

Ricardo Vilalta

Professor, Center of Inquiry for Science, Technology, Engineering, and Mathematics at The University of Austin.

Research Interests

Machine Learning, Artificial Intelligence, Statistical Data Science, and Astroinformatics.

Education

- (1998) Ph.D. Computer Science. University of Illinois at Urbana-Champaign (GPA 4.0/4.0).
- (1994) M.S. Computer Science. University of Illinois at Urbana-Champaign (GPA 4.0/4.0).
- (1989) B.E. Computer Engineering. Instituto Tecnológico y de Estudios Superiores de Monterrey, México (GPA 99.8/100).

Employment

- (2024-present) Professor, Center for STEM, The University of Austin.
- (2002-2024) Associate Professor, Department of Computer Science, University of Houston.
- (2021-2024) Joint Associate Professor, Department of Physics, University of Houston.
- (2020-2021) Adjunct Faculty, Department of Statistics, Rice University.
- (1998-2002) Research Member, IBM T.J. Watson Research Center, NY.

Honors and Awards

- (2017-2020) Vicepresident for Astroinformatics – International Astrostatistics Association.
- (2005) Excellence in Research Award – Dept. of Computer Science, University of Houston.
- (2005) Faculty Early Career Development (CAREER) Award – National Science Foundation.
- (2003) Best Paper Award – European Conference on Machine Learning.
- (2001) Invention Achievement Award – IBM Research.
- (1991-1997) Fulbright scholarship – University of Illinois at Urbana-Champaign.
- (1989) Valedictorian – Instituto Tecnológico y de Estudios Superiores de Monterrey, México.

Membership

- Association for the Advancement of Artificial Intelligence (AAAI).
- Institute of Electrical and Electronics Engineers (IEEE).
- Association for Computing Machinery (ACM).
- Informatics and Statistics Science Collaboration (ISSC) of the Large Synoptic Survey Telescope (LSST).
- International Astronomical Union (IAU).
- International Astrostatistics Association (IAA).

Teaching Experience

University of Houston

- COSC 6342: Machine Learning
- COSC 7362: Advanced Machine Learning
- COSC 4368: Artificial Intelligence Programming
- COSC 6368: Artificial Intelligence
- COSC 7363: Advanced Artificial Intelligence
- COSC 4337: Data Science II
- COSC 1306: Computer Science and Programming

Rice University

- STAT 413: Introduction to Statistical Machine Learning
- STAT 613: Statistical Machine Learning

Professional Activities

Invited Speaker

- (2019) Los Alamos National Laboratory, New Mexico. Speaker for Distinguished Astrophysics Seminar Series. The Art of Transfer Learning with Applications in Astronomy.
- (2018) Texas A&M University. A General Approach to Domain Adaptation with Applications in Astronomy.
- (2016) Carnegie Mellon University, Statistical Challenges in Modern Astronomy. Automated Classification of Supernova Ia Using Domain Adaptation and Active Learning.
- (2015) Halliburton Energy Services, Houston TX. Transfer Learning and Deep Learning: Emerging Trends in Machine Learning.
- (2015) Shell, Houston TX. New Trends in Machine Learning and Data Science.
- (2015) Aramco Services, Houston TX. Deep Learning: Searching for New Representations to Attain Enhanced Predictive Models.
- (2012) Workshop on Automatic Learning at the National Science Foundation (by IARPA). A Meta-Learning Approach to Model Selection, Combination, and Discovery.
- (2011) Penn State U., Int. Conf. on Statistical Challenges in Modern Astronomy V. The Importance of Informative Feature Representations.
- (2011) University of California at Berkeley. Transfer and Active Learning in Astronomy.
- (2011) Argonne National Laboratory, Chicago IL. Machine Learning in Space and Planetary Science.
- (2010) Southwest Research Institute (SwRI), San Antonio, Texas. An Overview of the Pattern Analysis Laboratory.
- (2006) Brigham Young University, Dept. of Computer Science. Automatic Geomorphic Mapping of Mars Using Pattern Recognition.
- (2006) CERN, Switzerland-France. Research Directions in Machine Learning with Applications to Particle Physics.
- (2006) Interview with Houston Radio Station KUHF 88.7 FM. Automated Identification and Characterization of Landforms on Mars.
- (2004) UT San Antonio. Understanding Simple Probabilistic Classifiers Through a Class-Cluster Decomposition Mechanism.
- (2002) Rice University, Physics Department. New Trends in Pattern Classification.

