

Jónathan Heras

Curriculum Vitae

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Education and Qualifications

2007	BSc on Mathematics	University of La Rioja (Spain)
2007	BSc on Computer Science	University of La Rioja (Spain)
2008	MSc on Mathematics	University of Zaragoza (Spain)
2011	PhD on Mathematics/Computer Science	University of La Rioja (Spain)

Positions

September 2007 - August 2008	Research Assistant at the Department of Mathematics and Computer Science, University of La Rioja. PI: Julio Rubio.
September 2008 - December 2011	PhD scholarship at the Department of Mathematics and Computer Science, University of La Rioja.
January 2012 - July 2012	Postdoctoral Research Assistant at the Department of Mathematics and Computer Science, University of La Rioja. PI: Thierry Coquand.
August 2012 - June 2014	Postdoctoral Research Assistant at the School of Computing, University of Dundee. PI: E. Komendantskaya.
August 2014 - September 2015	Postdoctoral Research Assistant at the Department of Mathematics and Computer Science, University of La Rioja. PI: César Domínguez.
October 2015 - December 2015	Software Developer at the company Formavolución.
September 2015 - Present	Lecturer at the Department of Mathematics and Computer Science, University of La Rioja.

Publications

Journal papers

1. J. Heras (2011). Mathematical Knowledge Management in Algebraic Topology. *ACM Communications in Computer Algebra* **45** (3/4), 236–237. DOI: 10.1145/2110170.2110187.
2. J. Heras, G. Mata, M. Poza, and J. Rubio (2011). On automation and certification of a homological method to process biomedical digital images. *Imagen-A* **4**, 29–31.
3. J. Heras, V. Pascual, J. Rubio, and F. Sergeraert (2011). *fKenzo*: A user interface for computations in Algebraic Topology. *Journal of Symbolic Computation* **46**, 685–698. DOI: 10.1016/j.jsc.2011.01.005.
4. J. Heras, V. Pascual, J. Rubio, and F. Sergeraert (2011). *fKenzo*: Una interfaz de usuario para realizar cálculos en topología algebraica. *Gaceta de la RSME* **14**, 295–308.
5. E. Komendantskaya, J. Heras, and G. Grov (2013). Machine learning in Proof General: interfacing interfaces. *Electronic Proceedings in Theoretical Computer Science* **118**, 15–42.
6. J. Heras, T. Coquand, A. Mörtberg, and V. Siles (2013). Computing Persistent Homology within Coq/SSReflect. *ACM Transactions on Computational Logic* **14**(4). DOI: 10.1145/2528929.
7. A. Romero, J. Heras, G. Mata, M. Morales, and J. Rubio (2014). Procesamiento Topo-Geométrico de Imágenes Neuronales. *Gaceta de la RSME* **17**(1), 109–128.
8. E. Komendantskaya, M. Schmidt, and J. Heras (2014). Exploiting Parallelism in Coalgebraic Logic Programming. *Electronic Notes in Theoretical Computer Science* **303**, 121–148. DOI: 10.1016/j.entcs.2014.02.007.
9. J. Heras and E. Komendantskaya (2014). Recycling Proof Patterns in Coq: Case Studies. *Mathematics in Computer Science* **8**(1), 99–116. DOI: 10.1007/s11786-014-0173-1.

