Fecha del CVA	01-05-2023

Parte A. DATOS PERSONALES

Nombre y apellidos	Bartomeu Coll Vicens		
DNI/NIE/pasaporte	42990925S	Edad	63
Núm. identificación del investigador	Researcher ID	L-1756-2014	
	Código Orcid	https://orcid.org/0000-0002-1309-2544	

A.1. Situación profesional actual

Organismo	Universitat de les Illes Balears			
Dpto./Centro	Escola Politécnica Superior			
Dirección	Campus UIB, carret. Valldemossa, km 7,5, 07122 Palma			
Teléfono	971173197	correo electrónico	Tomeu.coll@uib.cat	
Categoría profesional	Catedrático de Universidad		Fecha inicio	07/12/07
Espec. cód. UNESCO	220990 -Tratamiento Digital. Imágenes/ 120219 - Ecuaciones Diferenciales Ordinarias			
Palabras clave	Image processing, image analysis, applications, 3D / limit cycles, bifurcation theory			

A.2. Formación académica *(título, institución, fecha)*

Licenciatura/Grado/Doctorado	Universidad	Año
Licenciado en Ciencias (sección matemáticas)	Universitat Autònoma de Barcelona (UAB)	1983
Doctor en Ciencias (sección matemáticas)	Universitat Autònoma de Barcelona (UAB)	1987

A.3. Indicadores generales de calidad de la producción científica *(véanse instrucciones)*

Se incluirá información sobre el número de sexenios de investigación y la fecha del último concedido, número de tesis doctorales dirigidas en los últimos 10 años, citas totales, promedio de citas/año durante los últimos 5 años (sin incluir el año actual), publicaciones totales en primer cuartil (Q1), índice h. Adicionalmente, se podrán incluir otros indicadores que el investigador considere pertinentes.

Número de sexenios: 6 investigación + 1 sexenio transferencia
Fecha último sexenio concedido: 01/01/2022 (periodo: 01/01/2015-31/12/2021)
Número de tesis doctorales dirigidas: 6
Citas totales: 3937 (Web of Science)
Resultados encontrados: 45 (Web of Science)
Promedio de citas por elemento: 87,49 (Web of Science)
Publicaciones totales en primer cuartil (Q1): 27
h-index: 16 (Web of Science)

Citas en Scholar Google: Más de 17000 (a 17/04/2023). Hay 2 publicaciones significativas del investigador en las que el número de citas suman
13811 citas (a 17/04/2023)

Parte B. RESUMEN LIBRE DEL CURRÍCULUM *(máximo 3500 caracteres, incluyendo espacios en blanco)*

I am a mathematician who did my doctoral thesis in the field of qualitative theory of ordinary differential equations at the Universitat Autonoma of Barcelona (UAB), in 1987. During 1988-1989 I obtained a post-doctoral fellowship for a stay in Paris with Professor Jean-Michel Morel by starting the investigation in the field of mathematical processing of digital images.Together with the team of Professor Morel, we have contributed to the development of mathematical methods in image processing in three occasions. The first one, [CatteCollLionsMorel-SIAM on Numerical Analysys, 1992], is the conception of provably stable edge preserving nonlinear PDE's. This contribution linked for the first time nonlinear PDE's in image processing with the viscosity solution theory (that earned a

Fields medal to one of the authors of this article Pierre-Louis Lions). Before it, the implementation of the now-famous Perona-Malik model was problematic.
The second one is the first paper introducing the level set method in computer vision [CasellesCattéCollDibos-Numerishe Mathematic-1993]. In this paper the Kass, Witkin, Terzopoulos active contours, or snakes, were implemented implicitly a an image level line, thus demonstrating for the first time the potential of the level set method to detect multiple contours and its stability.
The third and most recent one is the introduction in image processing of the so called ``nonlocal method'', (see publication 10 and related) where not only this method was shown to bring for the first time a artefact-free denoising method, but it only created a paradigm that has been ever since been followed by most contributions in image processing in the past seven years. Best paper CVPR 2005, quoted more than 2000 times in Google scholar, this algorithm has an IPOL (www.ipol.im) archive containing more than 4000 online experiments on original images uploaded by the journal's readers.

