Curriculum Vitae of Alberto Cano

Blacksburg, VA (804) 937-3734 acano@vt.edu

Home page: https://canoalberto.github.io/
Google Scholar: https://scholar.google.com/citations?user=8f_w4HQAAAAJ
ResearchGate: https://researchgate.net/profile/Alberto_Cano

RESEARCH INTERESTS

High-Performance Computing: parallel and distributed computing, GPUs
Machine learning: classification, multi-label learning, imbalanced learning, ensemble learning
Data streams: self-adaptive learning, concept drift, explainable stream learning
Metaheuristics: evolutionary machine learning, genetic programming, nature-inspired optimization

ACADEMIC APPOINTMENTS

Associate Vice President for Research Computing 2024 - date
Advanced Research Computing, Virginia Tech

Associate Professor with tenure 2024 - date
Department of Computer Science, Virginia Tech

Faculty Director 2022 - 2024
High Performance Research Computing Core, Virginia Commonwealth University

Associate Professor with tenure 2021 - 2024
Department of Computer Science, Virginia Commonwealth University

Assistant Professor tenure-track 2015 - 2021
Department of Computer Science, Virginia Commonwealth University

EDUCATION AND ACADEMIC PREPARATION

VCU Leadership Development Program 2021 - 2022
Grace E. Harris Leadership Institute, Virginia Commonwealth University

Ph.D. in Computer Science 2011 - 2014
University of Granada, Spain
Dissertation: New Classification Models through Evolutionary Algorithms
Best PhD dissertation award from the Spanish Association for Artificial Intelligence

M.Sc. in Intelligent Systems 2012 - 2013
University of Cordoba, Spain
Dissertation: Association Rule Mining on GPUs

M.Sc. in Soft Computing and Intelligent Systems 2010 - 2011
Dissertation: New Classification Models through Evolutionary Algorithms
University of Granada, Spain

B.Sc. in Computer Science 2008 - 2010
Dissertation: Speeding up classification problems using Genetic Programming on GPUs
University of Cordoba, Spain

B.Sc. in Computer Engineering 2005 - 2008
Dissertation: Installing a WiFi for patients at the Reina Sofia Hospital in Cordoba
University of Cordoba, Spain

FUNDING

Expanding research computing and AI at the HPRC 2024 - 2025
Source: HEETF, State Council of Higher Education for Virginia
Amount: $744,038
Role: PI

Enhancing Multidisciplinary STEM Education through Living Labs 2024 - 2027
Source: National Science Foundation
Amount: $750,000 total ($150,000 share)
Role: Co-PI

Cross Reality Arts & Technology Empowered by Generative and Emotion AI 2024 - 2026
Source: Korea Creative Content Agency
Amount: $260,0000
Role: PI

Data Ecologies: A Transdisciplinary Approach to Data Centers and Justice 2024 - 2025
Source: VCU Institute for Sustainable Energy and Environment
Amount: $100,0000
Role: Co-PI

MRI: Track 1 Acquisition of NVIDIA DGX H100 GPU system for research and education at VCU 2023 - 2026
Source: National Science Foundation
Amount: $299,621
Role: PI

SentimentVoice: Integrating emotion AI and VR in Performing Arts 2023 - 2024
Source: Commonwealth Cyber Initiative
Amount: $25,000
Role: Co-PI

HPRC research computing clusters 2022 - 2023
Source: HEETF, State Council of Higher Education for Virginia
Amount: $1,442,280
Role: PI

Multi-Objective Optimization of Inlet Nozzle Design using Artificial Intelligence for Single Tank Thermal Energy Storage 2022 - 2023
Source: VCU Accelerate Fund
Amount: $100,000
Role: Co-PI

Machine learning for the supply chain management 2020 - 2022
Source: Hamilton Beach Brands, Inc.
Amount: $200,000
Role: PI

Real-time price monitoring tool for business intelligence 2019 - 2020
Source: Hamilton Beach Brands, Inc.
Amount: $50,000
Role: PI

Hate Speech Detection on Amazon Reviews using Data Stream Mining on Spark and AWS 2018 - 2019
Source: Amazon Machine Learning Awards
Amount: $25,000 cash + $50,000 AWS credits
Role: PI

Interpretable Data Mining Models for Early Prediction of Student Performance and Dropout 2018 - 2019
Source: VCU Presidential Research Quest Fund
Amount: $50,000
Role: PI

SENIOR PERSONNEL IN OTHER RESEARCH PROJECTS

Emerging Trends in Data Analysis 2018 - 2020
Source: Ministry of Economy and Competitiveness, Spain
Amount: $75,000

High-throughput Power Edge System for Big Data and Modeling 2017 - 2018
Source: HEETF, State Council of Higher Education for Virginia
Amount: $172,653

Personalized post-surgical diagnosis and prognosis of human gliomas 2017 - 2018
Source: Junta de Andalucia, Spain
Amount: $48,032

Data mining with more flexible data representations 2015 - 2017
Source: Ministry of Economy and Competitiveness, Spain
Amount: $199,840

New challenges in Knowledge Discovery: A Genetic Programming Approach 2018 - 2019
Source: Ministry of Science and Technology, Spain
Amount: $74,720

Application of Knowledge Extraction Techniques to Educational Data Systems 2009 - 2013
Source: Junta de Andalucia, Spain
Amount: $203,187