10. M. Poza, C. Domínguez, J. Heras, and J. Rubio (2014). A certified reduction strategy for homological image processing. *ACM Transactions on Computational Logic* **15**(3). doi: 10.1145/2630789.
11. J. Heras, C. Domínguez, E. Mata, and V. Pascual (2015). Surveying and Benchmarking Techniques to Analyse DNA Gel Fingerprint Images. *Briefings in Bioinformatics* **17**(6), 912–925. doi: 10.1093/bib/bbv102.
12. J. Heras, C. Domínguez, E. Mata, V. Pascual, C. Lozano, C. Torres, and M. Zarazaga (2015). A Survey of Tools for Analysing DNA Fingerprints. *Briefings in Bioinformatics* **17**(6), 903–911. doi: 10.1093/bib/bbv016.
13. J. Heras, C. Domínguez, E. Mata, V. Pascual, C. Lozano, C. Torres, and M. Zarazaga (2015). GelJ — a Tool for Analyzing DNA Fingerprint Gel Images. *BMC Bioinformatics* **16**(270). doi: 10.1186/s12859-015-0703-0.
14. J. Heras, F. Martín-Mateos, and V. Pascual (2015). Modelling Algebraic Structures and Morphisms in ACL2. *Applicable Algebra in Engineering, Communication and Computing* **26**(3), 277–303. doi: 10.1007/s00200-015-0252-9.
15. A. Jaime, J. M. Blanco, C. Domínguez, A. Sánchez, J. Heras, and I. Usandizaga (2016). Spiral and Project Based Learning with Peer-Assessment in a Computer Science Project Management Course. *Journal of Science Education and Technology* **25**(3), 439–449. doi: 10.1007/s10956-016-9604-x.
16. A. Jaime, A. Sánchez, C. Domínguez, J. Olarte, F. García-Izquierdo, and J. Heras (2016). El grupo de investigación en educación superior en informática de La Rioja y País Vasco: telecolaboración, PBL, valoración por pares y proyectos fin de carrera. *ReVisión* **9**(2), 17–26.
17. C. Domínguez, A. Jaime, A. Sánchez, J. M. Blanco, and J. Heras (2016). A comparative analysis of the consistency and difference among online self-, peer-, external- and instructor-assessments: the competitive effect. *Computers in Human Behavior* **60**, 112–120. doi: 10.1016/j.chb.2016.02.061.
18. C. A. Alonso, C. Domínguez, J. Heras, E. Mata, V. Pascual, C. Torres, and M. Zarazaga (2017). AntibioGramJ: a Tool for Analysing Images from Disk Diffusion Tests. *Computer Methods and Programs in Biomedicine* **143**, 159–169. doi: 10.1016/j.cmpb.2017.03.010.
19. C. Domínguez, J. Heras, E. Mata, V. Pascual, S. Vázquez-Garcidueñas, and G. Vázquez-Marrufo (2017). Extending GelJ for Interoperability: Filling the Gap in the Bioinformatics Resources for Population Genetics Analysis with Dominant Markers. *Computer Methods and Programs in Biomedicine* **140**, 69–76. doi: 10.1016/j.cmpb.2016.12.001.
20. C. Domínguez, J. Heras, and V. Pascual (2017). IJ-OpenCV: Combining ImageJ and OpenCV for Processing Images in Biomedicine. *Computer in Biology and Medicine* **84**, 189–194. doi: 10.1016/j.combiomed.2017.03.027.
21. G. Mata, G. Cuesto, J. Heras, M. Morales, A. Romero, and J. Rubio (2017). SynapCountJ: A Validated Tool for Analyzing Synaptic Densities in Neurons. *Communications in Computer and Information Science* **690**, 41–55. doi: 10.1007/978-3-319-54717-6_3.
22. C. Domínguez, J. Heras, E. Mata, and V. Pascual (2018). DecoFungi: A web application for automatic characterisation of dye decolorisation in fungal strains. *BMC Bioinformatics* **19**(66). doi: 10.1186/s12859-018-2082-9.
23. C. Domínguez, A. Jaime, F. García, and J. Heras (2018). The effects of adding non-compulsory exercises to an online learning tool on student performance and code copying. *ACM Transactions on Computing Education* **19**(3). doi: 10.1145/3264507.
24. A. Carballal, C. Fernandez-Lozano, J. Heras, and J. Romero (2019). Transfer learning features for predicting aesthetics through a novel hybrid machine learning method. *To be published in Neural Computing and Applications*. doi: 10.1007/s00521-019-04065-4.
25. A. Casado-García, C. Domínguez, M. García-Domínguez, J. Heras, A. Inés, E. Mata, and V. Pascual (2019). CLoDSA: A Tool for Augmentation in Classification, Localization, Detection, Semantic Segmentation and Instance Segmentation Tasks. *BMC Bioinformatics* **20**(323). doi: 10.1186/s12859-019-2931-1.