I lead currently an image processing project founded by the Spanish government, which has been renewed every three years since 1998. Furthermore, on the industrial level, our team at UIB has a permanent technology transfer contract, renewed every year since 2006 with the company DxO, one of the world leaders in image processing, whose image processing chains equips currently more than 300 millions cameraphones. Adaptations of our algorithms (nonlocal means, self-similarity demosaicking) are implemented in the raw converter of the software DxO Pro and in hardwarer for the cameraphones. In http://dxo.com/fr/photo, DxO's most visible product is DxO Pro, a famous image restoration software restoring.
A still more visible effect of the algorithms conceived by the UIB and CMLA teams is the fact that fast hardware implementations of these algorithms have been built by DxO and integrated so far in *more than 300 millions cameraphones (Nokia, Samsung,...)*.
The second key experience of our team is its longstanding cooperation with CNES (the French Space Agency) for over one decade, where *the team contributed the image restoration chain of the Earth observation satellites SPOT5 and the recently launched Pléiades*, and is currently contributing to establish reliable autonomous stereovision algorithms to exploit the tri-stereo Pleiades images. Our team has invented for CNES a new and mathematically proven correlation technique which is deposited jointly by UIB and CNES.

Parte C. MÉRITOS MÁS RELEVANTES *(ordenados por tipología)*

C.1. Publicaciones (últimos 10 años)

1. M Tomás-Cruz, A Sebastianelli, B Coll, J Duran, J Mifdal, Deep Unfolding for Hypersharpening Using a High-Frequency Injection Module, Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Reconigtion, 2023.

2. Coll, B.; Gasull, A.; Prohens, R., Probability of Occurrence of Some Planar Random Quasi-homogeneous Vector Fields, Mediterranean Journal of Mathematics, **vol. 19**, 278 (2022)

3. J. Mifdal, B. Coll, J. Froment, J. Duran, "Variational Fusion of Hyperspectral Data by Non-Local Filtering", Mathematics, Vol. 9 (11), pp. 265, 2021.

4. Alvarez, M.J.; Coll, B.; De Maesschalck, P.; Prohens, R. Asymptotic lower bounds on Hilbert numbers using canard cycles. 902073 - Journal of Differential Equations. 268 - 7, pp. 3370 – 3391, 2020

5. Coll, B.; Gasull, A.; Prohens, R. Asymptotic dynamics of a difference equation with a parabolic equilibrium. 917666 - Qualitative Theory of Dynamical Systems. 19 - 2, pp. 1 - 23. (Suiza): 2020.

6. J. Duran, A. Buades, B. Coll, G. Blanchet, C. Sbert, A survey of pansharpening methods with a new band-decoupled variational model, ISPRS Journal of Photogrammetry and Remote Sensing, 125, 78-105, 2017. Quartile 1

7. J. Mifdal, B. Coll, N. Courty, J. Froment, B. Vedel, Hyperspectral and multispectral Wasserstein barycenter for image fusion, IEEE International Geoscience and Remote Sensing Symposium (IGARSS), 2017

8. B. Coll, J. Duran, C. Sbert, Half-linear Regularization for Nonconvex Image Restoration Models, Inverse Problems and Imaging,, 9 (2), 337-370, 2015. Quartile 2

9. J. Duran, A. Buades, B. Coll, and C. Sbert, *A nonlocal variational model for pansharpening image fusion*, SIAM J. Imaging Sci., vol. 7(2), pp. 761-796, 2014. Quartile 1

10. B. Coll, F. Dumortier, R. Prohens, *Alien limit cycles in Lienard equations*, Journal of Differential Equations, vol. 254(3), pp. 1582-1600, 2013. Quartile 1

11. B. Coll, F. Dumortier, R. Prohens, *Configurations of limit cycles in Liénard equations*, Journal of Differential Equations, Vol. 255(11), pp. 4169–4184, 2013. Quartile 1

C.2. Proyectos

1. Ref. MTM2017-83568-P, Título: Estudio cualitativo de sistemas dinámicos y aplicaciones, con énfasis en la neurociencia. Entidad: Ministerio de Ciencia e Innovación, I.P. Rafel Prohens, Entidad afiliación: U.I.B., Fechas: 01/01/2018-31/12/2020, Quantía: 41.745 €, Tipo participación: Colaborador

2. Ref. TIN2017-85572-P, Título: Cadena completa de procesamiento multi-imagen y video, Entidad: Ministerio de Ciencia e Innovación, I.P.: Antonio Buades Capó, Entidad afiliación: U.I.B., Fechas: 01/01/2018-31/12/2020, Quantía: 41.745 €, Tipo participación: Colaborador

3. Ref. TIN2014-53772-R, Título: Procesamiento de Imágenes Digitales y Aplicaciones, Entidad: Ministerio de Ciencia e Innovación, I.P. Antonio Buades Capó y Bartomeu Coll Vicens (Co-IP), Entidad afiliación: U.I.B., Fechas: 01/01/2015-31/12/2017, Quantía, 41.745 €, Tipo participación: Co-IP.

