EUSFLAT

EUROPEAN SOCIETY
FOR FUZZY LOGIC
AND TECHNOLOGY

**Dialogue between Irina Perfilieva
and Antonio Di Nola**

**Fuzzy logic in France-
Bernadette Bouchon-Meunier**

**Granular Computing: Some Insights
and Challenges- Witold Pedrycz**

Picture by Dom Crossley (flashicurd)

### Editor-in-Chief

Humberto Bustince
*Public University of Navarra*
*Dep. of Automatic and Computation*
*Campus de Arrosadía*
*Pamplona, SPAIN*
(Phone) +34-948169254
(Fax) +34-948168924
(E-mail) bustince@unavarra.es

### Assistant Chief Editors

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*SPAIN*
Aránzazu Jurío
*Public University of Navarra*
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# Message from the Editor-in-Chief (December 2013)

HUMBERTO BUSTINCE

With this issue our magazine starts a new period. It is time to look back to say thank you to all those who made this adventure possible. It is a very long list of names, so let me just tell one: Javier Montero, our departing president, who gave the initial push to this project.

But it is also time to welcome some new friends in our magazine, specially, Bernadette Bouchon-Meunier. She did already collaborate very hard with us in previous issues, and now she enters as new member in our editorial board. Welcome, Bernadette.

Nevertheless, there is something that does not change: our illusion to provide an appealing magazine of interest for our whole community. Once again, to keep this interest, I invite all of you to submit your contributions. Research papers, reviews, proceedings, position papers... are welcome in Mathware&Soft Computing. Please take it into account. Regarding its contents, this issue opens with the first message from our new president, Gabriella Pasi.

Following our series with interviews between outstanding figures for our community, we have an interesting talk among Irina Perfilieva and Antonio Di Nola, with a personal description of Irina by Martin Stepnicka. We also have two very interesting papers. The first one, by Bernadette herself, provides her view about fuzzy logic in France. The second one, by Witold Pedrycz, deals with the topic of granular computing.

Last September, EUSFLAT assembly held place at Milano. We publish in our magazine the minutes of this important meeting. Also related to it, we include a report by Petr Cintula on the ceremony where the EUSFLAT Scientific Excellence Award was given to Petr Hajek.

As we are researchers, we do not forget scientific journals. This time we bring a report on Knowledge-based Systems written by the editors Hamido Fujita and Jie Lu. And, of course, conference reports and news, with a last minute one: Enric Trillas has been named honoris causa by the Public University of Navarra.

So here you have the new issue of our magazine. I hope you enjoy reading it.

Humberto Bustince
Editor-in-chief

# *Message from the President (December 2013)*

GABRIELLA PASI

Dear EUSFLAT Members,

it is a big honor to have been elected to serve as the new President of this active, friendly and collaborative scientific Society. The elections of the new board have taken place during the EUSFLAT conference that was held in Milano in September 2013, at the premises of the University of Milano Bicocca.

I am very grateful to Javier Montero, the previous President, to the previous Board and to the members of the Society for supporting my candidature and the election of the new Board. I am also grateful to the colleagues who are part of the new Board and who share with me the challenge of preserving the strength of the Society and of making it growing and facing the scientific issues that the Big Data era is posing.

Since its birth EUSFLAT has been an active and collaborative association, well connected to other international associations; the excellent contributions of previous boards have made EUSFLAT an association able to organize and to support a variety of events that offer a breeding ground where people can meet and seed for generating fruitful collaborations.

In particular I want to acknowledge the hard, constructive and fruitful work of the previous President Javier Montero (and of the whole past board), who strongly contributed to make the community grow, to promote scientific initiatives to spread it, and to encourage young people to work in this scientific context, where the development of theory and applications co-exist, and play a synergic role. In his four years of EUSFLAT Presidency, Javier maintained all the promises he did, and he made even more. It will be difficult to be as good as he has been but I will do my best to maintain the Society active and open to new initiatives.

In his first President letter Javier mentioned that "some actions will be possible during the next two years simply because the previous Board have made them possible. This is the way an Association improves, building up from the basement created by the previous generation".

I fully embrace this statement and I can say that the new board will work on the solid basis defined by previous boards and to the same main aims, among which the organization of scientific events, the dissemination of scientific results, the promotion of collaborations, the synergy between industry and academy, an active collaboration with the IFSA council, and to enlarge our community.

The new board will promote initiatives aimed at giving still more support to PhD students and young researchers, and at incentivizing collaborations and mobility in your scientific network, by also paying attention to relations with industries and companies for the development of applications and technologies. A means to achieve this is to promote the organization of a European Summer School on Fuzzy Logic and its applications, and to define proposals for getting funds to generate a scientific network which can support the organization of scientific events and the exchange of PhD students, such as Marie Curie Training Networks.

To fulfill these objectives I will need the support of all members, as I really want to maintain our scientific network active and growing, based on both the sharing of ideas and on an active involvement of all who want to contribute. As inter-disciplinarity is a challenging and important issue, I am convinced that working for involving scientists coming from different communities will help to spread and to apply at best the solid technical ground offered by Fuzzy Logic.

The new board includes some of the past board members, and their experience will be precious for the work we have to undertake: before mentioning the colleagues of the new team, I want to thank those members who served in the previous board, and with whom I shared a constructive, friendly and collaborative experience.

The new Board members are: Bernard De Baets (Vice-President). Martin Štěpnička (Secretary), Edurne Barrenachea (Tresurer), Eulalia Szmidt (Awards), Javier Montero (Connections with other Associations and Conferences), Brunella Gerla (Student Grants), Humberto Bustince (EUSFLAT Magazine), José Maria Alonso (Connection with the ECSC), VicenȚorra (Link to European Projects), Jose Casillas (EUSFLAT Web Site), Jie Lu (Connection with the IJCIS Journal), Sławomir Zadrożny (Working groups), Marie-Jeanne Lesot (Recruitement), Rudolf Kruse (Link to Industry). Thanks to all of you for accepting to share this experience!

Last but not least a thought to all people, to all colleagues and friends who greatly contributed to the foundations and to the development of Fuzzy Set Theory, Fuzzy Logic and Possibility Theory and of their applications. In particular a thought to Lotfi Zadeh, for his invaluable contributions among which, very precious and fundamental in any scientific context, the capability to motivate, to encourage and to appraise people.

We are open and we will be happy to receive any suggestions from you, the EUSFLAT Members.

Thank you

<div align="right">
Gabriella Pasi<br>
President of EUSFLAT
</div>

# Dialogue between Irina Perfilieva and Antonio Di Nola



**IP.** The dialogue below is about theory and applications, fuzzy and classical mathematics, future perspective in research. I invited Prof. Antonio Di Nola because of at least two reasons: first, I like to speak to him because we nicely understand each other without detailed explanations and second, our scientific lives are oppositely directed, if we choose between theory and applications. In my case, I am more and more directed to applications, while Antonio - more and deeply to the theory. From this point of view, it is interesting to compare our answers to the same questions (some of them were formulated by the Newsletter of the Iranian Fuzzy Systems Society).

### Why you get interested to fuzzy mathematics?

IP. In the period of my PhD study in the Lomonosov State University in Moscow I was responsible for writing reviews for the Russian journal "Referativnyj Zhurnal" that was similar to "Mathematical Reviews". Each reviewer was tightly associated with a certain topic. At that time, fuzziness was a new direction, and I was a new person - therefore I was asked to be in charge of it. I reviewed almost all conference papers (at that time, there were much less than now) and all papers that were carefully selected by critically disposed editors (renowned mathematicians). This means that I was educated on the best contributions to the topic. Step by step, I got into fuzzy mathematics.

ADN. As a young student I was interested in topics on foundation of Mathematics so, I started studying Mathematical Logic. Since the knowledge is strongly conditioned by how it is represented, thus I was in particular interested in the problems of representing vague knowledge, via mathematical tools. As a consequence I moved to Fuzzy Sets Theory.

### What charming and interesting is in fuzzy mathematics that we cannot find in classic mathematics?

IP. For me, fuzzy mathematics is mathematics. It develops different models and different methods than conventional mathematics does, but both are based on rigorous calculus. Charming and challenging is to discover that fuzzy methods can solve the same problems as conventional methods and face the same difficulties. On the other side, there are problems that are typical for fuzzy mathematics, for example, the initial value problem with fuzzy initial conditions.

ADN. Every time that one cannot give a sharp input to a system then a more general framework is needed for the system. This, sometime, can be done using fuzzy systems. Such a machinery helps to cover more cases than classical systems do.

### Do you have special memorize of your attending, presenting and contribution in fuzzy conferences and workshops?

IP. I remember the First European Congress on Fuzzy and Intelligent Technologies (EUFIT) in Aachen, 1993 organized by Prof. H.-J. Zimmermann. That was my first European conference where I met people whose names are now connected with the most important results in the theory of fuzzy sets - Prof. L.A. Zadeh, E. H. Mamdani, D. Dubois, H. Prade, E. P. Klement and many-many other ones. The atmosphere was very inspiring and enthusiastic. We believed that we were at the beginning of a new science with powerful tools for applications and new theoretic foundations. The first two plenary talks given by Prof. L.A. Zadeh and Prof. E. H. Mamdani were the most inspiring talks I have ever heard.

ADN. I remember my first conferences devoted Fuzzy Sets, where I met a lot of people coming from different areas of Mathematics and Computer Science. The atmosphere was very stimulating, and there, I convinced myself that my main topic had to be fuzzy logic.

### You have both theoretical and application results. Do you work actively in both directions? If you have made your choice in favor of one of these two, how do you explain this?

IP. I was trained in Applied mathematics and since my student years was fascinated how ingenious are mathematical approaches and methods. I am mostly involved into theoretical research, but when on a conference (or in a paper) I listen to (read) an interesting application and know, how I would do it with the help of my theory, I try to do it. Now I am deeply involved in image processing and together with my students want to push forward fuzzy methods in this area. This is very interesting field where you can rely on your intuition, but should have deep knowledge in mathematics in order to achieve success.

