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**EDUCATION****PhD in Computer Engineering: 2004 – 2008.**

PhD under the program: *Communication and Information Systems and its Management*. Enginyeria i Arquitectura La Salle, Universitat Ramon Llull.

*Dissertation Title:* “New Challenges in Learning Classifier Systems: Mining Rarities and Evolving Fuzzy Models” (Excellent Cum Laude) [[preprint](#)] [[slides preprint](#)].

*Thesis Supervisor:* [Ester Bernadó-Mansilla](#)

*Examining Committee:* [David E. Goldberg](#), [Francisco Herrera](#), [Martin V. Butz](#), [Xavier Llorà](#), and [Xavier Vilasís](#).

**DEA in Computer Engineering: 2004 – 2006.**

Enginyeria i Arquitectura La Salle, Universitat Ramon Llull.

*Dissertation Title:* “Facetwise Analysis of Learning Classifier Systems for Mining Rarities”

*DEA Supervisor:* [Ester Bernadó-Mansilla](#)

**MS in Computer Engineering: 2002 – 2004.**

Enginyeria i Arquitectura La Salle, Universitat Ramon Llull.

*Thesis Title:* “Development and Integration of the XCS Classifier System in KEEL and analysis of rule set reduction mechanisms” (A with Honors)

*Thesis Supervisor:* [Ester Bernadó-Mansilla](#)

Best student of the promotion

**MSc in Computer Engineering: 1999 – 2002.**

Enginyeria i Arquitectura La Salle, Universitat Ramon Llull.

*Thesis Title:* “Comparative Platform among Genetic Algorithms, Evolution Strategies, and Simulated Annealing” (A with Honors)

*Thesis Supervisor:* Josep M. Garrell Guiu

Best student of the promotion

## RESEARCH INTERESTS

### **Learning Classifier Systems and Genetic-Based Machine Learning.**

Conducting research for a better understanding of the processes that guide learning classifier systems, i.e., evolutionary rule-based machine learning techniques that evolve a rule set online from a stream of examples. Facetwise models have been derived to increase our understanding different aspects of such complex systems. Besides, these models have been used as a tool for design, detecting the weaknesses of learning classifier systems and proposing new approaches to overcome them.

### **Learning from domains with rare cases and rare classes.**

Analysis and improvement of different types of learners, including learning classifier systems, for extracting models from domains where rare cases or rare classes exist. For traditional machine learning techniques, several pre-process methodologies have been developed to improve the detection of rarities. For learning classifier systems, the underlying processes of these types of machine learning techniques have been improved to increase the accuracy of the models extracted from rare classes, which are learned on the fly due to its online learning architecture.

### **Fuzzy Logics and Genetic Fuzzy Systems.**

Design, implementation, and improvement of online rule-based fuzzy systems for supervised learning. Fuzzy logic provides a formal framework in which the reasoning mechanisms are similar to those of human experts. Thus, learning classifier systems have been extended by including fuzzy rules. This has enabled learning classifier systems to deal with much more interpretable rules, as linguistic fuzzy rules are, and to provide reasoning mechanisms that are similar to human ones. Moreover, they have also been prepared to deal with imprecise and incomplete data, which are really common in nature.

### **Substructural learning of decomposable problems.**

Design and implementation of methodologies to (i) extract the structure of randomly decomposable problems, (ii) learn which variables contribute together to define the output, and (iii) evolve classification models that exploit the salient interactions among variables.

### **Data complexity and analysis of problem difficulty.**

Designment and development of metrics to assess the intrinsic complexity of classification problems. These metrics are used to relate classifier error with

problem complexities and to identify the domain of competence of different learning systems. These complexity metrics have been used as an objective function of evolutionary algorithms to create boundedly-difficult problems, that is, problems with certain characteristics that may be hard to solve by different learning techniques. These artificially generated problems have been used to test the behavior of several systems on problems with different complexities and establish comparisons of learners on certain types of problems, which has led to a better understanding of the real characteristics that may pose more challenges to different learning systems.