PHD STUDENTS

V. Guerrero, Explainable Data Streams with Large Language Models 2024 - date
G. Aguiar, Imbalanced and active learning on drifting data streams 2021 - date
M. Roseberry, Multi-label classification on drifting data streams 2018 - 2024
J. Gonzalez-Lopez, Distributed multi-label learning on Apache Spark 2016 - 2019
G. Melki, Novel Support Vector Machines for Diverse Learning Paradigms 2016 - 2018

PUBLICATIONS

Journal articles

1. A. Esteban, A. Cano, A. Zafra, and S. Ventura. Hoeffding adaptive trees for multi-label classification on data streams. Knowledge-Based Systems, 304, 112561, 2024.
2. W. Sleeman, M. Roseberry, P. Ghosh, A. Cano, and B. Krawczyk. Improved KD-tree based imbalanced big data classification and oversampling for MapReduce platforms. Applied Intelligence, 54, 12558-12575, 2024.
3. G. Aguiar and A. Cano. A comprehensive analysis of concept drift locality in data streams. Knowledge-Based Systems, 289, 111535, 2024.
4. Y. Djenouri, A. N. Belbachir, A. Cano, and A. Belhadi. Spatio-temporal visual learning for home-based monitoring. Information Fusion, 101, 101984, 2024.
5. G. Aguiar and A. Cano. Dynamic budget allocation for sparsely labeled drifting data streams. Information Sciences, 654, 119821, 2024.
6. G. Aguiar, B. Krawczyk, and A. Cano. A survey on learning from imbalanced data streams: taxonomy, challenges, empirical study, and reproducible experimental framework. Machine Learning, 113, 4165-4243, 2024.
7. V. Eiji, A. Cano, and S. Barbon. Meta-learning for dynamic tuning of active learning on stream classification. Pattern Recognition, 138, 109359, 2023.
8. A. Cano and B. Krawczyk. ROSE: Robust Online Self-Adjusting Ensemble for Continual Learning on Imbalanced Drifting Data Streams. Machine Learning, 111, 2561-299, 2022.
9. G. Alberghini and S. Barbon and A. Cano. Adaptive Ensemble of Self-Adjusting Nearest Neighbor Subspaces for Multi-Label Drifting Data Streams. Neurocomputing, 481, 228-248, 2022.
10. A. Srivastava and A. Cano. Analysis and forecasting of rivers pH level using Deep Learning. Progress in Artificial Intelligence, 11, 181-191, 2022.
11. A. Belhadi, Y. Djenouri, G. Srivastava, A. Cano, and J. Chun-Wei Lin. Hybrid Group Anomaly Detection for Sequence Data: Application to Trajectory Data Analytics. IEEE Transactions on Intelligent Transportation Systems, 23(7), 9346-9357, 2022.
12. Y. Djenouri, H. Belhadi, K. Akli-Astouati, A. Cano, and J. Chun-Wei Lin. An Ontology Matching Approach for Semantic Modeling: A Case Study in Smart Cities. Computational Intelligence, 38(3), 876-902, 2022.
13. M.L. Gandía-González, A. Cano, et al. Machine learning techiniques application in glioma interactome study: a multicentric analysis of 100 patients. Brain and Spine, vol. 1, sup. 2, 100552, 2021.
14. A. Petri, B. Bogaz, A. Cano, and S. Barbon. Time Series Segmentation Based on Stationarity Analysis to Improve New Samples Prediction. Sensors, 21(21), art. 7333, 2021.
15. M. Roseberry, B. Krawczyk, Y. Djenouri, and A. Cano. Self-Adjusting k Nearest Neighbors for Continual Learning from Multi-Label Drifting Data Streams. Neurocomputing, 442, 10-25, 2021.
16. A. Cano and B. Krawczyk. Kappa Updated Ensemble for Drifting Data Stream Mining. Machine Learning, 109(1), 175-218, 2020.
17. J. Gonzalez-Lopez, S. Ventura, and A. Cano. Distributed multi-label feature selection using individual mutual information measures. Knowledge-Based Systems, vol. 188, 105052, 2020.
18. Y. Djenouri, D. Djenouri, Z. Habbas, J. Lin, T. Michalak, and A. Cano. When the Decomposition Meets the Constraint Satisfaction Problem. IEEE Access, vol. 8, 207034-207043, 2020.

19. A. Belhadi, Y. Djenouri, G. Srivastava, D. Djenouri, A. Cano, and J. Lin. A Two-Phase Anomaly Detection Model for Secure Intelligent Transportation Ride-Hailing Trajectories. IEEE Transactions on Intelligent Transportation Systems, 22(7), 4496-4506, 2020.

20. A. Belhadi, Y. Djenouri, J. Lin, and A. Cano. A Data-Driven Approach for Twitter Hashtag Recommendation. IEEE Access, vol. 8, 79182-79191, 2020.

21. A. Belhadi, Y. Djenouri, J. Lin, and A. Cano. Trajectory Outlier Detection: Algorithms, Taxonomies,Evaluation and Open Challenges. ACM Transactions on Management Information Systems, 11(30), art. 16, 2020.

22. A. Belhadi, Y. Djenouri, J. Lin, C. Zhang, and A. Cano. Exploring Pattern Mining Algorithms for Hashtag Retrieval Problem. IEEE Access, vol. 8, 10569-10583, 2020.

23. A. Belhadi, Y. Djenouri, J. Lin, and A. Cano. A General-Purpose Distributed Pattern Mining System. Applied Intelligence, vol. 50, 2647-2662, 2020.