- (2002) Fordham University, Computer Science Department. Applications of Artificial Intelligence in Real-World Problems.
- (2001) Notre Dame University, Computer Science Department. Decision Tree Classifiers in Industry, Medicine, and Astronomy.

Editorial Board and Editor

- (2023-Present) Associate Editor: *Frontiers in Astronomy And Space Sciences*.
- (2019-present) Editorial Board: *Machine Learning Journal*.
- (2018-present) Associate Editor: *Statistical Analysis and Data Mining Journal*.
- (2016-present) Editorial Board: *Trends in Artificial Intelligence Journal*.
- (2012) Editorial Board: *Intelligent Data Analysis for Real-Life Applications: Theory and Practice*.
- (2004) Guest editor *Machine Learning Journal*; special issue on Meta-Learning.
- (2000) Associate editor: *International Conference on Artificial Intelligence*.

Conference-Workshop Organization

- (2013) Workshop chair: *Astroinformatics*; IEEE International Conference on Data Mining.
- (2007) Workshop co-chair: *Meta-Learning*; International Joint Conference on Neural Networks.
- (2005) Workshop co-chair: *Meta-Learning*; International Conference on Machine Learning.
- (2000) Workshop chair: *What Works Where Well?*; 17th International Conference on Machine Learning.

Refereed Publications

Books

- (2008) Brazdil P., Giraud-Carrier C., Soares C. and Vilalta R. *Metalearning: Applications to Data Mining*. Springer Verlag. ISBN: 978-3-540-73262-4.

Journal Papers and Book Chapters

- (2024) Dai, Zhenyu; Moews, Ben; Vilalta, Ricardo; Davé, Romeel. Physics-informed neural networks in the recreation of hydrodynamic simulations from dark matter. *Monthly Notices of the Royal Astronomical Society*, Volume 527, Issue 2, pages 3381–3394.
- (2024) Rajput, Kishansingh; Schram, Malachi; Blokland, Willem; Alanazi, Yasir; Ramuhalli, Pradeep; Zhukov, Alexander; Peters, Charles; Vilalta, Ricardo. Robust Errant Beam Prognostics with Conditional Modeling for Particle Accelerators. *Machine Learning: Science and Technology*.
- (2023) Mroczek, D.; Hjorth-Jensen, M.; Noronha-Hostler, J.; Parotto, P.; Ratti, C.; Vilalta, R. Mapping out the thermodynamic stability of a QCD equation of state with a critical point using active learning. *Phys. Rev. C* vol. 107, issue 5. DOI: 10.1103/PhysRevC.107.054911.
- (2023) Wilkinson, J.; Salvatore, M.; Vilalta, R. Megafans on Mars: a fluvial analogue for the Sinus Meridiani layered sediments. In Wilkinson, J., & Gunnell, Y. (Eds.). *Fluvial Megafans on Earth and Mars*. Cambridge: Cambridge University Press.
- (2022) Meskhi, Mikhail M.; Wolfe, Noah E.; Dai, Zhenyu; Fröhlich, Carla; Miller, Jonah, M.; Wong, Raymond K. W.; Vilalta, Ricardo. A New Constraint on the Nuclear Equation of State from Statistical Distributions of Compact Remnants of Supernovae. *The Astrophysical Journal Letters*, Volume 932, Number 1, American Astronomical Society. DOI: 10.3847/2041-8213/ac7054