## RESEARCH EXPERIENCE

**Member of the Research Group in Intelligent Systems (GRSI): 2001 – present.** GRSI is a research group which has been recognized by the Catalan government, the *Generalitat de Catalunya*, under the reference *2005SGR-00302*. The group focuses its research on practical applications of evolutionary computation and soft-case-based reasoning.

Among others, the research group participates in the following projects:

- *Artificial Intelligence Telematic Network: 2003 – present.* The aim of this project is to coordinate and try to enhance the collaboration among research groups in the field of artificial intelligence. This project is funded by the Spanish government under grant *2003XT00075*.
- *Spanish Network on Data Mining and Machine Learning: 2003 – 2004.* This project is funded by the Spanish government under grant *TIC2002-11124-E*.

**Member of the Illinois Genetic Algorithm Laboratory (IlliGAL): 2006–present.** The IlliGAL, placed in the General Engineering Department (University of Illinois at Urbana champaign), is one of the most important research groups in genetic algorithms and genetic-based machine learning. At the IlliGAL, researches study nature’s search algorithm of choice, genetics, and evolution, as a practical approach to solving difficult problems on a computer. Theory and empirical results obtained in the lab demonstrate that well-designed genetic algorithms can be guaranteed to solve a broad class of provably hard problems quickly, reliably, and accurately. The quality of the research of the group is highlighted by the large number of publications of the director of the lab, Professor [David E. Goldberg](#)—one of the top 20 most cited authors in computer science more generally according to [Palsberg](#)—who has published more than 400 scientific publications in international journals, referred conferences, and book chapters.

## PARTICIPATION IN RESEARCH PROJECTS

**KEEL II: Rule-based Evolutive Models: 2005 – 2008.** *KEEL II* continues with the development of a machine learning tool initiated in the *KEEL* project. In *KEEL II*, we are introducing the following novelties to the prototype: (i) new machine learning techniques and (ii) algorithm evaluation methodologies.

The project is sponsored by the *Ministerio de Educación y Ciencia* under the national project with reference *TIN2005-08386-C05-04*.

**KEEL: Knowledge Extraction with Evolutionary Learning: 2002 – 2005.**

The *KEEL* project develops a software tool that integrates a large variety of genetic-based machine learning techniques for pattern classification, regression, and clustering; it includes the top-notch evolutionary learning methodologies. *KEEL* provides an intuitive visual tool that permits to run experiments, compare algorithms, and extract classification models for user's classification, regression, and unsupervised problems.

The following five universities participate in the project: Universidad de Granada (UGR), Universidad de Córdoba (UCO), Universitat Ramon Llull (URL), Universidad de Jaén (UJ), and Universidad de Oviedo (UO).

The project was sponsored by the *Ministerio de Ciencia y Tecnología* under the national project with reference *TIC2002-04036-C05-03*.

Since 2007 I am the technical coordinator of the *KEEL* project in the URL university.

## TEACHING EXPERIENCE

**Teaching *Artificial Intelligence*: 2008 – present.** Subject of the 5th course of Computer Engineering, Ingeniería i Arquitectura La Salle, Universitat Ramon Llull. I give the classes in English.

**Teaching *Programming II*: 2008 – present.** Subject of the 2nd course of Computer Engineering, Ingeniería i Arquitectura La Salle, Universitat Ramon Llull.

**Teaching *Data structures*: 2003 – 2008.** Subject of the 2nd course of Computer Engineering, Ingeniería i Arquitectura La Salle, Universitat Ramon Llull. Since 2007, I give the classes in English.

**Supervisor of Master Thesis: 2003 – present.** Supervisor of several master thesis of Computer Engineering students.

**Seminars of optimization and learning with genetic algorithms: 2004 – 2006.** Given several seminars in the subject *Artificial Intelligence*, 5th course

of Computer Engineering, Ingeniería i Arquitectura La Salle, Universitat Ramon Llull. These seminars introduce the students to genetic algorithms in the context of search, optimization, and machine learning.

**Coordination of seminars of first-year students in the GRSI lab: 2005 – 2006.** Coordination of the seminars given to the first-year students in the Research Group of Intelligent Systems lab (GRSI). In these seminars, the students are introduced to several topics in the optimization and machine learning realms.