4. Ref. TIN2011-27539, Título: Restauración y análisis de imágenes digitales, Entidad: Ministerio de Ciencia e Innovación, I.P.: Bartomeu Coll Vicens, Entidad afiliación: U.I.B., Fechas: del 01-01-2012 al 31-12-2014, Quantia: 41.745 €, Tipo participación: I.P.

5. Ref. TIN2008 04752, Título: Procesamiento y análisis digital de vídeo e imágenes 3D, Entidad: Ministerio de Educación y Ciencia, I.P.: Bartomeu Coll Vicens, Entidad afiliación: U.I.B., Fechas: del 01-01-2009 al 31-12-2011, Quantia: 106.480 €, Tipo participación: I.P.

6.Ref. HF2006-0124, Título: Análisis y restauración de imágenes digitales, Entidad: MRT francés ; Ministerio de Educación y Ciencia, I.P.: Bartomeu Coll Vicens, Entidad afiliación: U.I.B., Fechas: del 01-01-2007 al 31-12-2009, Quantia: 11.000 €, Tipo participación: I.P.

7.Ref. MTM2005-08567, Título: Modelos matemáticos para el tratamiento y análisis de imágenes, y aplicaciones, Entidad: Ministerio de Educación y Cultura, I.P.: Bartomeu Coll Vicens, Entidad afiliación: U.I.B., Fechas: del 01-01-2005 al 31-12-2008, Quantia: 35.000 €, Tipo participación: I.P.

8.Ref. E! 4303-WAFLE, Título: High Resolution Waferlevel reflowable EDoF Camera Module, Entidad: European project Eurostars, Coordinator: DxO Labs (France), Pathners: DxO labs, Heptagon, UIB. Period: 2008-2010. Final Cost of the project: 2282520 €, UIB Contribution: 10.08%

C.3. Contratos

-CNES (Centre National d'Etudes Spatiales): since 2008, permanent association funded by renewable research contracts. Total: 7 contracts (70000 euros/contract).

-DxO, French company specialized in image processing : permanent contract since 2007 Total amount: 70000 euros/year

C.4. Patentes

In recent years, the research activity of our group and the collaboration with companies has led to the deposition of 3 patents of which I am co-inventor. The areas in which they have laid these patents has been the restoration of digital images and the estimation of 3D terrain. One of these patents has been deposed by the Universitat de les Illes Balears with the French public research center CNRS, but the other two have been deposed in coordination with the companies DxO and CNES.

-A. Buades, B. Coll and J.M Morel. "Image data process by image noise reduction and camera integrating the means for implementing this process", Universitat Illes Balears – CNRS – ENS Cachan, 2004. Acepted in EEUU: Publication No.US-201 2-0268623-Al, Publication Date:1 0/25/2012

-F. Cao, F. Guichard, N. Azzabou, A. Buades, B. Coll, J.M. Morel, "Procedé de traitement d'objet numérique et systéme associé", French patent, Referente PA080163EC, 2008

-A. Buades, B. Coll, J.M Morel and B. Rougé, "Procedimiento de establecimiento de correspondencia entre una primera imagen digital y una segunda imagen digital de una misma escena para la obtención de disparidades", Spanish patent, Referente P25155ES00, UIB, 2009 (in PCT process)

C.5, C.6, C.7… Otros International Prizes/Awards

1991: Prix de Mathématiques Philip Morris as part of the team of prof. Jean-Michel Morel.

1996: The paper of V. Caselles, B. Coll and J.M. Morel, " A Kanizsa Programme", Preprint Ceremade 1996. One of the three annual selected articles by the SPM Department of the Centre National pour la Recherche Scientifique (CNRS, France) in 1996. Object of articles in "Le Courier du CNRS", "Science et Vie" and "Le Nouvel Observateur".
2005: CVPR best student paper in coll. A. Buadés and J.M. Morel

2005: ICASSP best paper award in coll. with A. Buadés and J.M. Morel

2011: "Ovation" at ICIAM 2011 (International Conference on Industrial and Applied Mathematics) on the occasion of the selection paper in SIGEST of the paper "A review of denoising methods, with a new one".
-Organizations of international conferences in the field as a membership in the steering and/or organising committee: 10 conferences
-Invited presentations internationally organised conferences and advanced schools: 12
-Long Term Visits: September 1988-July 1989: postdoctoral research fellowship, Ceremade (Univ. Paris-Dauphine), France

-Editorial Boards: SIAM Journal on Imaging Sciences (2012-2017), ISRN Mathematical Analysis, Journal of the Catalan Society Mathematics, IPOL Image Processing On Line

-Evaluator Commitee:
ANECA (Miembro de la Comisión de Acreditación del área de Matemáticas, 2017-2021), ANEP, French Agency, Austrian Agency,