26. A. Inés, C. Domínguez, J. Heras, E. Mata, and V. Pascual (2019). DeepClas4Bio: Connecting Bioimaging Tools with Deep Learning Frameworks for Image Classification. *Computers in Biology and Medicine* **108**, 49–56. DOI: 10.1016/j.combiomed.2019.03.026.
27. J. M. Blanco, C. Domínguez, A. Sánchez, A. Jaime, and J. Heras (2019). Managing Telecollaboration among Engineering Students and Faculty: A Case Study from Two Spanish Universities. *International Journal of Engineering Education* **35**(1(A)), 273–285.
28. M. Arredondo-Santoyo, C. Domínguez, J. Heras, E. Mata, V. Pascual, S. Vázquez-Garcidueñas, and G. Vázquez-Marrufo (2019). Automatic Characterisation of Dye Decolorisation in Fungal Strains using Expert, Traditional, and Deep Features. *To be published in Soft Computing*. DOI: 10.1007/s00500-019-03832-8.

Book chapters

1. J. Heras and V. Pascual (2010). “Mediated Access To Symbolic Computation Systems: An Open-Math Approach”. In: *Contribuciones científicas en honor de Mirian Andrés Gómez*. Ed. by L. Lambán, A. Romero, and J. Rubio. Universidad de La Rioja, pp.85–105.

Papers in conference proceedings

1. J. Heras, V. Pascual, and J. Rubio (2008). A graphical user interface for the Kenzo system, a program to compute in Algebraic Topology. In: *Proceedings of the 11th Encuentro de Álgebra Computacional y Aplicaciones (EACA'08)*, pp.93–96.
2. J. Heras, V. Pascual, and J. Rubio (2008). Mediated access to Symbolic Computation Systems. In: *Proceedings of the 7th International Conference on Mathematical Knowledge Management (MKM'08)*. Vol. 5144. Lecture Notes in Artificial Intelligence, pp.446–461.
3. J. Heras, V. Pascual, J. Rubio, and F. Sergeraert (2008). Improving the usability of Kenzo, a Common Lisp system for Algebraic Topology. In: *Proceedings of the 1st European Lisp Symposium (ELS'08)*, pp.155–176.
4. J. Heras, V. Pascual, and J. Rubio (2009). A customizable GUI through an OMDoc documents repository. In: *Proceedings of the 4th Mathematical User-Interfaces Workshop (MATHUI'09)*. <http://www.activemath.org/workshops/MathUI/09/>.
5. J. Heras, V. Pascual, and J. Rubio (2009). Applying Generative Communication to Symbolic Computation in Common Lisp. In: *Proceedings of the 2nd European Lisp Symposium (ELS'09)*, pp.27–42.
6. J. Heras, V. Pascual, and J. Rubio (2009). Content Dictionaries for Algebraic Topology. In: *Proceedings of the 22nd OpenMath Workshop*, pp.112–118.
7. J. Heras, V. Pascual, and J. Rubio (2009). Using Open Mathematical Documents to Interface Computer Algebra and Proof Assistant Systems. In: *Proceedings of the 8th International Conference on Mathematical Knowledge Management (MKM'09)*. Vol. 5625. Lecture Notes in Artificial Intelligence. Springer-Verlag, pp.467–473.
8. J. Heras, J. Rubio, L. J. Hernández, M. T. Rivas, and E. S. de Cabezón (2009). Cálculo en paralelo de la homología cúbica con gridMathematica. In: *Proceedings III Congreso Mathematica España*, pp.467–473.
9. J. Heras (2010). Effective Homology of the Pushout of Simplicial Sets. In: *Proceedings of the 12th Encuentro de Álgebra Computacional y Aplicaciones (EACA'10)*, pp.152–156.
10. J. Heras and V. Pascual (2010). ACL2 verification of Simplicial Complexes programs for the Kenzo system. In: *Proceedings of the Algebraic computing, soft computing, and program verification workshop*.
11. J. Heras, V. Pascual, A. Romero, and J. Rubio (2010). Integrating multiple sources to answer questions in Algebraic Topology. In: *Proceedings of the 9th International Conference on Mathematical Knowledge Management (MKM'10)*. Vol. 6167. Lecture Notes in Artificial Intelligence, pp.331–335.