24. H.T. Nguyen, A. Cano, V. Tam, and T.N. Dinh. Blocking Self-avoiding Walks Stops Cyber-epidemics: A Scalable GPU-based Approach. IEEE Transactions on Knowledge and Data Engineering, 32(7), 1263-1275, 2020.

25. J. Gonzalez-Lopez, S. Ventura, and A. Cano. Distributed selection of continuous features in multilabel classification using mutual information. IEEE Transactions on Neural Networks and Learning Systems, 31(7), 2280-2293, 2020.

26. J. Gao, H. Wei, A. Cano, and L. Kurgan. PSIONplusm Server for Accurate Multi-Label Prediction of Ion Channels and Their Types. Biomolecules, 10(6), art. 876, 2020.

27. M. Roseberry, B. Krawczyk, and A. Cano. Multi-label Punitive kNN with Self-Adjusting Memory for Drifting Data Streams. ACM Transactions on Knowledge Discovery from Data, 13(6), art. 60, 2019.

28. A. Cano and B. Krawczyk. Evolving Rule-Based Classifiers with Genetic Programming on GPUs for Drifting Data Streams. Pattern Recognition, vol. 87, 248-268, 2019.

29. A.C. Fuentes-Fayos, M.L. Gandía-González, A. Cano, et al. Metabolomics and molecular profiling in glioma patients: an interactomic approach. Neuro-Oncology, 21(3), 64-65, 2019.

30. A. Cano and J.D. Leonard. Interpretable Multi-view Early Warning System adapted to Underrepresented Student Populations. IEEE Transactions on Learning Technologies, 12(2), 198-211, 2019.

31. Y. Djenouri, A. Belhadi, J. Lin, D. Djenouri, and A. Cano. A Survey on Urban Traffic Anomalies Detection Algorithms. IEEE Access, vol. 7, 12192-12205, 2019.

32. Y. Djenouri, A. Belhadi, J. Lin, and A. Cano. Adapted k Nearest Neighbors for Detecting Anomalies on Spatio-Temporal Traffic Flow. IEEE Access, vol. 7, 10015-10027, 2019.

33. P. Skryjomski, B. Krawczyk, and A. Cano. Speeding up k-Nearest Neighbors Classifier for Large-Scale Multi-Label Learning on GPUs. Neurocomputing, vol. 354, 10-19, 2019.

34. Y. Djenouri, D. Djenouri, A. Belhadi, and A. Cano. Exploiting GPU and Cluster Parallelism in Single Scan Frequent Itemset Mining. Information Sciences, vol. 496, 363-377, 2019.

35. A. Cano. A survey on graphic processing unit computing for large-scale data mining. Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery, 8(1), e1232, 2018.

36. J. Gonzalez-Lopez, S. Ventura, and A. Cano. Distributed Nearest Neighbor Classification for Large-Scale Multi-label Data on Spark. Future Generation Computer Systems, vol. 87, 66-82, 2018.

37. G. Melki, V. Kecman, S. Ventura, and A. Cano. OLLAWV: OnLine Learning Algorithm using Worst-Violators. Applied Soft Computing, vol. 66, 384-393, 2018.

38. G. Melki, A. Cano, and S. Ventura. MIRSVM: Multi-Instance Support Vector Machine with Bag Representatives. Pattern Recognition, vol. 79, 228-241, 2018.

39. B. Krawczyk and A. Cano. Online Ensemble Learning with Abstaining Classifiers for Drifting and Noisy Data Streams. Applied Soft Computing, vol. 68, 677-692, 2018.

40. A. Cano, E. Yeguas-Bolivar, R. Muñoz-Salinas, R. Medina-Carnicer, and S. Ventura. Parallelization Strategies for Markerless Human Motion Capture. Journal of Real-Time Image Processing, 14(2), 453-467, 2018.

41. O. Reyes, A. Cano, H. Fardoun, and S. Ventura. A locally weighted learning method based on a data gravitation model for multi-target regression. International Journal of Computational Intelligence Systems, 11(1), 282-295, 2018.

42. A. Cano. An ensemble approach to multi-view multi-instance learning. Knowledge-Based Systems, vol. 136, 46-57, 2017.

43. A. Cano, C. Garcia, and S. Ventura. Extremely High-dimensional Optimization with MapReduce: Scaling Functions and Algorithm. Information Sciences, vol. 415-416, 110-127, 2017.

44. G. Melki, A. Cano, V. Kecman, and S. Ventura. Multi-Target Support Vector Regression Via Correlation Regressor Chains. Information Sciences, vol. 415-416, 53-69, 2017.

45. A. Cano, S. Ventura, and K.J. Cios. Multi-Objective Genetic Programming for Feature Extraction and Data Visualization. Soft Computing, 21(8), 2069-2089, 2017.

46. J.M. Luna, A. Cano, V. Sakalauskas, and S. Ventura. Discovering Useful Patterns from Multiple Instance Data. Information Sciences, vol. 357, 23-38, 2016.

47. A. Cano, J.M. Luna, E.L. Gibaja, and S. Ventura. LAIM discretization for multi-label data. Information Sciences, vol. 330, 370-384, 2016.

48. A. Cano, D.T. Nguyen, S. Ventura and K.J. Cios. ur-CAIM: improved CAIM discretization for unbalanced and balanced data. Soft Computing, 20(1), 173-188, 2016.

49. J.M. Luna, A. Cano, M. Pecheniskiy, and S. Ventura. Speeding-up Association Rule Mining with Inverted Index Compression. IEEE Transactions on Cybernetics, 46(12), 3059-3072, 2016.

