2017–2018, 2018–2019.
- Design/creation, coordination and teaching of the 5-ECTS course *Computer Vision* of the Master in Intelligent Interactive Systems of the Universitat Pompeu Fabra. 2015–2016, 2016–2017, 2017–2018, 2018–2019, 2019–2020, 2020–2021.
- Design/creation, coordination and teaching of the 4-ECTS undergraduate engineering course *Image Analysis and Interpretation*. Universitat Pompeu Fabra. 2011–2012, 2012–2013, 2013–2014, 2014– 2015, 2015–2016, 2016–2017, 2017–2018, 2018–2019.

- Design/creation, coordination and teaching of the 5-ECTS undergraduate engineering course *Optimization Techniques*. Universitat Pompeu Fabra.
- Coordination and teaching of the 4-ECTS undergraduate engineering course *Computational Foundations in Audiovisual Systems*. Universitat Pompeu Fabra. 2013–2014, 2014– 2015, 2015–2016, 2016–2017.
- Co-design/creation, coordination and teaching of the 4-ECTS undergraduate engineering course *Image Processing*. Universitat Pompeu Fabra. 2012–2013, 2013–2014, 2014– 2015, 2015–2016, 2016–2017.
- Co-design/creation in 1999 at the creation of the first two Engineering Undergraduate Degrees at the UPF (namely, Computer Science degree and Telecommunications degree, lead by Prof. Josep Blat), coordination, teaching, course notes if form of a book, of the 8-ECTS UPF undergraduate engineering courses:
  - *Calculus I*
  - *Calculus II*
  - *Fourier methods*
  - *Linear Algebra*
  - *Graphs Theory*

University Illes Balears

- Design/creation and co-design, coordination and teaching of the courses of the Bachelor degree in Mathematics, from 1992 to 1998:
  - *Differential Geometry*
  - *Complex Analysis*
  - *Functional Analysis*
  - *Fourier Analysis*
  - *Partial Differemtial Equations*
- Coordination and teaching of the course *Differential Calculus and Partial Differential Equations* of the Bachelor degree in Chemistry. From 1988 to 1990.
- Coordination and teaching of the course *Calculus* of the Bachelor degree in Computer Science. From 1987 to 1990.
- Coordination and teaching of the course *Algebra* of the Bachelor degrees in Economics. From 1987 to 1988.
- Coordination and teaching of the course *Probability and Statistics* of the Bachelor degrees in Psychology, Pedagogy and Geography. From 1986 to 1987.

University Granada

- Parte del curso de doctorado Fisymat Advanced Courses Biomat 2017: Mathematical Models in Biomedical Imaging Del 12 al 14 de junio de 2017 del doctorado de Física y Matemáticas (FisyMat), Programa de Doctorado distinguido con Mención hacia la Excelencia (Código MHE2011-00252). *Multiscale analysis of similarities between images on Riemannian manifolds*. Mathematical modelling and analysis of similarities in imaging (III). In: BIOMAT 2017 - Mathematical Models in Biomedical Imaging. Granada. June 12-14, 2017.

- Parte del curso de doctorado Fisymat Advanced Courses Biomat 2017: Mathematical Models in Biomedical Imaging Del 12 al 14 de junio de 2017 del doctorado de Física y Matemáticas (FisyMat), Programa de Doctorado distinguido con Mención hacia la Excelencia (Código MHE2011-00252). *Self-similarity and its variational formulation*. Mathematical modelling and analysis of similarities in imaging (II). In: BIOMAT 2017 - Mathematical Models in Biomedical Imaging. Granada. June 12-14, 2017.
- Parte del curso de doctorado Fisymat Advanced Courses Biomat 2017: Mathematical Models in Biomedical Imaging Del 12 al 14 de junio de 2017 del doctorado de Física y Matemáticas (FisyMat), Programa de Doctorado distinguido con Mención hacia la Excelencia (Código MHE2011-00252). *A tour on image and video analysis; local and nonlocal methods*. Mathematical modelling and analysis of similarities in imaging (I). In: BIOMAT 2017 - Mathematical Models in Biomedical Imaging. Granada. June 12-14, 2017.