ADN. I am particularly active on the theoretical side and I will continue my studies in this direction. Also I will devote efforts to provide semantics to fuzzy logic, hoping that this will help people for application and to better understand the fuzzy logic, as a logic.

### Which project you could not, but still want to realize?

IP. To become younger ...

ADN. To capture an elegant way to mathematically express the wisdom of the idea of "fuzzy set".

**Can we say that fuzzy calculus (if consistent) is a "conservative" extension of a corresponding classical one?**

IP. In many respects "yes", especially because the used meta-language is classical. On the other side, fuzzy calculus often helps me to understand better many formal mathematical constructions. For example, thanks to my favorite theory of F-transforms and fuzzy approach to image processing, I understand better the theory of integral transforms and many numeric methods like interpolation.

ADN. Fuzzy calculus is a fuzzy logic calculus, and under some respect, it can be developed inside the algebraic models of some formal logic based on a suitable triangular norm. Some of the above calculi are, technically speaking, conservative extensions of classical logic.

**What is the open research line for fuzzy community? And what is your recommendation to the young researcher?**

IP. In my opinion, the research line should be in establishing strong connections between problems and their solutions with fuzzy or computational intelligence techni-ques. We developed many tools that are able to cope with a variety of problems: fuzzy sets, fuzzy IF-THEN rules, fuzzy relational calculus, various logics and algebras, sets of new operations, etc. However, there are few results that show which problems can be successfully solved with the help of these new tools. For me is challenging to prove that fuzzy methods are able to compete with classical methods on the problems that are traditionally considered in e.g., applied mathematics and statistics. This requires a good knowledge of both approaches: traditional and fuzzy.

ADN. To approach any theoretical problem having open mind to use several different theoretical tools.

**If you share your experience or feeling with our readers as the last point it would be great**

IP. It is important to be open-minded and to have positive attitude to things that differ from a ruling system of postulates.

ADN. It is important to remember that in science "tout se tient". That is, same ideas can appear under many different dresses and many components play a proper role in the picture.

### Irina Perfilieva

Professor Irina Perfilieva, Ph.D., received the degrees of M.S. (1975) and Ph.D (1980) in Applied Mathematics from the Lomonosov State University in Moscow, Russia.

At present, she is full professor of Applied Mathematics in the University of Ostrava, Czech Republic. At the same time she is a head of the Dept. of Theoretical Research in the University of Ostrava, Institute for Research and Applications of Fuzzy Modeling.

She is the author or co-author of three books on mathematical principles of fuzzy sets and fuzzy logic, co-editor of one edited monograph and guest editor of many special issues of scientific journals. She is author or co-author of numerous papers in the area of multi-valued logic, fuzzy logic, fuzzy approximation and fuzzy relation equations. She is member of editorial boards of the following journals: Fuzzy Sets and Systems, International Journal of Computational Intelligence Systems, Iranian Journal of Fuzzy Systems, Journal of Uncertain Systems. She works as a member of Program Committees of the most prestigious International Conferences and Congresses in the area of fuzzy and knowledge-based systems.

For her long-term scientific achievements she was awarded on the International FLINS 2010 Conference on Foundations and Applications of Computational Intelligence. As a coauthor of the software tool "Internet service for time series analysis of economic indicators" she got a gold medal of Seoul International Invention Fair 2010. She received the memorial Da Ruan award for the best paper at FLINS 2012. On the last EUSFLAT conference in Milano 2013, we was nominated to be the 4th Honorary Member of the Association.

Her scientific interests lie in the area of mathematical modeling with applications to image processing and time series analysis where she successfully uses modern as well as classical approaches.

### Antonio Di Nola

He is Full Professor of Mathematical Logic and Director of the Department of Mathematics of the University of Salerno. Since the nineties he has been a leading proponent of the study of algebraic models of Lukasiewicz logic (MV-algebras), the most important among the many-valued logics. His contribution to the study of MV-algebras, witnessed by the seventeen citations of his works in the fundamental monograph "Algebraic foundations of many-valued reasoning", includes: a functional representation theorem for all MV-algebras (aka Di Nola's Representation Theorem); the discovery of categorical equivalences between categories of MV-algebras and categories of groups, rings, and semi-rings, profitably used in the literature of MV-algebras, the discovery of an equational axiomatisation of all varieties of MV-algebras, and a normal form theorem for Lukasiewicz logic. Today is actively committed to apply ideas from algebraic geometry in the MV-algebra and in the study of probability which admit infinitesimal values.

He is author/coauthor of more than 150 scientific works, published on international journals of logic, algebra and computer science. He was coordinator of many international projects. He is coauthor of the monograph: "Fuzzy Relation Equations and Their Applications to Knowledge Engineering" (A. Di Nola, W. Pedrycz, S. Sessa, E. Sanchez - Kluwer Acad. Publ.), "The Mathematics of FuzzySystems", A. Di Nola, A.G.S. Ventre (Eds.), Verlag TUV. Rheinland, Koln 1986, and co-editor of the volume "Lectures on Soft Computing and Fuzzy Logic", Springer.

He is Editor in Chief of the international journal "Soft Computing", Springer-Verlag, and Associate Editor of the following journals: International Journal of Computers, Communications and Control, Fuzzy Sets and Systems, Mathematica Slovacia, Fuzzy Optimization and Decision Making. He has been Associate Editor of the Journal of Mathematical Analysis and Applications. He has been Invited Speaker of many international conferences. He recently received the IFSA Fellowship.

## REPORT

# "Like glue"

**Martin Štěpnička**
Centre of Excellence IT4Innovations
Division University of Ostrava
martin.stepnicka@osu.cz

Božena Němcová, the first lady among Czech women writers, wrote a beautiful fairy tale "Salt above gold". In this fairy tale, a king asked his three daughters to express how much they loved him by comparing the love to a love to other objetcs. First daughter said: "I love you as gold". The king was satisfied. Second daughter said: "I love you as jewels". The king was also satisfied. The third - youngest - daughter Maruška said: "I love you as salt". The king got angry, he did not give Maruška any chance to explain her comparison and expelled her from his castle. Still influenced by his anger, the king commanded to throw all salt in the kingdom to a river to demonstrate to Maruška, how useless this material is. After some time, some cruel time full of eating only sweet or totally tasteless meals, the king realized that salt was above gold and that Maruška loved him as much as possible.

Why do I start with this classical fairy tale? Because comparing Irina to a glue might seem also very offensive at the first sight. But I hope that Irina, who had no clue that I was writing these lines till now when she is reading them in the neghboring office, will stay calm and patient till the very last line and, unlike the king, she will much earlier find out the importance of glue. Moreover, as Božena Němcová was the first lady of Czech prose, Irina is unquestionably the first lady of Czech fuzzy logic.

Everybody knows that Irina is an elegant, charming and fascinating person. This may sometimes cause that she gets less compliments from others as everybody takes it as standard in her case. I remember that once, Irina and Vilem came back to our Institue after lunch and Vilem asked me if I noticed something. I had to guiltily admit that I did not. It was her new hairstyle that she managed to change in a beauty salon during the lunch break. But how can one notice that something perfect changed into another perfection? The same could be said about her diligence, enthusiasm, friendliness or intelligence (in alphabetical order ;-) ). Thus let me focus on another Irina's quality, namely her skill to join people, that I imprudently expressed by a comparison to a glue in the title of this article.

When I used to be a young student, a new teacher appeared at our university. She was always very elegant and charming, always standing by Vilem's side. Not surprisingly for any of readers, this teacher could not have been anyone else but Irina. Irina was chosen to teach us Ordered Algebraic Structures and the subject was taught in English as Irina did not speak Czech yet at that time and none of us spoke Russian. But nobody complained. Our nowadays teaching experience is such that some students always strictly insist on education in their mother

Joining people is simply Irina's best discipline. Irina initiates at least few kilometers long walk on each work outing, Institute meeting or local workshop - no matter the weather conditions. Irina is the first person (with a group of followers behind) that opens the table tennis playroom on each FSTA. Irina was the essential element that initiated work outing into a bowling arena. And it was again Irina who managed to organize a squash tournament of the whole Institute - truly a heroic output if you consider that at least 50% of us have never held the squash racket before.

Among many joining skills which Irina is equipped with (and she is not afraid of using them ☺) there is her culinary art. One would never guess how much a visitor can eat at Irina's and Vilem's house during one evening. But try to say no if it looks so nice and tastes even better. And that you gain kilos? Who cares, Irina will take you to a squash center. These dinners "made by Irina" really help to glue the whole Institute together.

One does not even realize the everyday "glue-influence" of Irina because it is every day - it is easy to get used to it. But Irina's effect is unquestionable, she is simply connecting people.

tongue which breaks any plans for education in English. One could think that it is due to different generation of students but those, who know Irina personally, are sure about the influence of her personality and charisma.

I hope that Irina reading these last lines, unlike the king, will not throw all the glue within her reach into the closest river and that she will like the idea to be compared to glue. It is more than gold or jewels. Glue above gold ;-).

# Fuzzy logic in France

Bernadette Bouchon-Meunier
Laboratoire d'Informatique de Paris 6
CNRS - Université Pierre et Marie Curie-Paris 6
Bernadette.bouchon-meunier@lip6.fr

Researches in fuzzy logic started in France at the beginning of the 70s. The purpose of this short survey is to give an historical view of the development of researches on fuzzy sets and systems in France, and not to give a scientific analysis of technical results and international publications in this domain in France.