## VISITS TO RESEARCH GROUPS

**Illinois Genetic Algorithm Laboratory (IlliGAL): Jun. 2008 – Jul. 2008.**

In this visit, we continued on the investigation of the effect of class imbalances on learning classifier systems, as well as on how we can learn the sub-structure of non-trivial, hierarchical imbalanced problems.

**Soft Computing and Intelligent Information Systems (SCI2s): Jan. 28**

**– Mar. 14, 2008.** In this visit, we continued with the collaboration with several SCI2s members to further improve genetic-based machine learners for evolving linguistic fuzzy rules. Moreover, in this visit we also collaborated in the emerging field of *data complexity* assessment for supervised learning.

**Soft Computing and Intelligent Information Systems (SCI2s): Mar. 11**

**– Mar. 25, 2007.** In this visit, I collaborated with Jorge Casillas and other members of the SCI2s group to develop different genetic-based machine learning systems. We designed a new online supervised learning process based on a Michigan-style learning fuzzy-classifier system. The algorithm, called Fuzzy-UCS, is inspired by UCS, an existing learning classifier system for classification tasks. Fuzzy-UCS introduces a linguistic fuzzy representation to the rules with the aim of evolving more readable rule sets and providing a reasoning methodology more similar to human one, while maintaining similar performance and generalization capabilities than those presented by UCS.

**Illinois Genetic Algorithm Laboratory (IlliGAL): Jul. 2006 – Dec. 2006.**

In this visit, we developed facetwise models of learning classifier systems for learning from environments with rare cases or classes. The research resulted in the publication of several scientific papers.

## AWARDS & GRANTS

- **Best student paper award** in the 2008 ESTYLF conference for the paper *Albert Orriols-Puig, Jorge Casillas, and Francisco J. Martínez-López. Modelado Causal en Marketing Mediante Aprendizaje no Supervisado de Reglas de*

*Asociación Difusas. XIV Congreso Español sobre Tecnologías y Lógica Fuzzy (ESTYLF'08).*

- **Best paper award** in the Genetic and Evolving Fuzzy Systems Workshop in 2008 for the paper *Jorge Casillas, Albert Orriols-Puig, and Ester Bernadó-Mansilla. Toward Evolving Consistent, Compete, and Compact Fuzzy Rule Sets for Classification Problems. In Genetic and Evolving Fuzzy Systems, pages 89-94, IEEE, 2008.*
- **Beca BE (2008).** Scholarship to visit foreign research groups. This scholarship is granted by the *Generalitat de Catalunya*. The scholarship is funding my research visit to the IlliGAL, scheduled for the next June and July, 2008.
- **GECCO'08 travel grant.** Grant given to the students that have, at least, one paper in the 2008 Genetic and Evolutionary Conference.
- **GECCO'07 travel grant.** Grant given to the students that have, at least, one paper in the 2007 Genetic and Evolutionary Conference.
- **Best paper nomination** in the Genetic and Evolutionary Computation Conference in 2006 for the paper *Albert Orriols-Puig and Ester Bernadó-Mansilla. Bounding XCS Parameters for Unbalanced Datasets. Proceedings of the 2006 Genetic and Evolutionary Computation Conference. Seattle, WA. 2006.*
- **GECCO'06 travel grant.** Grant given to the students that have, at least, one paper in the 2006 Genetic and Evolutionary Conference.
- **Beca BE (2006).** Scholarship to visit foreign research groups. This scholarship is granted by the *Generalitat de Catalunya*. The scholarship funded my research visit to the *Illinois Genetic Algorithms Laboratory* (IlliGAL) done from July 16, 2006 to December 16, 2006.
- **Grant fundación Rafael Escolá la Excelencia Universitaria (2005).** Grant given to the three best engineers of the year (including the disciplines of general engineering, telecommunications engineering, and computer science engineering).
- **Beca FI (2004 – present).** Scholarship for researchers formation. Ref: 2005FI-00252.
- **Becas Líder de Inmersión a la Realidad Social Española (July 2004).** Fellowship granted to the 8 best Spanish students. Sponsors: Grupo Santander, Hoteles NH and Fundación Carolina.
- **Beca Colaboración (2003).** Scholarship to fund the collaboration of a last-year student with a research project of a research group of the University. Ministerio de Ciencia, Cultura y Deporte.