50. C. Márquez-Vera, A. Cano, C. Romero, A. Yousef Mohammad, H. Mousa Fardoun, and S. Ventura. Early Dropout Prediction using Data Mining: A Case Study with High School Students. Expert Systems, 33(1), 107-124, 2016.

51. A. Cano, J.M. Luna, A. Zafra, and S. Ventura. A Classification Module for Genetic Programming Algorithms in JCLEC. Journal of Machine Learning Research, vol. 16, 491-494, 2015.

52. A. Cano, A. Zafra, and S. Ventura. Speeding up multiple instance learning classification rules on GPUs. Knowledge and Information Systems, 44(1), 127-145, 2015.

53. A. Cano, S. Ventura, and K.J. Cios. Scalable CAIM discretization on multiple GPUs using concurrent kernels. Journal of Supercomputing, 69(1), 273-292, 2014.

54. A. Cano, A. Zafra, and S. Ventura. Parallel evaluation of Pittsburgh rule-based classifiers on GPUs. Neurocomputing, vol. 126, 45-57, 2014.

55. C. Márquez-Vera, A. Cano, C. Romero, and S. Ventura. Predicting student failure at school using genetic programming and different data mining approaches with high dimensional and imbalanced data. Applied Intelligence, 38 (3), 315-330, 2013.

56. A. Cano, J.M. Luna, and S. Ventura. High Performance Evaluation of Evolutionary-Mined Association Rules on GPUs. Journal of Supercomputing, 66(3), 1438-1461, 2013.

57. A. Cano, A. Zafra, and S. Ventura. An Interpretable Classification Rule Mining Algorithm. Information Sciences, vol. 240, 1-20, 2013.

58. A. Cano, J.L. Olmo, and S. Ventura. Parallel Multi-Objective Ant Programming for Classification Using GPUs. Journal of Parallel and Distributed Computing, 73 (6), 713-728, 2013.

59. A. Cano, A. Zafra, and S. Ventura. Weighted Data Gravitation Classification for Standard and Imbalanced Data. IEEE Transactions on Cybernetics, 43 (6) pages 1672-1687, 2013.

60. A. Cano, A. Zafra, and S. Ventura. Speeding up the evaluation phase of GP classification algorithms on GPUs. Soft Computing, 16 (2), 187-202, 2012.

Edited books

1. A. Cano, Social Media and Machine Learning, InTech, ISBN 978-1-78984-028-5, 2020.

2. S. Ventura, J. M. Luna, and A. Cano, Big Data on Real-World Applications, InTech, ISBN 978-953-51-2490-0, 2016.

Book chapters

1. J.M. Luna, A. Cano and S. Ventura. Genetic Programming for Mining Association Rules in Relational Database Environments. In Handbook of Genetic Programming Applications, Springer, 2015. ISBN 978-3-319-20882-4.

2. J.M. Luna, A. Cano and S. Ventura. An Evolutionary Self-Adaptive Algorithm for Mining Association Rules. In Data Mining: Principles, Applications and Emerging Challenges, Nova Publishers, 2015. ISBN 978-1-63463-770-1.

Contributions to international conferences

1. Y. Djenouri, G. Srivastava, A. Nabil, and A. Cano. Vision-based Spatiotemporal Learning for Human Activity Recognition. IEEE International Joint Conference on Neural Networks, 2024.

2. G. Aguiar and A. Cano. Enhancing Concept Drift Detection in Drifting and Imbalanced Data Streams through Meta-Learning. In IEEE International Conference on Big Data, 2648-2657, 2023.

3. M. Roseberry, S. Dzeroski, A. Bifet and A. Cano. Aging and rejuvenating strategies for fading windows in multi-label classification on data streams. In 38th ACM/SIGAPP Symposium On Applied Computing, 390-397, 2023.

4. G. Aguiar and A. Cano. An active learning budget-based oversampling approach for partially labeled multi-class imbalanced data streams. In 38th ACM/SIGAPP Symposium On Applied Computing, 382-389, 2023.

5. J. Bertini and A. Cano. An explainable classifier based on genetically evolved graph structures. In IEEE Congress on Evolutionary Computation, 2022.

6. B. Krawczyk and A. Cano. Locally Linear Support Vector Machines for Imbalanced Data Classification. In Pacific-Asia Conference on Knowledge Discovery and Data Mining, 616-628, 2021.

7. J. Perez, [...], A. Cano, et. al. An Endocrine and metabolic interactomic approach to identify novel diagnostic/prognostic biomarkers and therapeutic targets in gliomas. In 22nd European Congress of Endocrinology, 2020.

8. L. Korycki, A. Cano, and B. Krawczyk. Active Learning with Abstaining Classifiers for Imbalanced Drifting Data Streams. In IEEE BigData, 2334-2343, 2019.

9. B. Krawczyk and A. Cano. Adaptive ensemble active learning for drifting data stream mining. In International Joint Conference on Artificial Intelligence, 2763-2771, 2019.

10. J. Gonzalez-Lopez, S. Ventura, and A. Cano. ARFF data source library for distributed single/multiple instance, single/multiple output learning on Apache Spark. In International Conference on Computational Science, 173-179, 2019.

11. J.M. Moyano, E. Gibaja, S. Ventura, and A. Cano. Speeding up Classifier Chains in Multi-Label Classification. In International Conference on Internet of Things, Big Data and Security, 29-37, 2019.

12. M. Roseberry and A. Cano. Multi-label kNN Classifier with Self Adjusting Memory for Drifting Data Streams. In Second International Workshop on Learning with Imbalanced Domains: Theory and Applications, LIDTA@PKDD/ECML, PMLR 94:23-37, 2018.