The originator of the interest in this emerging domain was **Arnold Kaufmann** (1911-1994), a Professor in Paris, Grenoble and also Louvain (Belgium), who discovered fuzzy sets at their early beginning. His book "Introduction à la Théorie des Sous-Ensembles Flous. Eléments théoriques de base" [1], the first volume of a series of four, was published in 1973 and soon translated into English under the title "Introduction to the theory of Fuzzy Subsets: Fundamental theoretic elements" in 1975 [2]. This book is probably the first textbook on fuzzy sets in English. Arnold Kaufmann was then an active researcher in this field; he was recognized as a pioneer by the French community who paid tribute to him in 1992 at the occasion of a national workshop on fuzzy set theory.
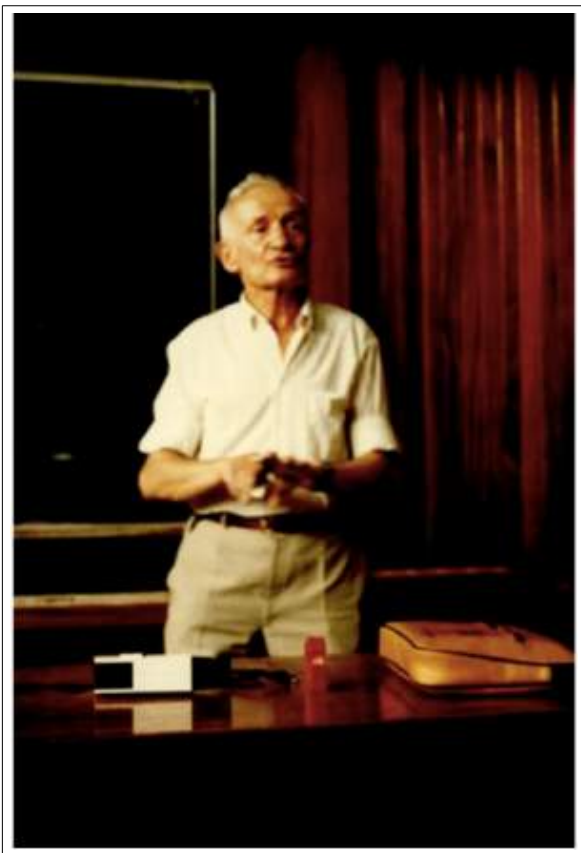


**A. Kaufmann in Marseille in 1983.**

Three domains made immediately good use of fuzzy set theory in France.

The first one is **medicine**, thanks to Elie Sanchez, who defended a Dr. Sci. thesis in Human Biology in 1974, entitled "Equations de relations floues" [3] with a proposed application to medical diagnosis assistance. After a sabbatical visit to Berkeley, he published a paper in the very first issue of the new journal Fuzzy Sets and Systems in 1978 on "Resolution of eigen fuzzy sets equations". He continued to promote fuzzy sets and systems in France, being an Associate Professor in Marseille. Elie Sanchez co-edited several books on fuzzy set theory and applications, the two first ones in 1982 with Madan M. Gupta [4, 5].

The second domain is **economy**. Claude Ponsard (1927-1990), a Professor in Economy in Dijon was a pioneer in promoting fuzzy sets in economic theory. His interest in fuzzy sets was aroused by A. Kaufmann's book in 1974, which led him to define a fuzzy theory of value, laying the foundations of fuzzy economics [6]. Researchers of the Institut de Mathematiques Economiques he set up in Dijon have published papers on this topic since 1978, in particular Antoine Billot, now a Professor in the Université Panthéon-Assas. In addition, Arnold Kaufmann collaborated with the Spanish economist Jaume Gil Aluja during 25 years, co-authoring several books with him from 1986 on fuzzy business management.

The third of the early domains of application in France has been **automatic control**. Noël Malvache, in the Université of Valenciennes, started investigations on fuzzy logic in 1972 and launched developments with Didier Willaeys [7], who defended a Dr. Sci. Thesis in 1980 on the application of fuzzy set theory to control [8]. They experimented the principles of fuzzy control on real world applications, for instance in the design of a window handle in 1975 or a motor control in 1977.

In addition to these application domains, early researches on more general topics were developed in France. I discovered Lotfi Zadeh's seminal paper in the university library by serendipity in 1975 and I published my first paper on fuzzy questionnaires in a French workshop in 1976, followed by communications in international conferences in 1977 [9] and 1978. I defended a Dr. Sci. thesis in 1978 partly dedicated to fuzzy concepts related to information and communication [10]. At the same time, Robert Féron, then an Associate Professor at the University of Lyon, introduced the concept of fuzzy random variable in 1976 [11]. Didier Dubois and Henri Prade published their first papers in 1978 [12, 13] and took advantage of one year postdoctoral positions in American universities to write a successful book entitled "Fuzzy Sets & Systems: Theory and Application" published in 1980 by Academic Press [14]. In addition, Jacques Brémont defended in 1975 a Dr. Sci. on the utilization of fuzzy logic for speech recognition

in Nancy [15].

**Industrial applications** of fuzzy logic started in the eighties on the basis of a few individual relations between French researchers and companies, for instance Electronic Serge Dassault in Paris or EDF in Valenciennes.

The development of industrial applications in France really took off after an exploratory tour organized by the France-Japan society (SFJTI) for a small number of researchers and a group of delegates of French companies, in December 1990, to visit the main Japanese university laboratories working on fuzzy logic, as well as companies commercializing products with fuzzy components, such as Fujitsu, Hitachi, Nissan, Mitsubishi Electric, to name just a few, and in addition the Laboratory for International Engineering Research (LIFE) created with the support of the Japanese Ministry of International Trade and Industry. After this visit, a well-documented report was prepared and proposed to French companies. A press conference was organized in April 1991 by SFJTI [16]. The interest of French companies was immediate and this marked a turning point in the vision of French engineers and scientists on fuzzy logic.

Various cooperations between university laboratories and companies were launched. Radio stations, general public newspapers and institutes prepared interviews, round tables, introductory papers. Special groups of interest were put together by several think tanks. In particular, André Titli, from the LAAS laboratory in Toulouse grasped the subject of fuzzy control and was the co-chair, with Laurent Foulloy, of the task force Commande Symbolique et Neuromimétique within the CNRS, exploring the capabilities of neural and fuzzy methods in automatic control. The first half of the 90s was a very stimulating period, providing all kinds of opportunities for fuzzy people and a friendly environment for fuzzy research teams.

After these promising pioneering works, **research teams** have been active on fuzzy set and systems in a number of university laboratories. While not claiming to be exhaustive, we can list the most important ones. In Toulouse, Henri Prade and Didier Dubois have been active since the 80s in the IRIT laboratory of the Université Paul Sabatier and André Titli joined the domain in 1991 in the LAAS laboratory. In Paris, the successive laboratories of the Université Pierre et Marie Curie-Paris 6 (Groupe de Recherche C.F. Picard, LAFORIA, LIP6) have hosted a team working on fuzzy logic I headed from 1979 to 2013, which is currently represented by my colleagues Christophe Marsala, Marcin Detyniecki and Marie-Jeanne Lesot, Maria Rifqi being now with the University Pantheon-Assas. In Paris also, a group of the Telecom-ParisTech institute around Isabelle Bloch has been working on fuzzy methods for image processing for twenty years. In Valenciennes, the Laboratory of Industrial and Human Automation control (LAMIH), launched in 1978 by N. Malvache, is very active in automatic control and human-machine systems under the leadership of Thierry-Marie Guerra. In Marseille, Elie Sanchez built the Neural & Fuzzy Systems Institute. In Lannion, Patrick Bosc launched researches on fuzzy databases in the 80s at IRISA and his team now headed by Olivier Pivert is still specialist of this domain. In Annecy, the LISTIC laboratory has developed researches on fuzzy control and fuzzy sensors for 20 years under the initial guidance of Laurent Foulloy, continued by Sylvie Galichet and her colleagues. Other working groups on fuzzy logic exist in Nancy, initiated by Jacques Brémont and Michel Lamotte at the Centre de Recherche en Informatique de Nancy (CRAN) and continued with Eric Levrat, in Montpellier around Anne Laurent and Olivier Strauss, in La Rochelle with Carl Frelicot and his colleagues, in Reims in the CReSTIC laboratory, and in a number of other places.



**French academics P. Bosc, B. Bouchon-Meunier, A. Titli and J.-F. Lemaitre in Japan, in a tour with representatives of French companies in 1990.**

**M. Mizumoto, E. Sanchez, M. Umano, D. Willaeys in Marseille in 1978.**

**National workshops** have been organized annually, starting in 1991. The so-called Journées Nationales sur les Ensembles Flous organized for the first time in Paris, then in Nîmes in 1992 and 1993, in Lille in 1994, were followed by the so-called Rencontres Francophones sur la Logique Floue et ses Applications (LFA) with an original steering committee consisting of P. Bosc, B. Bouchon-Meunier, D. Dubois, L. Foulloy, M. Grabisch, H. Prade, E. Sanchez, A. Titli. They were organized in Paris in 1995 and in a series of locations in France, except in 2001 where they were held in Mons (Belgium).

Apart from A. Kaufmann's textbooks, various **books in French** have been published to help to disseminate fuzzy set theory and fuzzy logic among students, researchers and engineers [17, 18, 19, 20, 21, 22, 23].

Fuzzy researchers in France have always been well integrated in the world community, having organized **international events** for many years. I had the privilege to invite Lotfi A. Zadeh at a Colloquium organized under the auspices of the CNRS on "Les développements récents de la Théorie de l'Information et leurs applications", in Cachan, near Paris, in 1977. In Marseille was held an International Colloquium on the theory and applications of fuzzy sets in 1978, which was one of the very first conferences devoted to this topic. It was organized by E. Sanchez, who also chaired the IFAC Symposium on Fuzzy information, knowledge representation, and decision analysis in1983. In Lyon, the CNRS sponsored a "Table Ronde sur le Flou" in 1980, put together by R. Féron and gathering many of the world pionneers in fuzzy sets.