- **Beca Universitaria de la Caixa de Manresa (2000)**. Scholarship given to the best students of the year in Catalonia.
- **Beca Universitaria de la Caixa de Manresa (1999)**. Scholarship given to the best students of the year in Catalonia.

## PROFESSIONAL ACTIVITIES

- Reviewer, IEEE Transactions on Evolutionary Computation
- Reviewer, Pattern Recognition Letters
- Reviewer, International Journal of Hybrid Intelligent Systems
- Reviewer, Genetic and Evolutionary Computation Conference
- Reviewer, International Workshop on Learning Classifier Systems
- Reviewer, Bio-Inspired Computing: Theory and Applications
- Reviewer, World Multi-Conference on Systemics, Cybernetics and Informatics
- Reviewer, Hybrid Intelligent Systems Conference

## INVITED TALKS

- [Learning Classifier Systems: New Trends](#), in I Workshop on Knowledge Extraction based on Evolutionary Learning, May 2008.
- [Some results on the use of UCS for imbalanced data sets](#), in I Workshop on Knowledge Extraction based on Evolutionary Learning, May 2008.
- Can LCSs learn from Rare Classes? University of Granada, March 2007.

## COAUTHORS

David E. Goldberg (University of Illinois, USA, h-index = 59) • Pier Luca Lanzi (Politecnico di Milano, Italy, h-index = 18) • Kumara Sastry (University of Illinois, USA, h-index = 16 ) • Jorge Casillas (Universidad de Granada, Spain, h-index = 15) • Ester Bernadó-Mansilla (Universitat Ramon Llull, Spain, h-index=7) • Francisco J. Martínez-López (University of Granada, Spain) • Núria Macià-Antolínez (Universitat Ramon Llull, Spain) • Joaquim Rios-Boutin (Universitat Ramon Llull, Spain) • Francesc Teixidó-Navarro (Universitat Ramon Llull, Spain) • Sergio Morales-Ortigosa (Universitat Ramon Llull, Spain)

## PUBLICATIONS

### Books

Elisabet Golobardes-Ribé and **Albert Orriols-Puig**. *Intel·ligència Artificial*. Creative Commons, ISBN XXXXXXXX, [preprint].

### Journal Papers

**Albert Orriols-Puig**, Ester Bernadó-Mansilla, David E. Goldberg, Kumara Sastry, Pier Luca Lanzi. *Facetwise Analysis of XCS for Problems with Class Imbalances*. IEEE Transactions on Evolutionary Computation, 2008, submitted (ISI index = 3.77), ISSN 1089-778X, [preprint].

**Albert Orriols-Puig** Jorge Casillas, and Francisco J. Martínez-López. *Unsupervised Learning of Fuzzy Association Rules for Consumer Behavior Modeling*. Mathware and Soft Computing, 2008, in press, ISSN 1134-5632, [preprint].

Sergio Morales-Ortigosa, **Albert Orriols-Puig**, and Ester Bernadó-Mansilla. *Analysis and Improvement of the Genetic Discovery Component of XCS*. International Journal of Hybrid and Intelligent Systems, 2008, submitted, ISSN 1134-5632, [preprint].

**Albert Orriols-Puig**, Jorge Casillas and Ester Bernadó-Mansilla. *Genetic-Based Machine Learning Systems Are Competitive for Pattern Recognition*. Evolutionary Intelligence, number 3, pages 209–232, 2008, doi=10.1007/s12065-008-0013-9, ISSN 1864-5909, [preprint].

**Albert Orriols-Puig**, Jorge Casillas and Ester Bernadó-Mansilla. *Fuzzy-UCS: A Michigan-style Fuzzy-Learning Classifier System for Supervised Learning*. IEEE Transactions on Evolutionary Computation, 2008 (first online), doi=10.1109/TEVC.2008.925144 (ISI index = 3.77), ISSN 1089-778X, [preprint].