12. J. Heras, G. Mata, M. Poza, and J. Rubio (2011). Homological processing of biomedical digital images: automation and certification. In: *Proceedings Computer Algebra in Algebraic Topology and its Applications. Session of ACA 2011 conference*.
13. J. Heras, V. Pascual, and J. Rubio (2011). A certified module to study digital images with the Kenzo system. In: *Proceedings of the 13th International Conference on Computer Aided Systems Theory (EUROCAST'2011)*. Vol. 6927. Lecture Notes in Computer Science, pp.113–120.
14. J. Heras, V. Pascual, and J. Rubio (2011). A System for Computing and Reasoning in Algebraic Topology. In: *Proceedings of the Conferences on Intelligent Computer Mathematics (CICM'2011)*. Vol. 6824. Lecture Notes in Computer Science, pp.295–297.
15. J. Heras, V. Pascual, and J. Rubio (2011). Proving with ACL2 the correctness of simplicial sets in the Kenzo system. In: *Proceedings of the 20th International Symposium on Logic-Based Program Synthesis and Transformation (LOPSTR'2010)*. Vol. 6564. Lecture Notes in Computer Science, pp.37–51.
16. J. Heras, M. Poza, M. Dénès, and L. Rideau (2011). Incidence simplicial matrices formalized in Coq/SSReflect. In: *Proceedings of the Conferences on Intelligent Computer Mathematics (CICM'2011)*. Vol. 6824. Lecture Notes in Computer Science, pp.30–44.
17. J. Heras, M. Dénès, G. Mata, A. Mörtberg, M. Poza, and V. Siles (2012). Towards a certified computation of homology groups for digital images. In: *Proceedings of the 4th International Workshop on Computational Topology in Image Context (CTIC'2012)*. Vol. 7309. Lecture Notes in Computer Science, pp.49–57.
18. J. Heras, G. Mata, M. Poza, and J. Rubio (2012). Symbolic manipulation and biomedical images. In: *Proceedings XIII Encuentros de Álgebra Computacional y Aplicaciones (EACA'2012)*.
19. J. Heras, M. Poza, and J. Rubio (2012). Verifying an algorithm computing Discrete Vector Fields for digital imaging. In: *Proceedings of the Conferences on Intelligent Computer Mathematics (CICM'2012)*. Vol. 7362. Lecture Notes in Computer Science, pp.215–229.
20. A. Romero, G. Mata, J. Rubio, J. Heras, and F. Sergeraert (2013). Spectral Sequences for computing persistent homology of digital images. In: *Proceedings of the 19th Conference on Applications of Computer Algebra (ACA'2013)*, pp.331–335.
21. E. Komendantskaya and J. Heras (2013). Statistical Proof Pattern Recognition: Automated or Interactive? In: *Proceedings of the 20th Automated Reasoning Workshop (ARW'2013)*, pp.25–26.
22. J. Heras and E. Komendantskaya (2013). ML4PG in Computer Algebra Verification. In: *Proceedings of the Conferences on Intelligent Computer Mathematics (CICM'2013)*. Vol. 7961. Lecture Notes in Computer Science, pp.354–358.
23. J. Heras, E. Komendantskaya, M. Johansson, and E. Maclean (2013). Proof-Pattern Recognition in ACL2. In: *Proceedings of the 19th International Conferences on Logic for Programming, Artificial Intelligence and Reasoning (LPAR-19)*. Vol. 8312. Lecture Notes in Computer Science, pp.389–406.
24. J. Heras, G. Mata, A. Romero, J. Rubio, and R. Sáenz (2013). Verifying a platform for digital imaging: a multi-tool strategy. In: *Proceedings of the Conferences on Intelligent Computer Mathematics (CICM'2013)*. Vol. 7961. Lecture Notes in Computer Science, pp.66–81.
25. J. Aransay, J. Divasón, J. Heras, L. Lambán, V. Pascual, A. L. Rubio, and J. Rubio (2014). Obtaining an ACL2 specification from an Isabelle/HOL theory. In: *Proceedings of the 12th International Conference on Artificial Intelligence and Symbolic Computation (AISC 2014)*. Vol. 8884. Lecture Notes in Artificial Intelligence, pp.47–61.
26. J. Heras and E. Komendantskaya (2014). ACL2(ml): Machine-Learning for ACL2. In: *Proceedings of the 12th International Workshop on the ACL2 Theorem Prover and its Applications*. Vol. 152. Electronic Proceedings in Theoretical Computer Science, pp.61–76.
27. J. Heras and E. Komendantskaya (2014). Proof-Pattern Search in Coq/SSReflect. In: *Proceedings of the 6th Coq Workshop (Coq-6)*.
28. J. Heras, M. Poza, C. Domínguez, and J. Rubio (2014). A Formal Proof of the Basic Perturbation Lemma. In: *Seventh de Brún Workshop on Homological Perturbation Theory*.