13. A. Cano and B. Krawczyk. Learning classification rules with differential evolution for high-speed data stream mining on GPUs. In IEEE Congress on Evolutionary Computation, 197-204, 2018.

14. B. Krawczyk, A. Cano, and M. Wozniak. Selecting local ensembles for multi-class imbalanced data classification. In International Joint Conference on Neural Networks, 1848-1855, 2018.

15. J. Gonzalez-Lopez, A. Cano, and S. Ventura. Large-scale multi-label ensemble learning on Spark. In IEEE Trustcom/BigDataSE/ICESS, 893-900, 2017.

16. A. Olex, B. McInnes, and A. Cano. Parsing MetaMap Files in Hadoop. In American Medical Informatics Association Symposium, 2017.

17. B. Krawczyk, B. McInnes, and A. Cano. Sentiment Classification from Multi-Class Imbalanced Twitter Data using Binarization. In 12th International Conference on Hybrid Artificial Intelligent Systems, Lecture Notes in Computer Science, vol 10334, 26-37, 2017.

18. A. Cano and C. Garcia-Martinez. 100 Million Dimensions Large-Scale Global Optimization Using Distributed GPU Computing. In IEEE Congress on Evolutionary Computation, 3566-3573, 2016.

19. F. Padillo, J.M. Luna, A. Cano, and S. Ventura. A Data Structure to Speed-Up Machine Learning Algorithms on Massive Datasets. In 11th International Conference on Hybrid Artificial Intelligent Systems. Lecture Notes in Computer Science, vol 9648, 365-376, 2016.

20. D. Pinheiro, A. Cano and S. Ventura. Synthesis of In-Place Iterative Sorting Algorithms Using GP: A Comparison Between STGP, SFGP, G3P and GE. In 17th Portuguese Conference on Artificial Intelligence. Lecture Notes in Computer Science, vol 9273, 305-310, 2015.

21. A. Cano and S. Ventura. GPU-parallel subtree interpreter for genetic programming. In Conference on Genetic and Evolutionary Computation, 887-894, 2014.

22. J.A. Pedraza, C. Garcia-Martinez, A. Cano, and S. Ventura. Classification Rule Mining with Iterated Greedy. In 9th International Conference on Hybrid Artificial Intelligent Systems (HAIS). Lecture Notes in Computer Science, 8480 LNCS:585-596, 2014.

23. A. Cano, A. Zafra, E.L. Gibaja, and S. Ventura. A Grammar-Guided Genetic Programming Algorithm for Multi-Label Classification. In 16th European Conference on Genetic Programming, EuroGP'13. Lecture Notes in Computer Science, vol 7831, 217-228, 2013.

24. J.L. Olmo, A. Cano, J.R. Romero, and S. Ventura. Binary and Multiclass Imbalanced Classification Using Multi-Objective Ant Programming. In 12th International Conference on Intelligent Systems Design and Applications, ISDA'12, 70-76, 2012.

25. A. Cano, A. Zafra, and S. Ventura. An EP algorithm for learning highly interpretable classifiers. In 11th International Conference on Intelligent Systems Design and Applications, ISDA'11, 325-330, 2011.

26. A. Cano, A. Zafra, and S. Ventura. A parallel genetic programming algorithm for classification. In 6th International Conference on Hybrid Artificial Intelligent Systems (HAIS). Lecture Notes in Computer Science, 6678 LNAI (PART 1):172-181, 2011.

27. A. Cano, J.M. Luna, J.L. Olmo, and S. Ventura. JCLEC meets WEKA! In 6th International Conference on Hybrid Artificial Intelligent Systems (HAIS). Lecture Notes in Computer Science, 6678 LNAI (PART 1):388-395, 2011.

28. A. Cano, A. Zafra, and S. Ventura. Solving classification problems using genetic programming algorithms on GPUs. In 5th International Conference on Hybrid Artificial Intelligent Systems (HAIS). Lecture Notes in Computer Science, 6077 LNAI (PART 2):17-26, 2010.

29. J. Fernández-Berni, R. Carmona-Galán, L. Carranza-González, A. Cano-Rojas, J. F. Martínez-Carmona, Á. Rodríguez-Vázquez, and S. Morillas-Castillo. On-site forest fire smoke detection by low-power autonomous vision sensor. In VI International Conference on Forest Fire Research, page 94, 2010.

Tutorials in international conferences

1. A. Cano. Learning from imbalanced data streams. IEEE World Congress on Computational Intelligence, 2024.
2. B. Krawczyk and A. Cano. Big Data Stream Mining. IEEE International Conference on Big Data, 2020.
3. B. Krawczyk and A. Cano. Learning from non-stationary data streams. IEEE International Conference on Data Science and Advanced Analytics, 2019.