**Albert Orriols-Puig**, Ester Bernadó-Mansilla. *Evolutionary Rule-Based Systems for Imbalanced Datasets*. Soft Computing Journal. Special Issue on Evolutionary and Metaheuristic-based Data Mining (EMBDM), 2008, doi=10.1007/s00500-008-0319-7 (ISI index=0.516), ISSN 1432-7643, [preprint].

### LNCS/LNAI volumes

**Albert Orriols-Puig**, Jorge Casillas, and Ester Bernadó-Mansilla. *Approximate versus Linguistic Representation in Fuzzy-UCS*. In Proceedings of the 2008 International Workshop on Hybrid Artificial Intelligence Systems (HAIS'08), LNAI, pages 722–729, Springer, ISSN 0302-9743, 2008 [preprint].

**Albert Orriols-Puig**, Kumara Sastry, David E. Goldberg, Ester Bernadó-Mansilla. *Substructural Surrogates for Learning Decomposable Classification Problems*. In Advances at the frontier of LCS, LNCS series, volume 4998, pages 235–254, Springer, ISSN 0302-9743, 2008 [preprint].

**Albert Orriols-Puig**, Jorge Casillas Ester Bernadó-Mansilla. *Evolving Fuzzy Rules with UCS: Preliminary Results*. In Advances at the frontier of LCS, LNCS series, volume 4998, pages 57–76, Springer, ISSN 0302-9743, 2008 [preprint].

**Albert Orriols-Puig** and Ester Bernadó-Mansilla. *Revisiting UCS: Description, Fitness Sharing, and Comparison with XCS*. In Advances at the frontier of LCS, LNCS series, volume 4998, pages 96–116, Springer, ISSN 0302-9743, 2008 [preprint].

**Albert Orriols-Puig** and Ester Bernadó-Mansilla. *The Class Imbalance Problem in UCS Classifier System: A Preliminary Study*. In Advances at the frontier of LCS, LNCS series, pages 164-183, Springer, ISSN 0302-9743, 2007 [preprint].

## Book Chapters

**Albert Orriols-Puig**, Jorge Casillas, and Ester Bernadó-Mansilla. *A Comparative Study of Several Classifiers in Supervised Learning*. Learning Classifier Systems in Datamining, Studies of Fuzziness and Soft Computing series, volume 125/2008, pages 205-230, Springer, ISSN 1860-949X, 2008 [preprint].

**Albert Orriols-Puig** and Ester Bernadó-Mansilla. *Mining Imbalanced Data with Learning Classifier Systems*. Learning Classifier Systems in Datamining, Studies of Fuzziness and Soft Computing series, volume 125/2008, pages 123-145, Springer, ISSN 1860-949X, 2008 [preprint].

Sergio Morales-Ortigosa, **Albert Orriols-Puig**, and Ester Bernadó-Mansilla. *Can Evolution Strategies Improve Learning Guidance in XCS? Design and Comparison with Genetic Algorithms based XCS*. In Artificial Intelligence Research and Development, number 184, pages 253–261, IOS Press, ISBN 978-1-58603-925-7, 2008 [preprint].

Núria Macià-Antolínez, Ester Bernadó-Mansilla, and **Albert Orriols-Puig**. *On the dimensions of data complexity through synthetic data sets*. In Recent Advances in Artificial Intelligence Research and Development, number 184, pages 244–252, IOS Press, ISBN 978-1-58603-925-7, 2008 [preprint].

Ester Bernadó-Mansilla, Tin K. Ho and **Albert Orriols-Puig**. *Data Complexity and Evolutionary Learning: Classifier's Behavior and Domain of Competence*. Data Complexity, pages 115-124. Springer, ISBN 978-1-84628-171-6, 2006 [preprint].

**Albert Orriols-Puig** and Ester Bernadó-Mansilla. *Analysis of Reduction Algorithms for XCS Classifier System*. In Recent Advances in Artificial Intelligence Research and Development, number 113, pages 383-390, IOS Press, ISBN: 978-1-58603-466-5, 2004 [preprint].

## Referred Conference Papers

**Albert Orriols-Puig**, Jorge Casillas, and Ester Bernadó-Mansilla. *First Approach toward On-line Evolution of Association Rules with Learning Classifier Systems*. In 2008 Genetic and Evolutionary Computation Conference workshop program, ACM

Press, pages 2031–2038, ISBN 978-1-60558-131-6, 2008. [preprint].