- (2022) Vilalta, Ricardo; Meskhi, Michael. Transfer of Knowledge Across Tasks. Book Chapter in *Metalearning: Applications to Automated Machine Learning and Data Mining*, edited by Brazdil, Pavel; van Rijn, Jan N.; Soares, Carlos Soares; Vanschoren, Joaquin; Springer International Publishing, Second Edition.
- (2022) Deiana, A. M.; Tran, N.; Agar, J.; Blott, M.; Vilalta, R., et. al. Applications and Techniques for Fast Machine Learning in Science. *Frontiers in big data*, 5, 787421. DOI: 10.3389/fdata.2022.787421
- (2021) Aarrestad, T.; van Beekveld, M.; Bona, M.; Vilalta, R.; et. al. The Dark Machines Anomaly Score Challenge: Benchmark Data and Model Independent Event Classification for the Large Hadron Collider. *SciPost Physics*, Volume 12, Issue 1, pages 43 (FERMILAB-PUB-21-285-CMS).
- (2020) Ben Moews, Morgan A Schmitz, Andrew J Lawler, Joe Zuntz, Alex I Malz, Rafael S de Souza, Ricardo Vilalta, Alberto Krone-Martins, Emille E O Ishida. Ridges in the Dark Energy Survey for cosmic trough identification. *Monthly Notices of the Royal Astronomical Society*, Volume 500, Issue 1, pp. 859–870.
- (2019) Vilalta R., Dhar Gupta K., Boumber D., Meskhi M. A General Approach to Domain Adaptation with Applications in Astronomy. *Publications of the Astronomical Society of the Pacific*, 131:108008 (11pp).
- (2019) Moews B., de Souza R., Ishida E., Malz A., Heneka C., Vilalta R., Zuntz J. Stress testing the dark energy equation of state imprint on supernova data. *Physical Review D* 99 (12), 123529.
- (2019) Bechtol K., Drlica-Wagner A., Vilalta R., et. al. Dark Matter Science in the Era of LSST. *Astro2020: Decadal Survey on Astronomy and Astrophysics*, science white papers, no. 207; *Bulletin of the American Astronomical Society*, Vol. 51, Issue 3, id. 207.
- (2019) Nord F., Connolly A., Kinney J., Kubica J., Vilalta R., et al. Algorithms and Statistical Models for Scientific Discovery in the Petabyte Era. arXiv preprint arXiv:1911.02479
- (2018) Vilalta R., Dhar Gupta K., Boumber D., Meskhi M. M. A General Approach to Domain Adaptation with Applications in Astronomy. *Publications of the Astronomical Society of the Pacific (PASP)*, IOP Science Press.
- (2018) Ishida E. E. O., Beck R., Gonzalez Gaitan, de Souza R., Krone-Martins A., Barrett J. W., Kenamer N., Vilalta R. Burgess J. M., Quint B., Vitorelli A. Z., Mahabal A., and Gangler E. Optimizing Spectroscopic Follow-Up Strategies for Supernova Photometric Classification with Active Learning. *Monthly Notices of the Royal Astronomical Society (MNRAS)* Volume 483, Issue 1, pp. 2:18, Oxford University Press.
- (2017) De Souza, R. S., Dantas, M. L. L., Costa-Duarte, M. V., Feigelson, E. D., Killedar, M., Lablanche, P. Y., Vilalta, R., Krone-Martins, A., Beck, R., Gieseke, F. A Probabilistic Approach to Emission-Line Galaxy Classification. *Monthly Notices of the Royal Astronomical Society (MNRAS)*, 472, no. 3, pp. 2808–2822, Oxford University Press.
- (2016) Sasdelli, M., Ishida, E. O., Vilalta, R., Agüena, M., Busti, V.C., Camacho, H., Trindade, A.M.M., Gieseke, F., Souza, R.S., Fantaye, Y.T., Mazzali, P.A. Exploring the Spectroscopic Diversity of Type Ia Supernovae with DRACULA: A Machine Learning Approach. *Monthly Notices of the Royal Astronomical Society (MNRAS)*.
- (2016) Toti, G., Vilalta, R., Lindnerd, P., Leferb, B., Maciase, C., Priced, D. Analysis of Correlation Between Pediatric Asthma Exacerbation and Exposure to Pollutant Mixtures with Association Rule Mining. *Artificial Intelligence in Medicine* 74 pp. 44–52. Elsevier.
- (2016) Vilalta, R., Giraud-Carrier, C., Brazdil, P., Soares, C. Inductive Transfer. *Encyclopedia of Machine Learning and Data Mining*. Claude Sammut & Geoff Webb (Eds). Springer.
- (2016) Brazdil, P., Vilalta, R., Giraud-Carrier, C., Soares, C. Meta-Learning. *Encyclopedia of Machine Learning and Data Mining*. Claude Sammut & Geoff Webb (Eds). Springer.
- (2015) de Souza R. S., Cameron E., Killedar M., Hilbe J., Vilalta R., Maio U., Biffi V., Ciardi B., Riggs J. D. The Overlooked Potential of Generalized Linear Models in Astronomy - I: Binomial Regression. *Astronomy and Computing* Vol. 12, pp. 21-32. Elsevier.