Research & teaching and innovation publications in Spanish

1. A. Cano and C. Garcia-Martinez. Optimización con 100 millones de variables reales sobre múltiples unidades de procesamiento gráfico. XI Congreso Español sobre Metaheurísticas, Algoritmos Evolutivos y Bioinspirados (MAEB), 377-386, 2016.
2. A. Cano and A. Rojas. Autómatas celulares y aplicaciones. UNIÓN. Revista Iberoamericana de Educación Matemática, (46):33-48, 2016.
3. F. Ibáñez A. Cano, and S. Ventura. Evaluación distribuida transparente para algoritmos evolutivos en JCLEC. II Jornadas de Algoritmos Evolutivos y Metaheurísticas (XVI CAEPIA), 231-240, 2015.
4. J.M. Moyano, E.L. Gibaja, A. Cano, J.M. Luna, and S. Ventura. Diseño Automático de Multi-Clasificadores Basados en Proyecciones de Etiquetas. II Jornadas de Fusión de la Información y ensembles (XVI CAEPIA), 355-366, 2015.
5. J.M. Moyano, E.L. Gibaja, A. Cano, J.M. Luna, and S. Ventura. Algoritmo evolutivo para optimizar ensembles de clasificadores multi-etiqueta. X Congreso Español sobre Metaheurísticas, Algoritmos Evolutivos y Bioinspirados (MAEB), 219-225, 2015.
6. A. Cano, J.M. Luna, and A. Rojas. Cómo compartir un secreto usando sistemas de ecuaciones lineales. Suma, (79):33-39, 2015.
7. A. Cano, J.L. Olmo, and S. Ventura. Programación Automática con Colonias de Hormigas Multi-Objetivo en GPUs. IX Congreso Español sobre Metaheurísticas, Algoritmos Evolutivos y Bioinspirados (MAEB), 288-297, 2013.
8. A. Cano, A. Zafra, and S. Ventura. Parallel Data Mining Algorithms on GPUs. Doctoral Consortium de la Conferencia de la Asociación Española para la Inteligencia Artificial (CAEPIA), 1603-1606, 2013.
9. A. Cano, J.M. Luna, A. Zafra, and S. Ventura. Modelo gravitacional para clasificación. VIII Congreso Español sobre Metaheurísticas, Algoritmos Evolutivos y Bioinspirados (MAEB), 63-70, 2012.
10. J.L. Olmo, A. Cano, J.R. Romero, and S. Ventura. Programación con Hormigas Multi-Objetivo para la Extracción de Reglas de Clasificación. VIII Congreso Español sobre Metaheurísticas, Algoritmos Evolutivos y Bioinspirados (MAEB), 219-226, 2012.
11. A. Rojas and A. Cano. Cifrado de imágenes y matemáticas. TE&ET. Revista Iberoamericana de Tecnología en Educación y Educación en Tecnología, (6):30-37, 2011.
12. A. Rojas and A. Cano. Una clase de aritmética modular, matrices y cifrado para ingeniería. UNIÓN. Revista Iberoamericana de Educación Matemática, 1(25):89-108, 2011.
13. A. Cano, A. Zafra, and S. Ventura. Speeding up evolutionary learning algorithms using GPUs. In ESTYLF 2010 XV Congreso Español sobre Tecnologías y Lógica Fuzzy, 229-234, 2010.
14. A. Rojas and A. Cano. Trabajando con imágenes digitales en clase de matemáticas. La Gaceta de la Real Sociedad Matemática Española, 2(13):317-336, 2010.

15. A. Rojas and A. Cano. Interpolación polinómica y la división de secretos. In XIV Congreso de Enseñanza y Aprendizaje de las Matemáticas, 2012.
16. A. Rojas and A. Cano. Motivando el aprendizaje del Álgebra lineal a través de sus aplicaciones: la división de secretos. In XX Congreso universitario de innovación educativa en las enseñanzas técnicas, 2012.
17. E. Gibaja, A. Zafra, M. Luque, and A. Cano. Recursos didácticos en el grado en ingeniería informática para el aprendizaje de matemáticas a través de la programación de ordenadores. In II Jornadas Andaluzas de Informática, 90-95, 2011.
18. A. Rojas and A. Cano. Cifrado de imágenes y reparto de secretos en clase de matemáticas. In XV Jornadas para el Aprendizaje y Enseñanza de las Matemáticas, 2011.
19. A. Rojas and A. Cano. Motivando el aprendizaje del álgebra lineal a través de sus aplicaciones. In II Jornadas sobre Innovación Docente y Adaptación al EEES en las Titulaciones Técnicas, 2011.
20. A. Rojas and A. Cano. Álgebra lineal y cifrado de imágenes. In CEAM 2010 XIII Congreso de enseñanza y aprendizaje de las matemáticas, 2010.
21. A. Cano. Reparto de secretos usando un sudoku. In CEAM 2010 XIII Congreso de enseñanza y aprendizaje de las matemáticas, 2010.
22. A. Cano and A. Rojas. Coloreado de imágenes y sistemas de ecuaciones lineales. In CEAM 2010 XIII Congreso de enseñanza y aprendizaje de las matemáticas, 2010.
23. A. Cano and A. Rojas. Fotomontajes de imágenes digitales y sistemas de ecuaciones lineales. In CEAM 2010 XIII Congreso de enseñanza y aprendizaje de las matemáticas, 2010.
24. A. Rojas and A. Cano. Descomposición en valores singulares e imágenes. In CEAM 2010 XIII Congreso de enseñanza y aprendizaje de las matemáticas, 2010.
25. A. Rojas and A. Cano. Álgebra lineal, secretos e imágenes. In CUIEET 2010 XVIII Congreso universitario de innovación educativa en las enseñanzas técnicas, 2010.
26. A. Rojas and A. Cano. Innovación en clase de matemáticas. In CUIEET 2010 XVIII Congreso universitario de innovación educativa en las enseñanzas técnicas, 2010.
27. A. Cano and A. Rojas. Descomposición en valores singulares e imágenes. In I Jornadas Andaluzas de Informática, 2009.
28. A. Rojas and A. Cano. Aplicaciones del álgebra lineal en la vida cotidiana. In XIV Jornadas para el Aprendizaje y Enseñanza de las Matemáticas, 2009.
29. R. Molina, J. Jiménez, C. Sánchez, and A. Cano. Adecuación de la red WiFi para cumplimiento de la normativa y permitir acceso a internet a los pacientes. In XI Congreso Nacional de Informática de la Salud, 2008.