The International Conference on Information Processing and Management of Uncertainty in Knowledge-based Systems (IPMU) was created in 1986 in Paris, from a common desire of Ronald R. Yager, Lotfi A. Zadeh and myself. It was organized five more times in France, generally in Paris, except in 2002 where it was held in Annecy, the 2014 IPMU conference being prepared in Montpellier. Although the topics of the conference cover all the methods for the management of uncertainty, it is a traditional meeting point for the international fuzzy community.

During the past thirty-five years, Lotfi A. Zadeh has actively supported the French community. Besides strongly supporting the organization of conferences in France, he regularly gave lectures in university seminars, for instance in the Université Pierre et Marie Curie until 2001, and he co-edited books with French researchers



**The organizing committee of IPMU 2006 in Paris with R.R. Yager.**

[24, 25, 26, 27, 28, 29, 30, 31]. He was conferred the Doctorate Honoris Causa of two universities: the Université Paul Sabatier in Toulouse in 1986 and the Université Pierre et Marie Curie in Paris in 2001.

The French community, as many others, is indebted to Lotfi Zadeh for his continuous stimulation and support.



**L.A. Zadeh and his wife, Fay Zadeh, at the occasion of the Doctorate Honoris Causa ceremony of the UPMC in Paris, 2001.**

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# Granular Computing - Some Insights and Challenges

Witold Pedrycz
Department of Electrical and Computer Engineering - University of Alberta
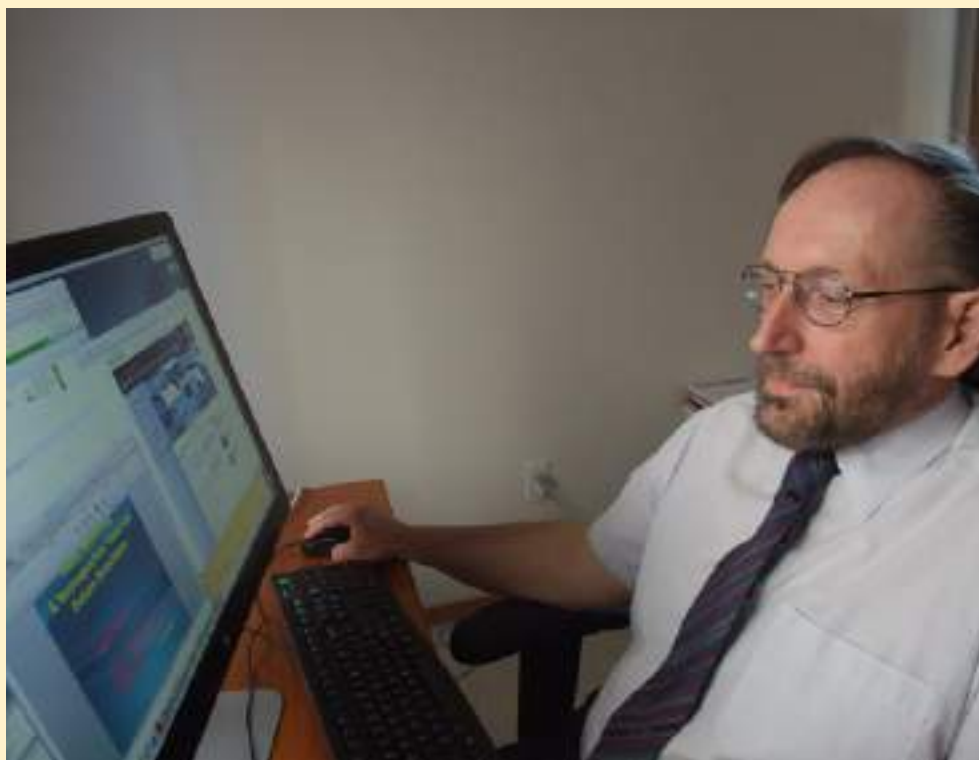
Information granules, information granulation, computing with information granules, and Granular Computing are the terms, which are becoming more visible, conceptually influential and aligned with a diversity of applications. The first research monograph on this subject was published in 2003 [1]. One decade later, this year brings a fully updated, extended and advanced book publication [2], which may serve as a compelling testimony to the progress in Granular Computing we have been witnessing over all these years.

Information granules are intuitively appealing constructs, which play a pivotal role in human cognitive and decision-making activities. We perceive complex phenomena by organizing existing knowledge along with available experimental evidence and structuring them in a form of some meaningful, semantically sound entities, which are central to all ensuing processes of describing the world, reasoning about the environment and support decision-making activities.

The term information granularity itself has emerged in different contexts and numerous areas of application. It carries various meanings. One can refer to Artificial Intelligence in which case information granularity is central to a way of problem solving through problem decomposition where various subtasks could be formed and solved individually. Information granules and the area of intelligent computing revolving around them being termed Granular Computing are quite often presented with a direct association with the pioneering studies by Zadeh [3]. Zadeh coined an informal yet highly descriptive notion of information granule. In general, by information granule one regards a collection of elements drawn together by their closeness (resemblance, proximity, functionality, etc.) articulated in terms of some useful spatial, temporal, or functional relationships. Subsequently, Granular Computing is about representing, constructing, and processing information granules.

It is again worth stressing that information granules permeate almost all human endeavors No matter which problem is taken into consideration, we usually set it up in a certain conceptual framework composed of some generic and conceptually meaningful entities - information granules, which we regard to be of relevance to the problem formulation, further problem solving, and a way in which the findings are communicated to the community. Information granules realize a framework in which we formulate generic concepts by adopting a certain level of

abstraction. Let us refer here to some areas, which deliver captivating evidence as to the nature of underlying processing and interpretation in which information granules play a pivotal role:

Image processing. In spite of the continuous progress in the area, a human being assumes a dominant and very much uncontested position when it comes to understanding and interpreting images. Surely, we do not focus our attention on individual pixels and process them as such but group them together into semantically meaningful constructs - familiar objects we deal with in everyday life. Such objects involve regions that consist of pixels or categories of pixels drawn together because of their proximity in the image, similar texture, color, etc. This remarkable and unchallenged ability of humans dwells on our effortless ability to construct information granules, manipulate them and arrive at sound conclusions.

Processing and interpretation of time series. From our perspective we can describe them in a semi-qualitative manner by pointing at specific regions of such signals. Medical specialists can effortlessly interpret various diagnostic signals including ECG or EEG recordings. They distinguish some segments of such signals and interpret their combinations. In stock market, one analyzes numerous time series by looking at amplitudes, trends, and patterns. Experts can interpret temporal readings of sensors and assess a status of the monitored system. Again, in all these situations, the individual samples of the signals are not the focal point of the analysis, synthesis and the signal interpretation. We always granulate all phenomena (no matter if they are originally discrete or analog in their nature). When working with time series, information granulation occurs in time and in the feature space where the data are described.

Granulation of time. Time is another important and omnipresent variable that is subjected to granulation. We use seconds, minutes, days, months, and years. Depending upon a specific problem we have in mind who the user is, the size of information granules (time intervals) could vary quite significantly. To the high-level management time intervals of quarters of year or a few years could be meaningful temporal information granules on basis of which one develops any predictive model. For those in charge of everyday operation of a dispatching center, minutes and hours could form a viable scale of time granulation. Long-term planning is very much different from day-to-day operation. For the designer of high-speed integrated circuits and digital systems, the temporal information granules concern nanoseconds, microseconds, and perhaps microseconds. Granularity of information (in this case time) helps us focus on the most suitable level of detail.

Design of software systems. We develop software artifacts by admitting a modular structure of an overall architecture of the designed system where each module is a result of identifying essential functional closeness of some components of the overall system. Modularity (granularity) is a holy grail of the systematic software design supporting a production of high quality software products.

Information granules are examples of abstractions. As such they naturally give rise to hierarchical structures: the same problem or system can be perceived at different levels of specificity (detail) depending on the complexity of the problem, available computing resources, and particular needs to be addressed. A hierarchy of information granules is inherently visible in processing of information granules. The level of detail (which is represented in terms of the size of information granules) becomes an essential facet facilitating a way a hierarchical processing of information with different levels of hierarchy indexed by the size of information granules.

Even such commonly encountered and simple examples presented above are convincing enough to lead us to ascertain that (a) information granules are the key components of knowledge representation and processing, (b) the level of granularity of information granules (their size, to be more descriptive) becomes crucial to the problem description and an overall strategy of problem solving, (c) hierarchy of information granules supports an important aspect of perception of phenomena and deliver a tangible way of dealing with complexity by focusing on the most essential facets of the problem, (d) there is no universal level of granularity of information; commonly the size of granules is problem-oriented and user dependent. Information granules and a level of granularity help realize seamlessly an effect of *zooming in* and *zooming out* by setting up the most suitable level of detail one has to consider when dealing with a given problem and coming up with a sound problem solving strategy.

Human-centricity comes as an inherent feature of intelligent systems. It is anticipated that a two-way effective human-machine communication is imperative. Human perceive the world, reason, and communicate at some level of abstraction. Abstraction comes hand in hand with non-numeric constructs, which embrace collections of entities characterized by some notions of closeness, proximity, resemblance, or similarity. These collections are referred to as information granules. Processing of information granules is a fundamental way in which people process such entities. Granular Computing has emerged as a framework in which information granules are represented and manipulated by intelligent systems. The two-way communication of such intelligent systems with the users becomes substantially facilitated because of the usage of information granules.

By no means, the above quite descriptive definition of information granules is formal. It rather intends to emphasize the crux of the idea and link it to the human centricity and computing with perceptions rather than plain numbers.

What has been said so far touched upon a qualitative aspect of the problem. The visible challenge is to develop a computing framework within which all these representation and processing endeavors could be formally realized.

While the notions of information granularity and information granules themselves are convincing, they are not operational (algorithmically sound) until some formal models of information granules along with the related algorithmic framework have been introduced. In other words, to secure the algorithmic realization of Granular Computing, the *implicit* nature of information granules has to be translated into the constructs that are *explicit* in their nature,

viz. described formally in which information granules can be efficiently computed with.