- (2013) Vilalta R., Dhar Gupta K., Macri L. A Machine Learning Approach to Cepheid Variable Star Classification using Data Alignment and Maximum Likelihood. *Astronomy and Computing*, Vol. 2, pp. 46-53. Elsevier. DOI: 10.1016/j.ascom.2013.07.002
- (2012) Vilalta R., Kuchibhotla S., Hoang S., Valerio R., Ocegueda-Hernandez F., Pinsky L. Classification of Sources of Ionizing Radiation in Space Missions: A Machine Learning Approach. *Journal of the European Space Agency, Acta Futura* 5, pp. 111-119, DOI: 10.2420/AF05.2012.111.
- (2012) Stepinski T., Wei D., Vilalta R. Detecting Impact Craters in Planetary Images Using Machine Learning. *Handbook of Intelligent Data Analysis for Real-Life Applications: Theory and Practice*. IGI Global.
- (2011) Brazdil P., Vilalta R., Soares C., Giraud-Carrier C. Meta-Learning. *Encyclopedia of the Sciences of Learning*. Springer.
- (2011) Ding W., Stepinski T., Bandeira L., Vilalta R., Wu Y., Lu Z., Cao T. Sub-Kilometer Crater Discovery with Boosting and Transfer Learning. *ACM Transactions on Intelligent Systems and Technology*. Volume 2, Issue 4.
- (2010) Stepinski T., Vilalta R. Machine Learning Tools for Geomorphic Mapping of Planetary Surfaces. In *Machine Learning*, Yagang Zhang, Editor, Publisher: In-Tech 2010, ISBN 978-953-307-033-9, pp. 251-266.
- (2010) Brazdil P., Vilalta R., Giraud-Carrier C., and Soares C. Meta-Learning. *Encyclopedia of Machine Learning*. Claude Sammut and Geoffrey I. Webb, Editors. Springer.
- (2010) Vilalta R., Giraud-Carrier C., Brazdil P. and Soares C. Inductive Transfer. *Encyclopedia of Machine Learning*. Claude Sammut and Geoffrey I. Webb, Editors. Springer.
- (2010) Ghosh S., Stepinski T., Vilalta R. Automatic Annotation of Planetary Surfaces with Geomorphic Labels. *IEEE Transactions on Geoscience and Remote Sensing*. Volume 48, Issue 1. pp. 175-185.
- (2008) Vilalta R., Stepinski T. Cluster Validation. *Encyclopedia of Data Warehousing and Data Mining*, 2nd edition, J. Wang Ed.
- (2008) Giraud-Carrier C., Brazdil P. and Soares C., Vilalta R. Meta-Learning. *Encyclopedia of Data Warehousing and Data Mining*.
- (2007) Stepinski T., Vilalta R., Ghosh S. Machine Learning Tools for Automatic Mapping of Martian Landforms. *IIIE Intelligent Systems*, 22(6), pp. 100-106.
- (2007) Vilalta R., Stepinski T., Achari M. An Efficient Approach to External Cluster Assessment with an Application to Martian Topography. *Data Mining and Knowledge Discovery Journal*. Vol. 14, pp. 1-23. Springer Netherlands.
- (2006) Eick C., Rouhana A., Bagherjeiran A., Vilalta R. Using Clustering to Learn Distance Functions for Supervised Similarity Assessment. *Journal of Engineering Applications of Artificial Intelligence*. Volume 19, Issue 4, pp. 395-401.
- (2005) Stepinski T., Vilalta R. Digital Topography Models for Martian Surfaces. *IEEE Geoscience and Remote Sensing Letters*. Vol. 2 (3) pp. 260-264.
- (2005) Vilalta R., Giraud-Carrier C., and Brazdil P. Meta-Learning: Concepts and Techniques. *Data Mining and Knowledge Discovery Handbook: A Complete Guide for Practitioners and Researchers*. Oded Maimon and Lior Rokach, Editors. Kluwer Academic Publishers.
- (2004) Vilalta R., Giraud-Carrier C., Brazdil P. and Soares C. Using Meta-Learning to Support Data Mining. *International Journal of Computer Science and Applications*. Vol. 1, No. 1, pp. 31-45.
- (2004) Giraud-Carrier C., Vilalta R., and Brazdil P. Introduction to the Special Issue on Meta-Learning. *Machine Learning*, Vol 54, No. 3, pp. 187-193.
- (2003) Vilalta R. and Oblinger D. Evaluation Metrics in Classification: A Quantification of Distance-Bias. *Computational Intelligence*, Vol. 29, No. 3, pp. 264-283.
- (2002) Vilalta R., Apte C., Hellerstein J., Ma S., and Weiss S. Predictive Algorithms in the Management of Computer Systems. *IBM Systems Journal, Special Issue on Artificial Intelligence*, Volume 41.