FUNDED TEACHING INNOVATION PROJECTS

- Estrategias para la mejora y el análisis sostenible de los Trabajos Finales de Grado. Universitat Pompeu Fabra (Plan de Ayudas de Soporte a la Calidad y la Innovación en Aprendizaje y Conocimiento PlaCLICK. From 01/09/2017 to 01/09/2018.
- Mentorías para apoyar la carrera de mujeres científicas e investigadoras. Universitat Pompeu Fabra (Plan de Ayudas de Soporte a la Calidad y la Innovación en Aprendizaje y Conocimiento PlaCLICK). From 01/09/2016 to 01/09/2017.
- Cuestionarios online para el apoyo al aprendizaje de asignaturas de matemáticas, incluyendo cálculo, álgebra, análisis matemático de múltiples variables, análisis de variable compleja. Universitat Pompeu Fabra (Plan de Ayudas de Soporte a la Calidad y la Innovación en Aprendizaje y Conocimiento PlaCLICK). From 01/09/2011 to 01/09/2012.
- Estrategias para el fomento del trabajo del estudiante dentro y fuera del aula. Universitat Pompeu Fabra (Plan de Ayudas de Soporte a la Calidad y la Innovación en Aprendizaje y Conocimiento PlaCLICK). From 01/09/2011 to 31/08/2012.
- Análisis y ajuste de la distribución de la carga de trabajo del estudiante a lo largo del trimestre/curso. Universitat Pompeu Fabra (Plan de Ayudas de Soporte a la Calidad y la Innovación en Aprendizaje y Conocimiento PlaCLICK). From 01/09/2011 to 01/09/2012.
- Creación de materiales para el estudiante de primer cursos de los tres Grados TIC de la ESUP (Engineering School). Universitat Pompeu Fabra (Plan de Ayudas de Soporte a la Calidad y la Innovación en Aprendizaje y Conocimiento PlaCLICK). From 01/09/2010 to 01/09/2011.
- Mecanismos de seguimento, ayuda y reconocimiento de la Calidad de los Estudios de la ESUP (Engineering School). Universitat Pompeu Fabra (Plan de Ayudas de Soporte a la Calidad y la Innovación en Aprendizaje y Conocimiento PlaCLICK). From 01/09/2009 to 01/09/2010.
- Adaptation to the European Higher Education Area, Bologna Process for the courses *Calculus I, II*. Universitat Pompeu Fabra (Plan de Ayudas de Soporte a la Calidad y la Innovación en Aprendizaje y Conocimiento PlaCLICK). 2006–2007.

SCIENTIFIC COMMITTEES, TECHNICAL COMMITTEES, PROGRAM COMMITTEES, AND ORGANIZING COMMITTEES

- Program Committee and Chair of the 4th Deep Learning Barcelona Symposium 2022. Barcelona, December 19, 2022.
- Program Committee and Chair of the 3rd Deep Learning Barcelona Symposium 2021. Barcelona, December 22-23, 2021.