29. M. Poza, C. Domínguez, J. Heras, and J. Rubio (2014). A Certified Reduction Strategy for Homological Image Processing. In: *Proceedings of the XIV Jornadas sobre Programación y Lenguajes (PROLE 2014)*, pp.173–174.
30. C. Domínguez, J. Heras, E. Mata, and V. Pascual (2016). WekaBioSimilarity — extending Weka with resemblance measures. In: *Proceedings of the XVII Conferencia de la Asociación Española para la Inteligencia Artificial (CAEPIA'16), session TAMIDA'16*. Vol. 9868. Lecture Notes in Artificial Intelligence, pp.89–98.
31. G. Mata, J. Heras, M. Morales, A. Romero, and J. Rubio (2016). SynapCountJ — a Tool for Analyzing Synaptic Densities in Neurons. In: *Proceedings of the 3rd International Conference on BioImaging (BioImaging 2016)*. SCITEPRESS – Science and Technology Publications, pp.25–31.
32. C. Domínguez, M. García, J. Heras, A. Inés, E. Mata, and V. Pascual (2017). DetectionEvaluationJ: a tool for measuring the goodness of object detection algorithms. In: *Proceedings of the 16th International Conference on Computer Aided Systems Theory (EUROCAST'17)*. Vol. 10672. Lecture Notes in Computer Science Part II, pp.273–280.
33. E. Komendantskaya and J. Heras (2017). Proof Mining with Dependent Types. In: *Proceedings of the 10th Conference on Intelligent Computer Mathematics (CICM 2017)*. Vol. 10383. LNCS, pp.303–318.
34. J. Heras et al. (2017). Análisis de imagen biomédica en el Grupo de Informática de la UR. In: *V Workshop Internacional en Imagen Médica Captura e Integración de datos Clínicos*.
35. A. Casado-García and J. Heras (2018). Guiding the Creation of Deep Learning-based Object Detectors. In: *Proceedings of the XVIII Conferencia de la Asociación Española para la Inteligencia Artificial (CAEPIA'18), session DEEPL'18*.
36. J. Aransay, F. J. G. Izquierdo, J. Heras, A. Inés, and G. Mata (2018). Creación de un servidor de integración continua para gestión y corrección de entregas de prácticas. In: *Proceedings of the XXIV Jornadas sobre la Enseñanza Universitaria de la Informática (JENUI 2018)*. Vol. 3, pp.111–118.
37. A. Bigatti, E. S. de Cabezón, and J. Heras (2019). Monomial resolutions for efficient computation of simplicial homology. In: *Proceedings of the 44th International Symposium on Symbolic and Algebraic Computation (ISSAC'19)*.
38. A. Casado-García, J. Heras, and A. Sanz-Sáez (2019). Towards the automatic analysis of stomata images. In: *Proceedings of the 17th International Conference on Computer Aided Systems Theory (EUROCAST'19)*.
39. A. Inés, C. Domínguez, J. Heras, E. Mata, and V. Pascual (2019). DeepCompareJ: A Tool for Comparing Image Classification Models. In: *Proceedings of the 17th International Conference on Computer Aided Systems Theory (EUROCAST'19)*.
40. A. Inés, C. Domínguez, J. Heras, E. Mata, and V. Pascual (2019). Towards Integrating ImageJ with deep biomedical models. In: *Proceedings of the 15th International Conference on Distributed Computing and Artificial Intelligence (DCAI 2018)*. Vol. 801. Advances in Intelligent Systems and Computing, pp.3340–338. doi: 10.1007/978-3-319-99608-0_40.
41. M. García, C. Domínguez, J. Heras, E. Mata, and V. Pascual (2019). An on-going framework for easily experimenting with deep learning models for bioimaging analysis. In: *Proceedings of the 15th International Conference on Distributed Computing and Artificial Intelligence (DCAI 2018)*. Vol. 801. Advances in Intelligent Systems and Computing, pp.330–333. doi: 10.1007/978-3-319-99608-0_39.
42. M. García, C. Domínguez, J. Heras, E. Mata, and V. Pascual (2019). Making transfer learning easier. In: *Proceedings of the 17th International Conference on Computer Aided Systems Theory (EUROCAST'19)*.