- (2002) Vilalta R. and Drissi Y. A Perspective View and Survey Of Meta-Learning. *Journal of Artificial Intelligence Review* 18 (2) pp. 77-95.

Conference and Workshop Papers

- (2021) Meskhi, Mikhail M.; Rivolli, Adriano; Mantovani, Rafael G.; Vilalta, Ricardo. Learning Abstract Task Representations. *Proceedings of Machine Learning Research, AAAI Workshop on Meta-Learning and MetaDL Challenge, Volume 140*, pp. 127-136.
- (2020) Noble Kennamer, Emille E. O. Ishida, Santiago Gonzalez-Gaitan, Rafael S. de Souza, Alexander Ihler, Kara Ponder, Ricardo Vilalta, Anaïs Moller, David O. Jones, Mi Dai, Alberto Krone-Martins, Bruno Quint, Sreevarsha Sreejith, Alex I. Malz, Lluís Galbany. Active learning with RESSPECT: Resource allocation for extragalactic astronomical transients. *IEEE Symposium on Computational Intelligence and Data Mining (CIDM-20)*, Canberra, Australia.
- (2020) M. van Beekveld, S. Caron, A. De Simone, A. Farbin, L. Hendriks, A. Jueid, A. Leinweber, J. Mamuzic, E. Merényi, A. Morandini, C. Nellist, S. Otten, M. Pierini, R. Ruiz de Austri, S. Sekmen, J. Schouwenberg, R. Vilalta, M. White. Model-Independent Signal Detection: A Challenge using Benchmark Monte Carlo Data and Machine Learning. *Proceedings of the Les Houches: Physics at TEV Colliders New Physics Working Group Report*.
- (2019) Pisheh F., Vilalta R. Filter-Based Information-Theoretic Feature Selection. *Proceedings of the 3rd International Conference on Advances in Artificial Intelligence, Istanbul Turkey*.
- (2018) Sutrisno, R., Vilalta R., Renshaw A. A Machine Learning Approach for Dark-Matter Particle Identification Under Extreme Class Imbalance. *28th Annual International Astronomical Data Analysis Software & Systems Conference (ADASS-18)*, Maryland, USA.
- (2017) Vilalta, R. Transfer Learning in Astronomy: A New Machine-learning Paradigm. *18th International Workshop on Advanced Computing and Analysis Techniques in Physics Research (ACAT-17)*, Seattle, WA., USA
- (2017) Vilalta R., Ishida E. E. O., Beck, R., Sutrisno, R., De Souza, R. S., Mahabal, A. Photometric Redshift Estimation: An Active Learning Approach. *IEEE Symposium on Computational Intelligence and Data Mining (CIDM-17)*, Hawaii, USA.
- (2017) Rincon, C. A., Paris, J. F., Vilalta R., Cheng, A. M. K., Long, D. D. E., (2017) Disk Failure Prediction in Heterogeneous Environments. *International Symposium on Performance Evaluation of Computer and Telecommunication Systems, Seattle WA, USA*.
- (2016) Dhar Gupta K., Pampana R., Vilalta R., Ishida E. E. O., de Souza R. S., Automated Supernova Ia Classification Using Adaptive Learning Techniques. *IEEE Symposium on Computational Intelligence and Data Mining (CIDM-16)*, Athens, Greece.
- (2016) Ishida E. O., Sasdelli, M., Vilalta, R. Agüena, M., Busti, V. C., Camacho, H., Trindade, A. M. M., Gieseke, F., de Souza, R. S., Fantaye, Y. T., Mazzali, P. A. Exploring the spectroscopic diversity of type Ia Supernovae with Deep Learning and Unsupervised Clustering. *Astroinformatics, Proceedings of the IAU Symposium No. 325*. M. Brescia, G. Djorgovski, E. Feigelson, G. Longo & S. Cavuoti, eds.
- (2016) Toti E. G., Vilalta R., Lindner P., Price D., Effect of the Definition of Non-Exposed Population in Risk Pattern Mining, *5th Workshop on Data Mining in Medicine and Healthcare, SIAM Data Mining Conference, Miami, Florida*.
- (2015) Vilalta R., Dhar Gupta K., Mahabal A. Star Classification Under Data Variability: An Emerging Challenge in Astroinformatics. *European Conference on Machine Learning (ECML-15)*, Porto, Portugal.
- (2015) Vilalta R., Dhar Gupta K., Mahabal A. Star Classification Under Data Variability: An Emerging Challenge in Astroinformatics. *European Conference on Machine Learning (ECML-15)*, Porto, Portugal.
- (2015) Guillen P., Larrazabal G., Gonzalez G. Bumber D., Vilalta R. Supervised Learning in Salt Body Detection. *85th Annual Meeting of the Society of Exploration Geophysicists, New Orleans, LA, USA*.