Sergio Morales-Ortigosa, **Albert Orriols-Puig**, and Ester Bernadó-Mansilla. *New Crossover Operator for Evolutionary Rule Discovery in XCS*. HIS'08: Proceedings of the 2008 Hybrid Intelligent Systems Conference, pages 867-872, 2008. [preprint].

Joaquim Rios-Boutin, **Albert Orriols-Puig**, and Josep M. Garrell-Guiu. *Artificial Data Sets based on Knowledge Generators: Analysis of Learning Algorithms Efficiency*. HIS'08: Proceedings of the 2008 Hybrid Intelligent Systems Conference, in press. [preprint].

Núria Macià-Antolínez, **Albert Orriols-Puig**, and Ester Bernadó-Mansilla. *Genetic-based synthetic data sets for the analysis of classifiers' behavior*. HIS'08: Proceedings of the 2008 Hybrid Intelligent Systems Conference, in press. [preprint].

Núria Macià-Antolínez, Ester Bernadó-Mansilla, and **Albert Orriols-Puig**. *Preliminary Approach on Synthetic Datasets Generation for Classification*. In 2008 International Conference on Pattern Recognition, in press. [preprint].

Francesc Teixidó-Navarro, **Albert Orriols-Puig**, and Ester Bernadó-Mansilla. *Hierarchical Evolution of Linear Regressors*. In Genetic and Evolutionary Computation Conference (GECCO'07), ACM Press, 1413–1420, ISBN 978-1-60558-131-6, 2008. [preprint].

Jorge Casillas, **Albert Orriols-Puig**, and Ester Bernadó-Mansilla. *Toward Evolving Consistent, Complete, and Compact Fuzzy Rule Sets for Classification Problems*. In Genetic and Evolving Fuzzy Systems, pages 89-94, IEEE, ISBN: 0-7803-9363-5, 2008. *Best paper award* [preprint].

**Albert Orriols-Puig**, David E. Goldberg, Kumara Sastry, and Ester Bernadó-Mansilla. *Modeling XCS in Class Imbalances: Population Size and Parameter Settings*. In Genetic and Evolutionary Computation Conference (GECCO'07), pages 1838-1845, ACM Press, ISBN 978-1-59593-697-4, 2007 [preprint].

**Albert Orriols-Puig**, Kumara Sastry, Pier Luca Lanzi, David E. Goldberg, and Ester Bernadó-Mansilla. *Modeling Selection Pressure in XCS for Proportionate and Tournament Selection*. In Genetic and Evolutionary Computation Conference (GECCO'07), pages 1846-1853, ACM Press, ISBN 978-1-59593-697-4, 2007 [preprint].

**Albert Orriols-Puig**, Kumara Sastry, David E. Goldberg, and Ester Bernadó-Mansilla. *Substructural Surrogates for Learning Decomposable Classification Problems: Implementation and First Results*. In 2007 Genetic and Evolutionary Computation Conference workshop program, pages 2875-2882, ACM Press, ISBN 978-1-59593-697-4, 2007 [preprint].

**Albert Orriols-Puig**, Jorge Casillas, and Ester Bernadó-Mansilla. *Fuzzy-UCS: Preliminary Results*. In 2007 Genetic and Evolutionary Computation Conference workshop program, pages 2871-2874, ACM Press, ISBN 978-1-59593-697-4, 2007 [preprint].

**Albert Orriols-Puig** and Ester Bernadó-Mansilla. *Bounding XCS's Parameters for*

*Unbalanced Datasets*. Best paper nomination. In Genetic and Evolutionary Computation Conference (GECCO'06), pages 1561-1568. ACM Press, ISBN 1-59593-186-4, 2006 [preprint].

**Albert Orriols-Puig** and Ester Bernadó-Mansilla. *A Further Look at UCS Classifier System*. In Genetic and Evolutionary Computation Conference (GECCO'06) workshop program, pages 1-4. ACM Press, ISBN 1-59593-186-4, 2006 [preprint].