PROFESSIONAL SERVICES

Editor in journals

1. Area Editor of Information Fusion.
2. Associate Editor of IEEE Access.
3. Associate Editor of Applied Intelligence.
4. Associate Editor of PeerJ - Computer Science.

Reviewer of research proposals

1. National Science Foundation. United States.
2. Israeli Science Foundation. Israel.
3. Chilean National Science and Technology, Chile.
4. Fonds Wetenschappelijk Onderzoek, Belgium.
5. National Centre of Science and Technology Evaluation, Kazakhstan.

Reviewer in journals (selection)

1. ACM Transactions on Knowledge Discovery from Data.
2. Applied Intelligence.
3. Applied Soft Computing.
4. Artificial Intelligence in Medicine.
5. Artificial Intelligence Review.
6. Cognitive Computation.
7. Computer Networks.
8. Computers & Electrical Engineering.
9. Computers and Education.
10. Distributed and Parallel Databases.
11. Expert Systems.
12. Expert Systems with Applications.
13. Future Generation Computer Systems.
14. IEEE Access.
15. IEEE Transactions on Cybernetics.
16. IEEE Transactions on Evolutionary Computation.
17. IEEE Transactions on Industrial Informatics.
18. IEEE Transactions on Knowledge and Data Engineering.
19. IEEE Transactions on Learning Technologies.
20. Information Fusion.
21. Information Processing in Agriculture.
22. Information Sciences.
23. Journal of Parallel and Distributed Computing.
24. Knowledge-Based Systems.
25. Knowledge and Information Systems.
26. Neural Computing and Applications.
27. Neurocomputing.
28. Pattern Recognition.
29. PeerJ Computer Science.

30. PLOS ONE.
31. Progress in Artificial Intelligence.
32. Soft Computing.
33. Swarm and Evolutionary Computation.

Conference organization (selection)

1. IEEE International Conference on Omni-layer Intelligent Systems.
   Track: Artificial Intelligence, Machine Learning, and Analytics, 2022.
2. IEA/AIE. Special Session Lifelong and Continual Learning on Data Streams:
   Algorithms and Applications, 2022.
3. Federated Conference on Computer Science and Information Systems.
   Track 4: Advances in Information Systems and Technologies, 2021,2022,2023.
4. IEA/AIE. Special Session on Data Stream Mining: Algorithms and Applications, 2021.
5. IEEE International Symposium on Computer-Based Medical Systems, 2019.
6. IEEE International Conference on Big Data. Special Track on Real-Time Big Data Analytics, 2018.
7. International Conference on Intelligent Systems Design and Applications, 2011.

Technical program committee in conferences (selection)

1. International Conference on Intelligent Systems Design and Applications
2. IEEE International Conference on Big Data Intelligence and Computing
3. IEEE Congress on Evolutionary Computation
4. International Conference on Educational Data Mining
5. International Joint Conference on Neural Networks
6. International Conference on Computational Collective Intelligence
7. International Conference on Soft Computing and Pattern Recognition
8. Federated Conference on Computer Science and Information Systems
9. International Conference on Hybrid Artificial Intelligence Systems
10. IEEE International Conference on Big Data
11. International Conference on Computational Science
12. International Conference on Discovery Science
13. IEEE World Congress on Computational Intelligence
14. International Joint Conference on Artificial Intelligence
15. ACM SIGKDD International Conference on Knowledge Discovery and Data Mining

Professional societies

- IEEE Senior Member (Member 2009 to 2019, Senior Member 2019 to date)
- ACM Senior Member (Member 2016 to 2023, Senior Member 2023 to date)

TEACHING EXPERIENCE

Virginia Commonwealth University

CMSC 508 - Databases (undergraduate) 2016 - 2024

CMSC 603 - High Performance Distributed Systems (graduate) 2016 - 2024

Course	2017	2018	2019	2020	2021	2022	2023	Dept. Avg.
CMSC 508 (# students)	41	65	62	49	48	32	43	–
Instructor evaluation	4.6/5	4.3/5	4.6/5	4.6/5	4.8/5	4.6/5	4.3/5	3.7/5
CMSC 603 (# students)	14	14	7	15	12	12	17	–
Instructor evaluation	4.5/5	4.9/5	4.7/5	4.3/5	4.8/5	4.7/5	4.9/5	4.0/5

University of Córdoba, Spain (Graduate Teaching Assistant)