- (2015) Dvijesh, S., Dcosta M., Vilalta R., Pavlidis I. Perinasal Indicators of Deceptive Behavior. IEEE Conference on Automatic Face and Gesture Recognition (FG2015), Ljubljana, Slovenia.
- (2014) Valerio R., Vilalta R. Kernel Selection in Support Vector Machines Using Gram-Matrix Properties. Conference on Advances in Neural Information Processing Systems (NIPS-14). Workshop on Modern Nonparametrics: Automating the Learning Pipeline. Montreal, Canada.
- (2014) Shi W., Wen Y., Liu Z., Zhao X., Bumber D., Vilalta R., Xu L. Scalable and Fault Resilient Physical Neural Networks on a Single Chip. International Conference on Compilers, Architectures, and Synthesis of Embedded Systems.
- (2014) Vilalta R., Dhar Gupta K., Macri L. Domain Adaptation Under Data Misalignment: An Application to Cepheid Variable Star Classification. The 22nd International Conference on Pattern Recognition (ICPR-14), Stockholm, Sweden.
- (2014) Valerio R., Vilalta R. A Data Complexity Approach to Kernel Selection for Support Vector Machines (student abstract). The 28th AAAI Conference on Artificial Intelligence (AAAI-14), Quebec, Canada.
- (2014) Dhar Gupta K., Vilalta R., Asadourian V., Macri L. Adapting Predictive Models For Cepheid Variable Star Classification Using Linear Regression And Maximum Likelihood. Statistical Challenges in 21st Century Cosmology (SCCC-14), Lisbon, Portugal. A Symposium of the International Astronomical Union IAU
- (2013) Ocegueda-Hernandez F., Vilalta R. An Empirical Study of the Suitability of Class Decomposition for Linear Models: When Does It Work Well?. 13th SIAM International Conference on Data Mining, Austin, TX, USA.
- (2013) Hoang S., Vilalta R., Pinsky L., Kroupa M., Stoffle N., Idarraga J. Data Analysis of Tracks of Heavy Ion Particles in Timepix Detectors. The 15th International Workshop on Advanced Computing and Analysis Techniques in Physics (ACAT-13), Beijing, China.
- (2012) Vilalta, R. Commentary: Morphological Image Analysis and Sunspot Classification. In Statistical Challenges in Modern Astronomy V. Springer.
- (2012) Vilalta R., Real L. Modeling Repetitive Patterns: A Bridge Between Pattern Theory and Data Mining. IEEE International Conference on Granular Computing and International Symposium on Foundations and Frontiers of Data Mining (FFDM-12), Hangzhou, China.
- (2012) Hoang S., Pinsky L., Vilalta R. LET Estimation of Heavy Ion Particles based on a Timepix-Based Si Detector. The International Conference on Computing in High Energy and Nuclear Physics (CHEP-12), New York, USA.
- (2011) Vilalta R., Kuchibhotla S., Ocegueda-Hernandez F., Hoang S., Pinsky L. Machine Learning for Identification of Sources of Ionizing Radiation During Space Missions. Workshop on AI in Space: Intelligence Beyond Planet Earth, International Joint Conference on Artificial Intelligence (IJCAI-11), Barcelona, Spain.
- (2010) McGarvey Kenny, Vilalta R., Samara Marilia, Michell Robert. A Pattern Recognition System for the Automated Tracking and Classification of Meteors Using Digital Image Data. 20th Conference on Astronomical Data Analysis Software and Systems (ADASS-10), Boston, USA.
- (2010) Ding W., Stepinski T., Bandeira L., Vilalta R., Wu Y., Lu Z., Cao T. Robust Automatic Detection of Craters in Planetary Images. 19th ACM Conference on Information and Knowledge Management (CIKM-10), Toronto, Canada.
- (2010) Vilalta R., Kuchibhotla S., Valerio R., Pinsky L. Development of Pattern Recognition Software for Tracks of Ionizing Radiation In Medipix2-Based (TimePix) Pixel Detector Devices. 18th International Conference on Computing in High Energy and Nuclear Physics (CHEP-10), Taipei, Taiwan. Journal of Physics: Conference Series.
- (2010) Tasic P., Vilalta R. A Unified Framework for Reinforcement Learning, Co-Learning and Meta-Learning: How to Coordinate in Collaborative Multi-Agent Systems. International Conference on Computational Science (ICCS 2010), Track on Cognitive Agents: Theory and Practice. Amsterdam, Netherlands.