Posters

1. J. Heras, V. Pascual, and J. Rubio (2009). Content Dictionaries for Algebraic Topology. In: *Posters 22nd OpenMath Workshop*.

2. G. Mata, G. Cuesto, M. Morales, J. Rubio, and J. Heras (2011). SynapCountJ: un software para el estudio de la densidad sináptica. In: *Posters XIV Congreso Nacional Sociedad Española de Neurociencia*.
3. G. Mata, G. Cuesto, M. Morales, J. Rubio, and J. Heras (2012). Developing new tools to analyze neuronal morphology, spine and synaptic density. In: *Posters 1st Congress of the Spanish Network of Advanced Optical Microscopy*.
4. G. Mata, G. Cuesto, M. Morales, J. Rubio, and J. Heras (2012). SynapCountJ - an ImageJ Plugin to analyze synaptical densities in Neurons. In: *Posters IEEE International Symposium on Biomedical Imaging*.
5. G. Mata, G. Cuesto, M. Morales, J. Rubio, and J. Heras (2012). SynapCountJ - an ImageJ Plugin to analyze synaptical densities in Neurons. In: *Posters 8th Forum of Neuroscience*.
6. J. Heras and E. Komendantskaya (2013). ML4PG: Machine Learning for Proof General. In: *Posters 20th Automated Reasoning Workshop*.
7. C. Domínguez, J. Heras, E. Mata, and V. Pascual (2017). AntibigramJ: a Tool for Analysing Images from Disk Diffusion Tests. In: *Posters 1st NEUBIAS 2020 Conference*.
8. C. Domínguez, J. Heras, E. Mata, and V. Pascual (2017). GelJ - a Tool for Analyzing DNA Fingerprint Gel Images. In: *Posters 1st NEUBIAS 2020 Conference*.
9. G. Mata, J. Heras, M. Morales, A. Romero, and J. Rubio (2017). New tools to analyse synaptic density and neuronal structures. In: *Posters 1st NEUBIAS 2020 Conference*.
10. A. Inés, C. Domínguez, J. Heras, E. Mata, and V. Pascual (2018). Towards Integrating ImageJ with Deep Learning frameworks. In: *Posters 2nd NEUBIAS 2020 Conference*.
11. M. García, C. Domínguez, J. Heras, E. Mata, and V. Pascual (2018). An on-going framework for easily experimenting with deep learning models. In: *Posters 2nd NEUBIAS 2020 Conference*.