- Member of the Program Committee (PC) of the Eighth International Conference on Scale Space and Variational Methods in Computer Vision, from May 16th to May 20th, 2021, in Cabourg, France.
https://ssvm2021.sciencesconf.org/
- Member of the Scientific Working Group on Inverse Problems and Imaging, of the International Federation for Information Processing (IFIP). January 2020-now.
- Invited Member of the Jury of the French-German Mathematics in Imaging Phd Prize. March 2020-January 2021.
- Invited member of the Comité de Expertos de la 'Acción Matemática contra el coronavirus' within the Comité Español de Matemáticas (CEMat).
- Member of the Technical Committee of the ACMCV 2020, 7th Catalan Meeting on Computer Vision. September 22, 2020. http://acmcv.cat/
- General Chair and Program Committee of the 2nd Deep Learning Barcelona Symposium 2019. Barcelona, December 19-20, 2019.
- Member of the Scientific Committee of the Thematic Quarter of the Institut Henry Poincaré, with title *The Mathematics of Imaging*. January to April 2019.
- General Chair and Program Committee of the 1rst Deep Learning Barcelona Symposium 2018. Barcelona, December 20-21, 2018.
- Co-organizer of the special session "Mathematical models in image processing", in CSASC 2016. Barcelona. September 20-23, 2016.
- Co-organizer of the SIAM conference DSPDEs'10 Emerging Topics in Dynamical Systems and Partial Differential Equations, Barcelona, May 31 - June 4, 2010.
- Examiner Board and Jury member of a large number of PhD thesis in France, Germany and Spain.
- Examiner Board and Jury member of a large number of PhD thesis proposals, Master thesis and Undergraduate thesis.
- Reviewer for competitive research projects.
- Usual reviewer of International Journals (Quartile 1): International Journal of Computer Vision, IEEE Transactions on Pattern Analysis and Machine Intelligence, IEEE Transactions on Image Processing, SIAM Journal on Imaging Sciences, SIAM Journal Multiscale Modeling and Simulation, Pattern Recognition, IEEE Transactions on Circuits and Systems for Video Technology, Neurocomputing, Journal of Mathematical Imaging and Vision, Numerische Mathematik, Journal of The Franklin Institute, Journal of Applied Mathematics and Computation, etc.
- Usual reviewer for International Conferences: International Conference on Computer Vision and Pattern Recognition, International Conference on Image Processing, ACM SIGGRAPH, Scale Space and Variational Methods in Computer Vision, etc.
- Teaching Committee, Member of the Committee, Department of Information & Communications Technology, Universitat Pompeu Fabra, 2004–present.
- Member of the Postgraduate and Doctoral Studies Commission of the Department of Information & Communications Technology, Universitat Pompeu Fabra, 2015–present.
- Examiner in Evaluation Committees of several research and docent positions.

- Faculty Selection Committee, Member of the Committee, Department of Information & Communications Technology, Universitat Pompeu Fabra, 2013–present.
- Research Committee, Department of Information & Communications Technology, Universitat Pompeu Fabra, 2013–present.

PROFESSIONAL SERVICE

ACADEMIC AND SCIENTIFIC MANAGEMENT

- She has taken on a large number of academic services and management responsibilities at UPF since 1999 (always, except one year and a half: from 16/07/2008 to 31/12/2009), some of them detailed below. Thus, she has 4 autonomic management sections ("trams autonòmics de gestió)".
- 05/11/2018–Present: Coordinator at UPF of the inter-university Master in Computer Vision organized by four universities in Barcelona (Universitat Autònoma de Barcelona, Universitat Oberta de Catalunya, Universitat Politècnica de Catalunya and Universitat Pompeu Fabra). Recently awarded with "Mención en progreso de Excelencia".
- 07/08/2018–5/11/2018: Deputy director and Academic Coordinator of the Bachelor degree in Audiovisual Systems Engineering, being part of the direction board of the Engineering School of Universitat Pompeu Fabra.
- 01/01/2015–6/8/2018: Deputy director and Academic Coordinator of the Bachelor degree in Audiovisual Systems Engineering, being part of the direction board of the Polytechnic School (ESUP, now Engineering School) of Universitat Pompeu Fabra.
- 01/01/2010–10/10/2011: Deputy director and Academic Coordinator of the Bachelor degree in Computer Science, being part of the direction board of the Polytechnic School (ESUP).
- 17/05/2004–15/07/2008: Director/Dean of the Polytechnic School – Computer Science Studies, (ESUP, now Engineering School), Universitat Pompeu Fabra. Designated by the Rector.
  - Co-leadership in the design and approval, by the Generalitat and by the AQU, of several new Engineering degrees, namely, Bachelor's Degree in Audiovisual Systems Eng., in Computer Science Eng., in Telecommunications Network Eng., and in Biomedical Eng.
  - Co-leadership in the adaptation to the European Higher Education Area/Espacio Europeo de Educación Superior (EEES) of the teaching at the ESUP (Engineering School).
  - Co-leadership in the official establishing of the Polytechnic School (ESUP, now Engineering School) of the UPF, and in the development and approval of its first Statutes.
  - Co-leadership in the creation of a mentoring of the first year students by the last year students. This mentoring included some extra-curricular classes on mathematics and other first year subjects. This mentoring was granted and funded by La Generalitat through the "Pla Enginycat". In September 2010, the ESUP was awarded by the Social Council of the UPF with a Teaching Initiative Prize 'For the development of a mentorship program within the EnginyCat initiative to attract and retain engineering vocations'.
  - Leadership in the creation, enrollment and participation of several ETIC-UPF Engineering teams (continued along the years) at international contests on Advanced Programming (coordinated and coached by Anders Jonhson).
  - Co-leadership in the creation and launch of the UPF Awards to baccalaureate research projects in engineering and applied mathematics, whose 1st edition was in 2008.