**Albert Orriols-Puig** and Ester Bernadó-Mansilla. *The Class Imbalance Problem in UCS Classifier System: Fitness Adaptation*. In Congress on Evolutionary Computation, volume 1, pages 604-611. IEEE, 2005 [preprint].

**Albert Orriols-Puig** and Ester Bernadó-Mansilla. *The Class Imbalance Problem in Learning Classifier Systems: A Preliminary Study*. In Genetic and Evolutionary Computation Conference (GECCO'05) workshop program, pages 74-78, ACM Press, 2005 [preprint].

## National Conferences

**Albert Orriols-Puig**, Jorge Casillas, and Francisco J. Martínez-López. *Modelado Causal en Marketing Mediante Aprendizaje no Supervisado de Reglas de Asociación Difusas*. XIV Congreso Español sobre Tecnologías y Lógica Fuzzy (ESTYLF'08). *Best paper award*. In press. [preprint].

**Albert Orriols-Puig**, Jorge Casillas, and Ester Bernadó-Mansilla. *Aprendizaje Supervisado de Reglas Difusas mediante un Sistema Clasificador Evolutivo Estilo Michigan*. Proceedings of the II Congreso Español de Informática (CEDI 2007), pages 171-178. I Jornadas sobre Algoritmos Evolutivos y Metaheurísticas (JAEM07). Zaragoza (Spain), 2007 [preprint].

## Technical Reports

Kumara Sastry and **Albert Orriols-Puig**. *Extended Compact Genetic Algorithm in Matlab*. Technical report number 2007010, Illinois Genetic Algorithms Laboratory - University of Illinois at Urbana Champaign, 2007 [preprint].

**Albert Orriols-Puig**, David. E. Goldberg, Kumara Sastry, and Ester Bernadó-Mansilla. *Modeling XCS in Class Imbalances: Population Size and Parameters' Settings*. Technical report number 2007001, Illinois Genetic Algorithms Laboratory - University of Illinois at Urbana Champaign, 2007 [preprint].

**Albert Orriols-Puig**, Kumara Sastry, Pier Luca Lanzi, David E. Goldberg, and Ester Bernadó-Mansilla. *Modeling Selection Pressure in XCS for Proportionate and Tournament Selection*. Technical report number 2007004, Illinois Genetic Algorithms Laboratory - University of Illinois at Urbana Champaign, 2007 [preprint].

**Albert Orriols-Puig**. *Facetwise Analysis of Learning Classifier Systems in Imbal-*

*anced Domains (Catalan version only)*. Diploma de Estudios Avanzados. Ingeniería i Arquitectura la Salle - Universidad Ramon Llull, 2006 [preprint].

## SOURCE CODE

### Extended Compact Genetic Algorithm in Matlab

Kumara Sastry, **Albert Orriols-Puig**

Documentation: <http://www.illegal.uiuc.edu/pub/papers/IlliGALs/2007009.pdf>

Source: <http://www.illegal.uiuc.edu/pub/src/ECGA/eCGAmatlab.zip>

### Complexity Metrics Library in C++

**Albert Orriols-Puig**

Documentation: <http://www.salle.url.edu/~aorriols/Software/CMAPIv1.0.tgz>

Source: <http://www.salle.url.edu/~aorriols/Software/CMAPIv1.0.tgz>

### The eXtended Classifier System (XCS)

**Albert Orriols-Puig**

Documentation: <http://www.keel.es>

Source: <http://www.keel.es>

### The sUpervised Classifier System (UCS)

**Albert Orriols-Puig**

Documentation: <http://www.keel.es>

Source: <http://www.keel.es>

## LANGUAGES

Catalan (native), Spanish, English: Reading, speaking and writing very well.

- English proficiency course. Institut d'Estudis Nord-Americans (IEN), 2007.
- Advanced Certificate in English. Institut d'Estudis Nord-Americans (IEN), 2006.
- Course of English Language at Advanced Level in Oxford Brookes University. Nord Anglia International. Oxford, UK (1999).
- Certificate of Competence in English. The University of Michigan - English Language Institute. Ann Arbor, Michigan, United States of America (1998).