PhD thesis

1. J. Heras (2011). “Mathematical Knowledge Management in Algebraic Topology”. PhD thesis. University of La Rioja.

Book editing

1. E. Komendantskaya and J. Heras, eds. (2013). *Proceedings of 20th Automated Reasoning Workshop (ARW'2013)*. School of Computing, University of Dundee, UK.
2. J. Heras and A. Romero, eds. (2016). *Proceedings of XV Encuentro de Álgebra Computacional y Aplicaciones (EACA 2016)*. ISBN: 978-84-608-9024-9. Universidad de La Rioja, Spain.

Participation in Grants

1. *Computer Algebra systems: new developments in Algebraic Topology and reliability*. Funded by Comunidad Autónoma de La Rioja. PI: Julio Rubio. 2007–2008.
2. *Asistentes para la creación de aplicaciones cliente de sistemas de cálculo simbólico*. Funded by Comunidad Autónoma de La Rioja. PI: Vico Pascual. 2008–2010.
3. *Mathematical Knowledge Management: Algebraic Topology and Logic cases*. Funded by Ministerio de Ciencia e Innovación. PI: Julio Rubio. 2009–2012.
4. *Formath: Formalization of Mathematics*. Funded by European Union. PI: Thierry Coquand. 2010–2013.
5. *Machine-learning coalgebraic automated proofs*. Funded by EPSRC First Grant scheme. PI: Ekaterina Komendantskaya. 2011–2013.
6. *Coalgebraic Logic Programming for Type Inference: parallelism and coreursion for a new generation of programming languages*. Funded by EPSRC. PI: Ekaterina Komendantskaya. 2013–2016.
7. *Machine Learning for ACL2*. Funded by SICSA Proof of Concept programme. PI: Jónathan Heras. 2013–2014.

8. *DIGIBAC: Desarrollo de métodos automatizados para el análisis de imágenes digitales de patrones de electroforesis de bacterias*. Funded by an ADER grant. PI: César Domínguez. 2014–2016.
9. *Formalization of Mathematics: applications to symbolic computation and computer algebra*. Funded by Ministerio de Economía y Competitividad. PI: Julio Rubio. 2015–2017.
10. *CLODE: motor para la clasificación, localización y detección de objetos en imágenes y vídeos para la Industria 4.0*. Funded by an ADER grant. PI: César Domínguez. 2018–2020.
11. *Álgebra Computacional: formalización y aplicaciones a la fiabilidad de redes y al procesamiento de imágenes biomédicas*. Funded by Ministerio de Economía y Competitividad. PIs: E. Sáenz-de-Cabezón and V. Pascual. 2018–2020.
12. *HOLMS: Técnicas Avanzadas de Análisis de Imágenes para Categorización y Extracción de Información en Documentos*. Funded by Ministerio de Ciencia, Innovación y Universidades. PIs: C. Domínguez. 2018–2021.

Invited talks

- *fKzeno: a user interface for computations in Algebraic Topology*, DFKI institute, Germany, October 2009.
- *fKzeno: a user interface for computations in Algebraic Topology*, University of Seville, Spain, February 2010.
- *Incidence Simplicial Matrices on SSReflect*, INRIA-Sophia institute, France, September 2010.
- *Homological processing of biomedical images*, Universidad de Valladolid, Spain, November 2011.
- *Neuronal structure detection using persistent homology*, Chalmers University, Sweden, May 2012.
- *Machine Learning for Proof General: interfacing interfaces*, Strathclyde University, UK, November 2012.
- *Integration of statistical machine learning tools into the Proof General interface*, University of Edinburgh, UK, December 2012.
- *Machine Learning for Interactive Theorem Provers: interfacing interfaces*, University of La Rioja, Spain, December 2012.
- *¿Pueden los ordenadores ayudarnos en la demostración de teoremas?*, University of La Rioja, Spain, March 2013.
- *Aprendizaje Automatizado ¿Cómo aprenden los ordenadores?*, University of La Rioja, Spain, October 2015.