The common platform emerging within this context comes under the name of Granular Computing. In essence, it is an emerging paradigm of information processing. While we have already noticed a number of important conceptual and computational constructs built in the domain of system modeling, machine learning, image processing, pattern recognition, and data compression in which various abstractions (and ensuing information granules) came into existence, Granular Computing becomes innovative and intellectually proactive endeavor that manifests in several fundamental ways:

- It identifies the essential commonalities between the surprisingly diversified problems and technologies used there, which could be cast into a unified framework known as a granular world. This is a fully operational processing entity that interacts with the external world (that could be another granular or numeric world) by collecting necessary granular information and returning the outcomes of the granular computing.

- With the emergence of the unified framework of granular processing, we get a better grasp as to the role of interaction between various formalisms and visualize a way in which they communicate.

- It brings together the existing plethora of formalisms of set theory (interval analysis), fuzzy sets, rough sets under the same roof by clearly visualizing that in spite of their visibly distinct underpinnings (and ensuing processing), they exhibit some fundamental commonalities. In this sense, Granular Computing establishes a stimulating environment of synergy between the individual approaches.

- By building upon the commonalities of the existing formal approaches, Granular Computing helps assemble heterogeneous and multifaceted models of processing of information granules by clearly recognizing the orthogonal nature of some of the existing and well established frameworks (say, probability theory coming with its probability density functions and fuzzy sets with their membership functions).

- Granular Computing fully acknowledges a notion of variable granularity whose range could cover detailed numeric entities and very abstract and general information granules. It looks at the aspects of compatibility of such information granules and ensuing communication mechanisms of the granular worlds.

- Granular Computing gives rise to processing that is less time demanding than the one required when dealing with detailed numeric processing.

- Interestingly, the inception of information granules is highly motivated. We do not form information granules without reason. Information granules arise as an evident realization of the fundamental paradigm of abstraction.

On the one hand, Granular Computing as an emerging area brings a great deal of original, unique ideas. On the other, it dwells substantially on the existing well-established developments that have already happened in a number of individual areas. In a synergistic fashion, Granular Computing brings fundamental ideas of interval analysis, fuzzy sets and rough sets, facilitates building a unified view at them where an overarching concept is the granularity of information itself. It helps identify main problems of processing and its key features, which are common to all the formalisms being considered.

Granular Computing forms a unified conceptual and computing platform. Yet, what is important, it directly benefits from the already existing and well-established concepts of information granules formed in the setting of set theory, fuzzy sets, rough sets and others. Reciprocally, the general investigations carried out under the rubric of Granular Computing offer some interesting and stimulating thoughts to be looked at within the realm of the specific formalism of sets, fuzzy sets, shadowed set or rough sets.

Over the years, Granular Computing has witnessed an emergence of some fundamentals, which deliver a coherent, comprehensive and efficient conceptual and algorithmic platform. More importantly, these fundamentals help establish a unified view at the very essence of the underlying processing and form a creative and unique perspective irrespectively of the diversity among the technologies of fuzzy sets, rough sets and intervals. The three fundamentals promoted in [2] involve (i) a principle of justifiable granularity, (ii) a treatment of information granules as an important asset in system design, modeling and analysis, and (iii) engagement of information granules of higher order and higher type in hierarchical information processing. Along with the formation of the foundations of Granular Computing, they open new avenues of research endeavours.

## The principle of justifiable granularity

We are concerned with a development of a single information granule $\Omega$ based on some experimental evidence (data) coming in a form of a collection of a one-dimensional (scalar) numeric data, $\mathbf{D} = x_1, x_2, \ldots, x_N$. The essence of the principle of justifiable granularity is to form a meaningful (legitimate) information granule based on available experimental evidence (data) $\mathbf{D}$ where we require that such a construct has to adhere to the two intuitively compelling requirements:

(i) *experimental evidence (legitimacy)*: The numeric evidence accumulated within the bounds of ? has to be as *high* as possible. By requesting this, we anticipate that the existence of the information granule is well motivated (justified) as being reflective of the existing experimental data. For instance, if $\Omega$ is an interval then the more data are included within the bounds of $\Omega$, the better - in this way the set becomes more legitimate. Likewise in case of a fuzzy set, the higher the sum of membership degrees ($\sigma$-count) of the data in $\Omega$, the higher the experimental justifiability of this fuzzy set is.

(ii) *sound semantic (meaning)*: At the same time, the information granule should be as *specific* as possible. This request implies that the resulting information granule comes with a well-defined semantics (meaning). In other words, we would like to have $\Omega$ highly detailed, which the information granule semantically meaningful (sound). This implies that the smaller (more compact) the information granule (lower information granule) is, the better. This point of view is in agreement with our general perception of knowledge being articulated through constraints (information granules) specified in terms of statements such as "x is A", "y is B", etc. where A and B are constraints quantifying knowledge about the corresponding variables. Evidently, the piece of knowledge coming in the form "x is in [1,3]" is more specific (semantically sound, more supportive of any further action, etc.) than another piece of knowledge where we know only that "x is in [0,10]".

While these two requirements are appealing from an intuitive point of view, they have to be translated into some operational framework in which the formation of the information granule can be realized. This framework depends upon the accepted formalism of information granulation, viz. a way in which information granules are described as sets, fuzzy sets, shadowed sets, rough sets, probabilistic granules and others.

### Information granularity as a crucial design asset: towards an optimal allocation of information granularity

Information granularity is an important design asset. Information granularity allocated to the original numeric model elevates a level of abstraction, viz. generalizes the original construct initially developed at the numeric level. A way in which such an asset is going to be distributed throughout the construct or a collection of constructs to make the abstraction more efficient, is a subject to optimization.

Consider a certain mapping $y = f(\mathbf{x}, \mathbf{a})$ with $\mathbf{a}$ being a vector of parameters of the mapping. The mapping can be sought in a general way. One may think of a fuzzy model, neural network, polynomial, differential equation, linear regression, etc. The granulation mechanism $\mathbf{G}$ is applied to $\mathbf{a}$ giving rise to its granular counterpart, $\mathbf{A} = \mathbf{G}(\mathbf{a})$ and subsequently producing a granular mapping, $Y = \mathbf{G}(f(\mathbf{x}, \mathbf{a})) = f(\mathbf{x}, \mathbf{G}(\mathbf{a})) = f(\mathbf{x}, \mathbf{A})$. Given the diversity of the underlying constructs as well as a variety of ways information granules can be formalized, we arrive at a suite of interesting constructs such as granular neural networks, say interval neural networks, fuzzy neural networks, probabilistic neural networks, etc.

There are a number of well-justified and convincing arguments behind elevating the level of abstraction of the existing constructs. Those include: an ability to realize various mechanisms of collaboration, quantification of variability of sources of knowledge considered, better modeling rapport with systems when dealing with non-stationary environments.

### Hierarchical information processing: an emergence and engagement of information granules of higher order and higher type

Hierarchical information processing is predominantly concerned with forming and computing at various levels of abstraction. The results can be passed back and forth by navigating across levels of hierarchy. Information granules involved in this communication are expressed at the pertinent level of specificity (or abstraction). The communication and processing requirements give rise to more advanced constructs of higher order and higher type information granules. Higher type information granules are concerned with granules whose grades of membership (belongingness) are described by a certain information granule. Type-2 or more specifically interval-valued fuzzy sets are just examples of these constructs. Order -2 information granules are granules formed over a space, which itself is created as a collection of information granules. Obviously, type-2 and order -2 granular structures are generalized to type-3, type-4, order-3, order-4 and higher types and orders constructs; however these generalizations should come with a compelling motivation. We need to be aware that such buildups are associated with some computing overhead.

It is quite apparent that these advanced constructs of information granules are often heterogeneous (hybrid) as we may admit the usage of several formalisms of information granulation (say, membership grades that themselves are expressed as probabilistic granules) and emergence of higher type of successively increasing type when traversing the layers of hierarchy of the hierarchical architecture.

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# Minutes of the EUSFLAT General Assembly 2013

## Milano, September 12, 2013



Javier Montero, Edurne Barrenechea, Gabriella Pasi and Martin Štěpnička during the assembly

The assembly starts at 16:00, twenty minutes later than as scheduled in order to allow all participants from delayed sessions to get to the Assembly before its beginning.

## Agenda

1. EUSFLAT Board report

2. Treasury report *

3. EUSFLAT 2015 conference

4. EUSFLAT Awards

    - Proposal for EUSFLAT Honorary Membership *

    - Acknowledgement for EUSFLAT Scientific Excellence Award

    - Acknowledgement for EUSFLAT 2011 & 2012 Best PhD Thesis Award

    - Acknowledgement for Best Student Paper at EUSFLAT 2013 conference

5. New Board Elections *

6. Other matters

    * Requires a decision

## 1. - EUSFLAT Board report

| | |
|---|---|
| President: | Javier MONTERO, Spain |
| Vice President: | Gabriella PASI, Italy |
| Secretary: | Martin STEPNICKA, Czech Republic |
| Treasurer: | Edurne BARRENECHEA, Spain |
| Recruiting: | Valentina E. BALAS, Romania |
| EUSFLAT Magazine: | Humberto BUSTINCE, Spain |
| Web Coordination: | Jorge CASILLAS, Spain |
| BISC & IFSA News: | Asli CELIKYILMAZ, USA |
| Calls & Forum: | Oscar CORDÓN, Spain |
| Grants: | Bernard DE BAETS, Belgium |
| Conference Liaison: | Marcin DETYNIECKI, France |
| Working Groups: | Eyke HÜLLERMEIER, Germany |
| Outreach activities: | Radko MESIAR, Slovak Republic |
| Conference Endorsement: | Dragan RADOJEVIK, Serbia |
| Special IJCIS Issues: | Luis MARTÍNEZ, Spain |
| Awards: | Eulalia SZMIDT, Poland |

**Javier Montero**, the President of EUSFLAT reminds some information from IFSA:

- IFSA PRESIDENT (2013-2015): Christer Carlsson (Finland).