- (2010) Tosić P., Vilalta R. Learning and Meta-Learning for Coordination of Autonomous Unmanned Vehicles: A Preliminary Analysis. 19th European Conference on Artificial Intelligence (ECAI-10) and the Sixth Conference on Prestigious Applications of Intelligent Systems (PAIS-2010), Lisbon, Portugal. In *Frontiers in Artificial Intelligence and Applications*, Volume 215, pp. 163-168.
- (2010) Vilalta R., Ocegueda-Hernandez F., Bagaria C. A Conceptual Study of Model Selection in Classification: Multiple Local Models vs One Global Model. Second International Conference on Agents and Artificial Intelligence (ICAART-2010), Valencia, Spain.
- (2009) Vilalta R., Valerio R., Ocegueda-Hernandez F., Watts G. The Effect of the Fragmentation Problem in Decision Tree Learning Applied to the Search for Single Top Quark Production. 17th International Conference on Computing in High Energy and Nuclear Physics (CHEP-09), Prague, Czech Republic. *Journal of Physics: Conference Series*, Volume 219, Part 3.
- (2009) Jiamthaphaksin R., Eick C., Vilalta R. A Framework for Multi-objective Clustering and its Application to Co-location Mining. International Conference on Advanced Data Mining and Applications (ADMA-09), Beijing, China.
- (2007) Sun C., Vilalta R. Data Selection using SASH Trees for Support Vector Machines. 5th International Conference on Machine Learning and Data Mining (MLDM-07), Leipzig, Germany.
- (2007) Ghosh S., Stepinski T., Vilalta R. Automatic Mapping of Martian Landforms Using Segmentation-Based Classification. 38th Lunar and Planetary Science Conference. League City, Texas.
- (2007) Stepinski T., Ghosh S., Vilalta R. Machine Learning for Automatic Mapping of Planetary Surfaces. Nineteenth Annual Conference on Innovative Applications of Artificial Intelligence (IAAI-07).
- (2007) Subhlok J., Johnson O., Subramaniam V., Vilalta R., Yun C. Tablet PC Video based Hybrid Coursework in Computer Science: Report from a Pilot Project. 38th ACM Technical Symposium on Computer Science Education (SIGCSE-2007).
- (2006) Stepinski T., Ghosh S., Vilalta R. Automatic Recognition of Landforms on Mars Using Terrain Segmentation and Classification. Ninth International Conference on Discovery Science (DS-2006).
- (2006) Vilalta R., Mutchler G., Taylor S., Knuteson B. Automatic Signal Enhancement in Particle Physics Using multivariate Classification and Physical Constraints. Ninth Workshop on Mining Scientific and Engineering Datasets (MSD06), in conjunction with the Sixth SIAM International Conference on Data Mining, Bethesda, Maryland.
- (2006) Vilalta R. Identifying and Characterizing Class-Clusters to Explain Learning Performance. AAI Spring Symposia: What Went Wrong and Why: Lessons from AI Research and Applications. Ed. Dan Shapiro. Stanford University, CA.
- (2005) Bagherjeiran A., Eick C., Chen C., Vilalta R. Adaptive Clustering: Obtaining Better Clusters Using Feedback and Past Experience. Fifth IEEE International Conference on Data Mining (ICDM05), New Orleans, Louisiana.
- (2005) Vilalta R., Sarda P., Mutchler G., Padley P. Signal Enhancement Using Classification Techniques and Physical Constraints. Conference on Statistical Problems in Particle Physics, Astrophysics and Cosmology (PHYSTAT05), Oxford, U.K.
- (2005) Knuteson B., Vilalta R. Testing Theories in Particle Physics Using Maximum Likelihood and Adaptive Bin Allocation. 9th European Conference on Principles and Practices of Knowledge Discovery in Databases (PKDD05), Porto, Portugal.
- (2005) Bagherjeiran A., Vilalta R., Eick C. Content-Based Image Retrieval Through a Multi-Agent Meta-Learning Framework. 17th IEEE Conference on Tools with Artificial Intelligence (ICTAI05), Hong Kong.
- (2005) Eick C., Rouhana A., Bagherjeiran A., Vilalta R. Using Clustering to Learn Distance Functions for Supervised Similarity Assessment. International Conference on Machine Learning and Data Mining (MLDM05), Leipzig Germany.