Awards

- Received PhD scholarship at the Department of Mathematics and Computer Science, University of La Rioja. 2008–2011.
- Best programming pearl award for the paper *Homological processing of biomedical images* at the 1st workshop of Industrial Applications of Computer Algebra (AICA'11). 2011.
- Awarded a diploma for one of the best PhD dissertations written at the University of La Rioja in academic year 2010/11. 2013.
- *Notable Article in Computing 2014* for the paper “A certified reduction strategy for homological image processing”. 2015.

Teaching

- Lab assistant of the module “Metodología de la Programación” (BSc course). Department of Mathematics and Computer Science, University of La Rioja. Autumn 2011.

- Lab assistant of the module “Architecture Fundamentals and Unix” (BSc course). School of Computing, University of Dundee. Autumn 2012.
- Lecturer of the module “Introduction to Programming” (BSc course). University of Dundee. Autumn 2013.
- Lecturer of the module “Algorithms and Artificial Intelligence” (BSc course). University of Dundee. Spring 2014.
- Lecturer of the module “Desarrollo de Aplicaciones Web” (MSc course). Department of Mathematics and Computer Science, University of La Rioja. Autumn 2015, Autumn 2016, Autumn 2017.
- Lecturer of the module “Taller Informática I”. Universidad de la Experiencia, University of La Rioja. Autumn 2015, Autumn 2016, Autumn 2017.
- Lecturer of the module “Herramientas TIC para docentes”. Diploma de Extensión Universitaria en Formación Pedagógica y Didáctica, University of La Rioja. Autumn 2015, Autumn 2016, Autumn 2017.
- Lecturer of the module “Tecnología de la Programación” (BSc course). Department of Mathematics and Computer Science, University of La Rioja. Spring 2016, Spring 2017.
- Lecturer of the module “Programación Orientada a Objetos” (BSc course). Department of Mathematics and Computer Science, University of La Rioja. Autumn 2016, Autumn 2017, Spring 2018.
- Lecturer of the module “Inteligencia Artificial” (BSc course). Department of Mathematics and Computer Science, University of La Rioja. Spring 2017, Spring 2018.

Academic visits

- German Research Center for Artificial Intelligence. Saarbrücken, Germany. October 2009.
- University of Seville. Seville, Spain. February 2010.
- INRIA-Sophia institute. Sophia, France, September 2010.
- University of Seville. Seville, Spain. July 2011.
- Chalmers University. Goteborg, Sweden. May 2012.

Further Academic Service

- Organisation Committee membership: MAP 2010, ARW13, SPLS14, EACA 2016.
- Programme Committee membership: CICM’13, CICM’14, Coq’16, IPAC’16.
- Reviewer: ILP’13, Journal of Automated Reasoning, Proceedings A, Journal of Symbolic Computation, Formal Aspects of Computing, Journal of Immunological Methods, Biochemical Genetics, Journal of Advanced Research, Applied Sciences.

Software

- fKenzo: A system for computing and reasoning in Algebraic Topology. 2011.
- ML4PG: Machine Learning for Proof General. 2012–2014.
- ACL2(ml): Machine Learning for ACL2. 2013–2014.
- GelJ: a Java program for the analysis of DNA gel fingerprints images. 2015–2016.
- WekaBioSimilarity: binary measures in Weka. 2016.
- IJ-OpenCV: a Java library connecting ImageJ and OpenCV. 2016.
- AntibioqramJ: a Java program for reading antibiogram images. 2016.

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- DetectionEvaluationJ: an ImageJ plugin that has been designed to evaluate the performance of object detection algorithms using several metrics. 2016.
 - DecoFungi: a web application for measuring dye decolorisation from fungal strains. 2017.