- ELECTED PRESIDENT (2015-2017): Shun-Feng Su (Taiwan).

- IFSA 2015 conference (point 3 in today's agenda) - jointly with EUSFLAT in Oviedo, Spain, Local Chair: Luis Magdalena (European Center for Soft Computing).

- Many awards obtained by EUSFLAT members were reported to the Society.

EUSFLAT membership stats were reported. The main number - the current number of members - equals to 271. Importantly, the percentage of Spanish members is still below 50% which confirms the international nature of the Society. Related to the membership, the president reported the recruitment campaign that has been initiated during his voting period.

**Jie Lu**, the co Editor-in-Chief of the Society journal IJCIS, reported main news from the last year. Main statistics were provided. The main point of this report was the message ensuring the Society that the journal Impact Factor is expected to be obtained back already in 2014. Jie Lu introduced a strategy (already applied) for improving the quality of the journal.

**Humberto Bustince** reported the activity of Mathware & Soft Computing magazine. He thanked to all editors and all other people who help the magazine to be published regularly. He invited anyone from the Society to participate on the contributions published in the magazine. The Society members are advised to visit http://www.eusflat.org/msc.

**Javier Montero** recalled main achievements of the Board activity in the last 4 years of his presidential mandate (new guise of the magazine, agreement with IJCIS, honorary members, Status updates, new awards launched, travel grant programme extended and spread etc.). Also missing issues were reported (Fuzzywiki and similar projects not launched, no Committer membership so far applied, etc.).

## 2.- Treasury reports: 2012 Budget, 2013 Estimated budget, 2014 Proposed budget

**Edurne Barrenechea** informed about the treasury reports. The main features were as follows.

- 2012 budget surplus: 2454.50 EUR

- December 31, 2012 account situation: 28272.77 EUR

- 2013 expected budget surplus: -1455.32 EUR

- 2014 proposed budget surplus: -1670.00 EUR

- December 31, 2014 proposed account situation: 25 147.45 EUR

Apart from the treasury reports, the Society was also informed about other features such as no change in the height of membership fees or proposed expenses for travel grants (4500EUR/year). The Society was asked to approve the treasury report.

**The treasury report was approved by all EUSFLAT members participating on the Assembly.**

## 3.- EUSFLAT 2013 Conference

**Luis Magdalena**, the Chair of the 2015 conference, presented his vision of the organization of the next conference. He presented many details as well as motivation to participate on the joint IFSA-EUSFLAT event. The main information consists in the dates of the conference (June 30 - July 3) and the location (Asturias, Spain). The particular Venue has not been decided yet (Gijón or Oviedo). Society members are advised to visit http://www.softcomputing.es/ifsa-eusflat2015/.

## 4.- EUSFLAT Awards

### Proposal for EUSFLAT Honorary Membership: Irina Perfilieva

Javier Montero presented the Board proposal to award the $4^{th}$ Honorary Membership to Irina Perfilieva. The proposal has been approved by the Assembly.

### Acknowledgement EUSFLAT Scientific Excellence Award: Petr Hájek

The committee has nominated Petr Hájek as the second EUSFLAT Scientific Excellence Award holder. Petr Hájek could not attend the EUSFLAT conference due to health reasons. Therefore, he was awarded the Scientific Excellence Award by Francesc Esteva in Prague, September 4 (within ManyVal2013 conference). Francesc Esteva reported the award ceremony. The president expressed his thanks to Frances Esteva, Petr Cintula, Franco Montagna, Zuzana Haniková and others who helped with the ceremony.

*For his enormous contribution to the formal logical foundations of fuzzy logics, fuzzy set theory, and fuzzy systems.*

### Acknowledgement EUSFLAT 2011 & 2012 Best PhD Thesis Awards

EUSFLAT 2011 Best PhD Thesis Award goes to Nicolás Madrid for his thesis *Measures of Inconsistency and Existence of Fuzzy Stable Models in a Residuated Framework* (supervised by Manuel Ojeda-Aciego).

EUSFLAT 2012 Best PhD Thesis Award goes to Marco Cerami for his thesis *Fuzzy description logics from a mathematical fuzzy logic point of view* (supervised by Francesc Esteva, Felix Bou and Lluis Godo).

Both awards will be given on the Gala dinner.

### Acknowledgement for Best PhD Student Paper at EUSFLAT conference

Three student authors - Aránzazu Jurío, Tarad Jwaid and Ali Fallah Tehrani - were nominated to the Best PhD Student paper award. All of them will be acknowledged on the Gala dinner. The winner will be announced also during the Gala dinner.

## 5.- New Board Elections

Javier Montero gave his last Farewell speech in the presidential position. He thanked to all Board members and also other people who contributed to the Society during his voting period.

As the Secretary, Martin Štěpnička was in charge of the new Board elections. After a short review of the situation, legal issues and the submitted candidature, the members were asked to vote. Since the majority of members voted for the only candidature led by Gabriella Pasi, the New Board was elected.

**List of elected Board (2013-2015) members:**

**President**
Gabriella Pasi
*Università degli Studi di Milano Bicocca, Italy*

**Vice-president**
Bernard De Baets
*Ghent University, Belgium*

**Secretary**
Martin Štěpnička
*University of Ostrava, Czech Republic*

**Treasurer**
Edurne Barrenechea
*Public University of Navarra, Spain*

**Additional members:**
Eulalia Szmidt
Francisco Javier Montero
Humberto Bustince
Vicenc Torra
Brunella Gerla
Jie Lu
Jorge Casillas
Marie-Jeanne Lesot
Rudolf Kruse
Sławomir Zadrożny
José María Alonso

Gabriella Pasi, the new President, had a short speech related to her vision for the new voting period.

## 6.- Other matters

Society was reminded that the next EUSFLAT Assembly will take place during IPMU 2014 in Montpellier, France, July 15-19.

With no other issue, the Assembly finished at 17:10.

Date: September 13, 2013
Signed:
Javier Montero (EUSFLAT President)
Gabriella Pasi (EUSFLAT vice-president, newly elected EUSFLAT President)
Martin Štěpnička (EUSFLAT Secretary)



(From top to bottom, left to right) Javier Montero, Edurne Barrenechea, Martin Štěpnička, Humberto Bustince, Jie Lu, Luis Magdalena and Irina Perfilieva during their talks at the EUSFLAT 2013 General Assembly

REPORT

# How to go from Prof. Montero to simply Javier

Humberto Bustince
Universidad Publica de Navarra, Spain

Last September, at the EUSFLAT conference held at Milano, Javier Montero finished his term as president of the European Society for Fuzzy Logic and Technologies. Although many important and positive tasks have been accomplished along his period as president, in these lines I am not going to talk about them. On the contrary, I prefer to put the focus on the person, so, rather than speaking about Prof. Montero (now vice dean Montero), I will say a few words about Javier.

But I have to start saying that, for a while, he was just Prof. Montero to me. I first met him at North Carolina in 2000, or to be more precise, that was the first conference I saw him

But Javier is not a person to be distant. And I realized this specially in ESTYLF 2004 - XVII Spanish Conference on Fuzzy Logic and Technologies- conference which held place at Jaén. I will never forget that date Javier Montero, Luis Martínez and José Luis García Lapresta invited several Spanish researchers, including me, to explain our research activities. Suddenly, we were at the same level and I found an absolutely open, friendly scientist who was actively interested in my research. At that moment, prof. Montero was starting to become Javier. And the transformation was fully complete when, to my great surprise, he and Luis offered me to be part as responsible of one node of a joint research project proposal. It is important to say that in Spain Government research projects are at the top of scientific activity, so to include somebody in your own proposal is in some sense a proof of faith in that person's research.

I have to say that the proposal was approved for one year by the Ministry, but it was the starting point for a close friendship which lasts up to today. Since then we have collaborated in several research papers, we have met

in many conferences and, specially, we have shared many great moments. From EUROFUSE 2009 in Pamplona, quite moved, to IFSA at Cancun, many and many pages of anecdotes and funny stories could be written. But it would be better if Javier does it, since he has an impossible to imitate way of making of any story a source of laugh. In the same way, he is able to find surprising ways to solve any deadlock in research, or to provide new insights for a given problem. Apart from finding always the right word in the right moment.

I know that Prof. Montero's term is over. But I also know that Javier's friendship stands. And that's really great.

PS: If you can, ask Javier for talking you about his experimental study on the regulation of air conditioning to kill mosquitoes, or about how to make a plane stop when it is about to take off. . . Or about any other of so many funny moments. Thanks, Javier!!

REPORT

# EUSFLAT Scientific Excellence Award to Petr Hájek

**Petr Cintula**



On the last September 4th, Prof. Petr Hájek received in Prague the EUSFLAT Scientific Excellence Award.

In the context of the conference ManyVal2013 (held in Prague, 4-6 September 2013), the organizing committee prepared, as a surprise part of the program, an award ceremony dedicated to Petr Hájek. The ceremony was opened by Francesc Esteva who, on behalf the nomination committe (formed by Luis Magdalena, Ulrich Bodenhofer, Javier Montero and himself), explained that the EUSFLAT Scientific Excellence Award was created on 2011 in order to acknowledge excellent research on the scientific and technological areas covered by the society, that was awarded to Didier Dubois on 2012, and now to Petr Hájek, for his crucial contributions to mathematical fuzzy logic and the foundations of fuzzy logic.

Franco Montagna then gave a touching speech in which he praised the quality and the influence of Hájek's scientific work. Montagna stressed that before moving to fuzzy logic, Hájek had already followed a brilliant career on logic and foundations of mathematics, specializing on set theory and arithmetics, and later, starting from the early nineties, he developed the necessary logical foundations for the theory of fuzzy sets and its applications when he introduced his celebrated basic logic BL (Montagna conjectured that in the future it will be known as /Hájek logic/) as a base for a mathematical study of all fuzzy logics known at that time. Montagna concluded that the key for Hájek's scientific success had been his good compromise between mathematical abstract theory and applications, in a series of works that have attracted both abstract mathematicians and applied scientist.