Databases (undergraduate) 2013 - 2015

Operating Systems (undergraduate) 2013 - 2015

Advisor to high-school, undergraduate and master students

1. Sean Fang, Maggie L. Walker Governor's School. Explaining concept drift in data streams, Virginia Commonwealth University, 2022.
2. Abhay Sri, Deep Run High School. Analysis and forecasting of rivers pH level using Deep Learning, Virginia Commonwealth University, 2021.
3. Gavin Alberghini, MSc in Computer Science. Multi-label classification on data streams with concept drift, Virginia Commonwealth University, 2020.
4. Benjamin Neuwirth, Maggie L. Walker Governor's School. Real-time data streams with concept drift, Virginia Commonwealth University, 2018.
5. Abigail Byram, BSc in Computer Science. Multi-view multi-instance multi-label document classification, Virginia Commonwealth University, 2018.
6. Sykler Khun, MSc in Computer Science. Utilizing data-mining techniques to find conserved patterns in the different globalcauses of mortality, Virginia Commonwealth University, 2017.
7. Aaron Lee, MSc in Computer Science. Rule extraction from semi-supervised learning data streams, Virginia Commonwealth University, 2017.
8. Gabriella Melki, MSc in Computer Science. Fast Online Training of L1 Support Vector Machines, Virginia Commonwealth University, 2016.
9. Jorge Molina, BSc in Computer Science. Cálculo de las pérdidas de corriente alterna del filtro inductor en inversores. Universidad de Córdoba, 2017.
10. Asa Kaplan, BSc in Computer Science. Real-time Face Recognition Drone Surveillance System, Virginia Commonwealth University, 2017.
11. Francisco Ibanez, MSc in Computer Science. Evaluacion distribuida transparente para algoritmos evolutivos en JCLEC. Universidad de Córdoba, 2015.
12. Francisco Agredano, BSc in Computer Science. Paralelizacion de algoritmos de estrategias evolutivas en GPU. Universidad de Córdoba, 2015.

13. Antonio Sanchez, BSc in Computer Science. Paralelización de algoritmos de evolución diferencial en GPU. Universidad de Córdoba, 2014.

14. Cristina Llano, BSc in Computer Science. Estrategias evolutivas. Implementación en JCLEC. Universidad de Córdoba, 2012.

15. Francisco Lopez, BSc in Computer Science. Desarrollo de modelos de programación genética para el aprendizaje de sistemas de clasificación basados en reglas difusas. Universidad de Córdoba, 2012.

16. Rocio Herrero, BSc in Computer Science. Aplicación de técnicas de programación genética para la resolución de problemas de clasificación con datos no balanceados: estudio experimental. Universidad de Córdoba, 2011.

17. Jesus Gil, BSc in Computer Science. Implementación del modelo MEPAR-Miner en JCLEC y WEKA: programación multi-expresión para clasificación de reglas. Universidad de Cordoba, 2011.

SYNERGISTIC ACTIVITIES

1. Significant contributions to machine learning
    - My research in machine learning is focused on: (1) Evolutionary algorithms for explainable machine learning on high-speed drifting streams. (2) Flexible representations for learning from multi-view, multi-instance, and multi-label data streams. (3) Scalability of the methods to big data using parallel and distributed computing on GPUs, Spark, Flink, and Storm.
    - Collaborator of the JCLEC (Java Class Library for Evolutionary Computation) open-source software for algorithms in evolutionary computation applied to big data mining. The software is not only designed for research but also for teaching in graduate courses. It contains the code of the algorithms published by Dr. Cano and it is publicly available at http://jclec.sf.net to promote the transparency, reproducibility, visibility, and impact of his research. The software has been downloaded by over five thousand users from +100 countries and it received +500 citations.
2. Significant contributions to training and education in STEM
    - Dual Ph.D. program in Computer Science between the Virginia Commonwealth University and the University of Cordoba, Spain. Increase the participation of Hispanic under-represented students in Computer Science. Graduated two Ph.D. students (one female, one hispanic) within his four first years at VCU. He graduated 19 students with BSc/MSc in Computer Science (60% female).
    - Dr. Cano is author of 20 publications in innovative teaching in higher education. He engaged in 10 funded projects for innovation in education for integrating teaching and research.
    - Dr. Cano organized of RamHacks (2015-2020) http://ramhacks.vcu.edu, a 24-hour hackathon at VCU where students take the chance to collaboratively design and implement innovative applications. In the last edition we had more than 420 participants coming from 40 higher education institutions across the US and the event is supported by nation-wide sponsors contributing more than $60k fundraising. It represents an effective integration activity to attract new students into Computer Science programs.
    - Dr. Cano organized the 2022 and 2023 high school programming contest and participates in the Computer Science day at VCU, events which serve to attract high school students into Computer Science and fuel the STEM pipeline. Dr. Cano has also been involved in community outreach engaging engineering activities in the Hispanic-majority E.S.H. Greene Elementary School (88% Hispanic). This involved teaching robot programming (Lego mindstorms) to 10 year-olds.
3. Significant contributions to internal service
    - Faculty Director of the High Performance Research Computing (HPRC, https://hprc.vcu.edu) Core at VCU since January 2022. Connect with researchers at VCU to address their research computing needs and provide high performance computing resources. Manage a team of five full time employees to maintain four research clusters and support the researchers. Overview of the operations of the two clusters (total of 8,000 cores and +4PB storage). Received a $1.4m HEETF grant from the State of Virginia to expand the computing capabilities of the clusters in 2022. Received a $300k grant from NSF to acquire a GPU supercomputer in 2023.
4. Significant contributions to external service
    - Reviewer of research proposals for the National Science Foundation (United States), Israeli Science Foundation (Israel), Chilean National Science and Technology (Chile), Wetenschappelijk Onderzoek (Belgium), and National Centre of Science and Technology Evaluation (Kazakhstan).
    - Area Editor in Information Fusion, Associate editor in IEEE Access, Applied Intelligence, and PeerJ - Computer Science. Reviewer in 75+ journals, including IEEE Trans. on Cybernetics, IEEE Trans. on Knowledge and Data Eng., IEEE Trans. on Neural Networks and Learning Analytics, Machine Learning, Pattern Recognition. Technical program committee in 175+ international conferences including IJCAI, ICML, ECML.