- (2004) Vilalta R., Stepinski T., Achari M., Ocegueda-Hernandez F. A Quantification of Cluster Novelty with an Application to Martian Topography. 8th European Conference on Principles and Practice of Knowledge Discovery in Databases (PKDD04).
- (2004) Eick C., Zeidat N., Vilalta R. Using Representative-Based Clustering for Nearest Neighbor Dataset Editing. Fourth IEEE International Conference on Data Mining (ICDM04), Brighton U.K.
- (2004) Vilalta R., Achari M., and Eick C. Piece-Wise Model Fitting Using Local Data Patterns. Sixteenth European Conference on Artificial Intelligence. Valencia, Spain.
- (2004) Vilalta R., Stepinski T. Thematic Maps of Martian Topography Generated by a Clustering Algorithm. 35th Lunar and Planetary Science Conference. League City, Texas.
- (2003) Vilalta R., Achari M., and Eick C. Class Decomposition Via Clustering: A New Framework For Low-Variance Classifiers. Third IEEE International Conference on Data Mining, Melbourne, Florida.
- (2003) Vilalta R., Padley P., Lee S.J., Sun C., Bagherjeiran A. Evaluating and Constructing Features For Identification of Tau Leptons. Conference on Statistical Problems in Particle Physics, Astrophysics, and Cosmology. Stanford CA.
- (2003) Sahoo R. K., Oliner A. J., Rish I., Gupta M., Moreira J. E., Ma S., Vilalta R. Critical Event Prediction for Proactive Management in Large-scale Computer Clusters. The Ninth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, Washington DC.
- (2003) Vilalta R. and Rish I. A Decomposition Of Classes Via Clustering To Explain And Improve Naive Bayes. European Conference on Machine Learning. Cavtat-Dubrovnik, Croatia. (Best Paper Award)
- (2003) Vilalta R. and Achari M. Classification for Systems with Complex Low-Level Interactions. IEEE International Symposium on Intelligent Control.
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- (2003) Vilalta R. and Stepinski T. Classification of Martian Terrain Using Automated Discovery of Structure Algorithm Applied to Digital Topography. Meeting of the American Geophysical Union (AGU), San Francisco, CA.
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