After that, Zuzana Haniková, former student of Petr Hájek, spoke about his influence in the Czech scientific community. She gave an overview of Hájek's publications, focusing in the influential monograph "Metamathematics of Fuzzy Logic" from 1998, explained how he helped establishing an active research group in Prague and surveyed the numerous awards and public recognitions he has received in the country.

Finally, Francesc Esteva presented the award diploma to Petr Hájek, who stood up and showed his gratitude in a short speech and received a resounding applause by his friends, colleagues and disciples. The ceremony was closed with a little reception in the premisses of the Institue of Philosophy of the Academy of Sciences of the Czech Republic.

(Left) Francesc Esteva during his explanation about the EUSFLAT Scientific Excellence Award.



(Right) Franco Montagna talking about the quality and the influence of Hájek's scientific work.



(Left) The audience of the ceremony dedicated to Petr Hájek.
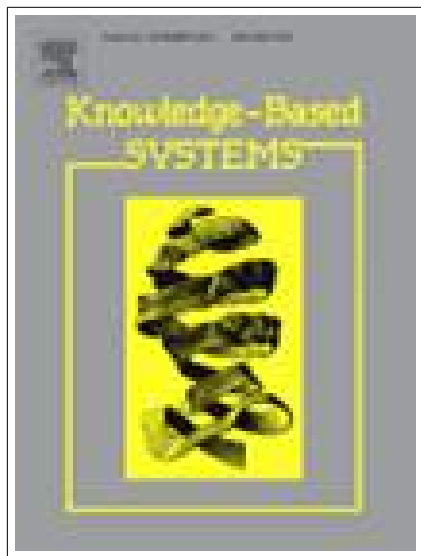
(Right) Petr Hájek with his family after the ceremony.





(Left) Zuzana Haniková, former student of Petr Hájek, speaking about his influence in the Czech scientific community.

# Knowledge-Based Systems



The journal "Knowledge-Based Systems" (Elsevier) leads research and practice in the field of systems where knowledge plays a dominant role and/or knowledge-based techniques are applied. This journal particularly focuses on knowledge engineering, intelligent information systems, and the design process, models and methods, software tools, user interactions and organisational issues of knowledge-based systems. The journal serves many communities and publishes papers on new trends and up-to-date relevant knowledge in its related research areas.

This journal has recently identified seven flagship topics:

- Big data techniques and data-driven information systems

- Cognitive interaction and intelligent human interface

- E-service personalization and recommender systems

- Intelligent decision, prediction and warning support systems

- Computational intelligence-based systems with applications

- Swarm intelligence and evolutionary computing

- Knowledge engineering, learning-based systems, and semantic net

The journal attracts a high level of attention from audiences across a wide range of scientific research communities by disseminating high quality scientific articles and communicating information about new scientific resources in emerging hot topics and disciplines. The enhancement of the journal has contributed to the improvement of its impact factor to 4.104 (2012), which places it among the leading journals in the Artificial Intelligence category of the Computer Science area (www.scimagoji.com). In 2012 and 2013, this journal received 1300 and 1500 submissions respectively. The acceptance rate is about 18% (2012, 2013). The journal has received excellent author feedback on reputation, the speed of referee response, reviewing standard, editorial efficiency and correspondence, and so on; its scores are much higher than the average scores of all journals from this publisher in related areas. The overall expression of satisfaction (i.e., authors agreeing to the statement: I am very satisfied with this journal overall) has been further improved from a high value 92% in 2011 to 97% in 2013.

For answers to questions, or to comment, please do not hesitate to contact the editors.

**Editors in Chief**
Hamido Fujita (Japan), Jie Lu (Australia)

More information at: http://www.journals.elsevier.com/knowledge-based-systems

# AGOP 2013, Seventh International Summer School on Aggregation Operators



The Seventh International Summer School on Aggregation Operators was held at the Palacio of Condestable of Pamplona (Navarra, Spain) from July 16 to July 19, 2013.

In many problems of practical interest arises the need of merging quantitative information. This need comes from different and complementary disciplines such as Engineering, Economics, Science, Mathematics and others.

The study of aggregation operators was widely developed during the last decades, both from a purely theoretical side and from the point of view of their many applications. Nowadays, aggregation functions are a crucial in such different fields as, for instance, multicriteria decision making, fuzzy control, expert systems, approximate reasoning, neural networks, fuzzy systems modelling, measure theory, image processing, etc.



Following the past editions of AGOP in Oviedo (2001), Alcalá de Henares (2003), Lugano (2005), Ghent (2007), Palma de Mallorca (2009) and Benevento (2011), AGOP 2013 was organized by the Group of Research in Artificial Intelligence and Approximate Reasoning (GIARA) of the Public University of Navarra, led by Humberto Bustince, together with the working group of EUSFLAT on aggregation functions coordinated by Radko Mesiar and Tomasa Calvo. The local organization was in charge of Humberto Bustince, Javier Fernandez, Aranzazu Jurio and Daniel Paternain, with the active collaboration of all the other members of the GIARA goup.



Since its inception, the International Summer School on Aggregation Operators has been devoted to facilitate the exchange and discussion on the latest trends and results on aggregation operators. Moreover, as a summer school, it has also intended to allow students with scientific and technical backgrounds to make a first contact with the different techniques and results in this field which may be useful for their research and/or professional life.



In this spirit, this edition has counted, on one hand, with 43 presentations of researchers from Europe and America, who had discussed their last results, theoretical and applied, providing a wide view of the present state-of-the art in the field of aggregation functions. Among these contributions, the work On the Construction of Semiquadratic Copulas by Tarad Jwaid, Bernard De Baets and Hans De Meyer obtained the Best Student paper award, whereas

the work Aggregation of incomplete qualitative information, by Juan Vicente Riera and Joan Torrens, was chosen as the best paper.



At the same time, some of the most important scientists in aggregation functions and related fields gave a total of seven plenary talks understood as summer courses specially focused on Ph.D. Students. These speakers were Michal Baczynski, of the University of Silesia, Bernard De Baets, of the University of Ghent, who gave the opening talk; Jozo Dujmovic, of the San Francisco State University, Fabrizio Furante, of the Free University of Bolzano, Salvatore Greco, of the University of Catania, Anna Kolesárová, of the Slovak University of Technology, Gabriella Pigozzi, from the Université Paris Dauphine, and Ana Pradera, from the Rey Juan Carlos University of Madrid.

In total, around 100 participants have taken part in this edition of the AGOP. Several of the contributions will appear in a forthcoming special issue of the Fuzzy Sets and Systems journal, together with works presented at the EUSFLAT Conference in Milano.
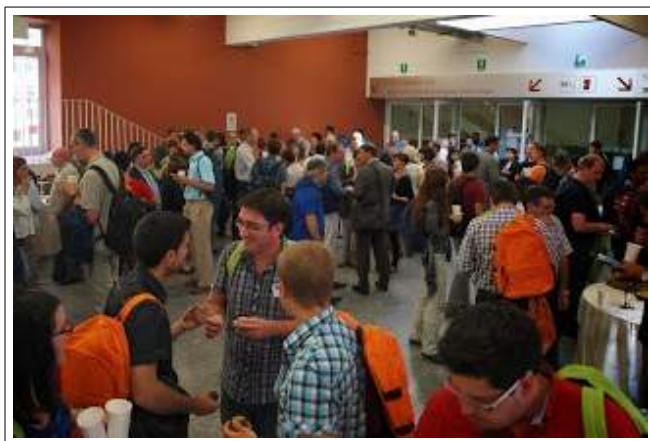
CONFERENCE REPORT

# EUSFLAT 2013, 8th Conference of the European Society for Fuzzy Logic and Technology

The 8th biannual EUSFLAT conference took place on September 11-13, 2013 at the University of Milano-Bicocca, Milan, Italy.



**The welcome party**

This edition of the conference has consisted in eleven special sessions and fourteen regular sessions; the 137 attendants included both theoreticians and applicative researchers working on fuzzy logic and its applications. EUSFLAT 2013 received a total of 152 submissions from 34 countries. Papers were reviewed by at least two reviewers. Papers submitted to the eleven special sessions were peer-reviewed based on the same criteria used for regular papers, and decision on acceptance has been taken in accordance with session organizers. Based on the outcome of the review process and recommendations of special session organizers, 125 papers were accepted for inclusion in the conference program. We are very grateful to the special session organizers, to the PC members and to the external referees that helped us to have a rigorous reviewing process and a rich scientific program. Proceedings are published by Atlantis Press and can be found online at http://www.atlantis-press.com/publications/aisr/eusflat-13.

The EUSFLAT 2013 program was enriched by three keynote lecturers: Bernadette Bouchon-Meunier, "Interpretability, a silver lining to a fuzzy cloud"; Humberto Bustince, "Image Processing and Classification using Extensions of Fuzzy Sets. First Successes"; and Antonio di Nola, "On generalizing the Nullstellensatz and McNaughton's Theorem for MV algebras". Our warm thanks go to the speakers who kindly accepted to share their expertise with the attendees.

The conference has offered a good opportunity for people to meet, and to exchange knowledge, experiences and ideas for common projects and collaborations. It has also offered to the numerous students attending the conference, the possibility to know about promising research direc-

tions and to meet senior people with whom to fruitfully exchange ideas. During the Gala Dinner the Best Student Paper of this edition of the conference has been awarded to **Aranzazu Jurio** for the paper entitled "Convex combination of grouping functions for image thresholding. Selection of weighting vectors" (coauthored by Miguel Pagola, Daniel Paternain, Nicolas Madrid, and Humberto Bustince). Always during the Gala dinner the following PhD Thesis have been awarded from EUSFLAT for 2011 and 2012 respectively: Measures of Inconsistency and Existence of Fuzzy Stable Models in a Residuated Framework authored by **Nicolás Madrid** (**supervised by Manuel Ojeda-Aciego**, 2011), and Fuzzy description logics from a mathematical fuzzy logic point of view authored by **Marco Cerami** (**supervised by Francesc Esteva, Felix Bou and Lluis Godo**, 2012).