  - Co-leadership in the creation of the "Curs d'Introducció a la Universitat" (CIU) adapted to our Engineering degrees. CIU was promoted by the UPF. We were awarded by a Teaching Initiative Prize with 6000 euros funding: 6000 euros.

- 28/01/2002–17/05/2004 Deputy director of the Polytechnic School ESUP-UPF, Coordinator of the Bachelor degree in Computer Science.
- 28/01/2002–17/05/2004: Academic Exchange Coordinator of the Polytechnic School (ESUP).
- 25/10/2001–28/01/2002 Head of the Bachelor degree in Computer Science, Polytechnic School ESUP-UPF.
- 19/07/2000–25/10/2001 Head of the Polytechnic School ESUP-UPF.
- 25/11/1999–25/10/2001 Secretary of the Department TIC.
- Coordinator of the Final Degree Project of all the ICT Engineering Degrees of the UPF.
- Scientific direction of the Image Processing group of Barcelona Media (now EureCat), a centre for advanced technology dedicated to applied research and the transfer of knowledge and technology. From September 2013 to October 2015.
- Usual reviewer of International Journals (Quartile 1): IEEE Transactions on Image Processing, IEEE Transactions on Pattern Analysis and Machine Intelligence, SIAM Journal on Imaging Sciences, SIAM Journal Multiscale Modeling and Simulation, IEEE Transactions on Circuits and Systems for Video Technology, International Journal of Computer Vision, Neurocomputing, Journal of Mathematical Imaging and Vision
- Usual reviewer for International Conferences: International Conference on Image Processing, ACM SIGGRAPH, Scale Space and Variational Methods in Computer Vision, etc.
- Reviewer for many "Habilitation" of Research in France and Germany.
- Examiner Board and Jury member, in France, Germany and Spain, of a large number of PhD thesis.
- Examiner Board and Jury member of a large number of PhD thesis proposals, Master thesis and Undergraduate thesis.
- Teaching Committee, Member of the Committee, Department of Information & Communications Technology, Universitat Pompeu Fabra, 2004–present.
- Member of the Postgraduate and Doctoral Studies Commission of the Department of Information & Communications Technology, Universitat Pompeu Fabra, 2015–present.
- Examiner in Evaluation Committees of several research and docent positions.
- Faculty Comission, Member of the Comission, Department of Information & Communications Technology, Universitat Pompeu Fabra.
- Research Committee, Department of Information & Communications Technology, Universitat Pompeu Fabra, 2013–present.
- Member of the Sociedad Española de Matemática Aplicada (SEMA), from 1997 on.
- Member of the Societat Catalana de Matemàtiques (SCM), from 1983 until 2010.