Eight Student Grants have been given to students who applied to attend the conference and to present their papers.

During the conference the Assembly of the Society has taken place; the minutes of the Assembly are reported in this issue of the journal. During the Assembly the new EUSFLAT board has been elected, and the assembly has manifested a big gratitude to Javier Montero and to the whole exiting board, for their hard work and invaluable support in spreading the Association and in promoting important initiatives.



**The outcoming President Javier Montero, the incoming President Gabriella Pasi and the EUSFLAT secretary Martin Štěpnička**

EUSFLAT 2013 would not have been successful without the support of several people. We wish to thank the members of the EUSFLAT Board for their invaluable support throughout the organization process. We are also grateful to all the local staff: Silvia Calegari, Emanuele Panzeri, Marco Allegretti, Francesca Scoglio, Arjumand

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Younus and Atif Muhammad Qureshi, who effectively helped in the organisation process. Last but not least, we thank the institutions that hosted and supported the organization of the conference, and the conference sponsors: the University of Milano-Bicocca, the Department of Informatics, Systems and Communication, and the Banca Popolare di Sondrio.

It has been our pleasure to be involved in the organization of this conference, to prepare its technical program and the proceedings and to welcome in Milano all the participants. We hope that everyone enjoyed the conference as well as the social programme and the staying in Milano.

Gabriella Pasi
Javier Montero
Davide Ciucci

# Eusflat 2013 awards



Nicolas Madrid getting his 2011 Best PhD Thesis Award from Javier Montero



Marco Cerami getting his 2012 Best PhD Thesis Award from Javier Montero



The President Javier Montero gives the Best Student Paper Award to Aranzazu Jurio during the banquet at the Milano Acquarium

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# EUROFUSE 2013, Uncertainty and Imprecision Modelling in Decision Making



EUROFUSE (http://www.euro-online.org/web/ewg/2/ewg-eurofuse-fuzzy-sets) and the UNIMO-DE Research Unit of the University of Oviedo (http://unimode.uniovi.es) organized the workshop EURO-FUSE2013 on Uncertainty and Imprecision Modeling in Decision Making. This meeting was held in Oviedo, Spain, from 2nd to 4th December 2013.

The aim of the workshop was to bring together a broad group of researchers working in the theory of fuzzy sets, related areas and their applications. The workshop was intended to establish the new trends in the field and to encourage cooperation among the participants.



The conference gathered 45 people from European and non European countries: Spain, Belgium, France, Hungary, Italy, Poland, Slovakia, Brazil and India. To guarantee for the quality of the accepted papers, each of the 30 accepted contributions was reviewed by two members of an International Scientific Committee composed of recognized researchers in the relevant areas. The papers accepted for presentation were distributed in six regular sessions: preference representation and modelling, decision making, theory, applications of aggregation functions, measures of similarity, applications and aggregation operators. Aside

them, there was a special session where the four best student papers (in accordance with the reviewers' reports) were presented and discussed in order to decide the best student paper award. This award was won by **Ignacio Montes** from the University of Oviedo, by the paper entitled "Imprecise copulas and bivariate stochastic orders". The general best paper award was won by "On distances derived from t-norms" by **Javier Martin and Gaspar Mayor** from the University of the Balearic Islands. A selected number of papers will be extended and revised for possible inclusion in a Special Issue of the international journal Fuzzy Sets and Systems.



Apart from the regular sessions, there were three plenary talks by invited speakers. Thus, Bernard De Baets, from Ghent University, spoke about "Rock-Paper-Scissors and the thin line between transitivity and intransitivity"; Serafín Moral, from the University of Granada, about "Information Aggregation with Imprecise Probability" and Esteban Induráin, from the Public University of Navarre, gave us the talk "From qualitative to quantitative scales: a survey on the numerical representation of preference orderings".

The program schedule really started on Sunday 1 with a welcome cocktail and continued with three working days with a half day of social activities on Wednesday. It officially started on Monday morning with an opening ceremony including the interventions of Dr. José María Alonso as member of the EUSFLAT board, Dr. Bernard De Baets as coordinator of the EUROFUSE Working Group, Dr. Rafael González as vice-dean of the Polytechnic School of Engineering of Gijón, Dr. Manuel Montenegro as chairman of the department of Statistics and O.R. of the University of Oviedo, Dr. Susana Montes as chair of the Organizing Committee and Dr. Luis José Rodríguez as Vicerrector of the University of Oviedo. Apart from the plenary talks and regular sessions, there was some time for discussion on Monday and Tuesday afternoon. The attendees gathered for the conference gala dinner on

Tuesday evening and for the 'Espicha' (traditional Asturian dinner) on Wednesday evening. The social program was completed with a visit to the Aquarium of Gijón on Wednesday afternoon.



This conference was partially supported by the University of Oviedo, more precisely by: the Vice-Rector's Office for Research and Campus of International Excellence, the Polytechnic School of Engineering of Gijón and the Department of Statistics and Operational Research and Didactic of Mathematics. This meeting was also supported by the IFSA and EUSFLAT associations, the Foundation for Asturias Promotion of Applied Scientific Research and Technology and the Oviedo Town Hall. The support of the European Society for Fuzzy Logic and Technology allowed to offer free registration for three students and reduced registration fees for EUSFLAT's members.



The success of this workshop was a joint work of all of those who have been involved in its preparation: program chairs, the international scientific committee, the organizing committee. Of course, the participants were another key for the success of this workshop, since they created a fertile framework for exchanging scientific ideas, inspiring new research and establishing contacts for closer future co-operations.

More information about EUROFUSE2013 can be found at the web page http://eurofuse2013.uniovi.es.

CONFERENCE REPORT

# SEMATICA 2013, 3rd post-graduate seminar of the Spanish Computational Intelligence-focused network ATICA

The third post-graduate seminar of the Spanish Computational Intelligence-focused network ATICA, SEMATICA 2013, was held at the Faculty of Mathematics of the Complutense University of Madrid from November 20th to 22nd. Similarly to past editions, SEMATICA 2013 offered Master Degree and Ph.D. students a nice combination of workshops and conferences with both a transversal and a technical focus. Particularly, under the title "Computational Intelligence at a time of Economic Crisis", this year's seminar focused on the need for an adequate communication to society of the results of scientific and technological research, as well as for adopting a broad perspective regarding the search for funding opportunities.

In this way, the seminar's first day was devoted to conferences regarding successful and challenging applications of Computational Intelligence, as e-health or smart cities, as well as to the final stage of the first Spanish-wide edition of the Three Minutes Thesis competition, during which up to eight participants briefly exposed their Ph.D. Thesis projects and research results to a non-specialized audience. The winner of the competition was Daniel Paternain, from the Public University of Navarra.

SEMATICA 2013's second day had a transversal character, holding a coaching workshop for students as well as three conferences with different focus, from H2020 funding perspectives to the preparation of a scientific document (e.g. a paper or a Ph.D. Thesis), and including an interesting overview of the current tendencies and challenges on Computational Intelligence.

Finally, the third and last day embraced a doctoral seminar in which some SEMATICA 2013's participants exposed their Ph.D. projects to a heterogeneous audience formed by other Ph.D. students and senior researchers coming from both universities and technological companies. A nice debate, in which some of the ideas just exposed were discussed, followed the seminar, before the sixth edition of the FuzzyMAD conference (joining together the fuzzy community of the Madrid region) put the closing bell for SEMATICA 2013.



**Participants of the first Spanish-wide edition of the Three Minutes Thesis competition**

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## NEWS

# Enric Trillas, a pioneer of fuzzy logic, Honoris Causa by the Public University of Navarra

## Public University of Navarra, Spain



Enric Ruiz Trillas (Barcelona, 1940), a scientific expert in fuzzy logic and artificial intelligence, has been named on December 5, 2013 Doctor Honoris Causa from the Public University of Navarra due to his outstanding scientific record. The agreement was unanimously adopted at the meeting of the Governing Council of the University, held that day.

Enric Trillas is a Spanish pioneer in fuzzy logic and one of the first European researchers in this field of science, which tries to get that machines are able to mimic human reasoning. Advances in this field of research are particularly valuable for the development of artificial intelligence applications, since the theoretical models designed by scientists allow machines to handle imprecise information and make decisions in a similar way as the human brain does.

Enric Trillas studied at the University of Barcelona, where he graduated in 1964 and he got his Ph.D. in Science (Mathematics section) in 1972. In 1974, he became a professor at the Polytechnic University of Catalonia, institution where he held various academic positions such as deputy director of the School of Architecture, Dean of the Faculty, Vice Chancellor for Academic Affairs (1980 - 1982) and Vice Chancellor of University Extension (1982-1983).

In 1989 he moved to the Technical University of Madrid, where in 1990 he took up the Chair of Computer Science and Artificial Intelligence in the Faculty of Computer Science. There he worked in the Department of Artificial Intelligence until 2006.

He has been president of the Spanish Higher Council for Scientific Research (CSIC) , between 1984 and 1988; general manager and vice president of the Spanish National Institute for Aerospace Technology (INTA) , from 1989 to 1995; general secretary of the Spanish National Scientific and Technological Research Plan and Secretary of the Spanish Interministerial Commission of Science and Technology from 1995 to 1996. He has also been and president of the Aerospace Engineering Services (INSA) company.

Author of over 200 scientific publications and technical papers, he has been director of 16 doctoral theses. His books include: "Fuzzy sets" (1980), "Introduction to Fuzzy Logic (1995), "First Lessons in fuzzy logic" (1998) and "Artificial intelligence: machines and people" (1998), the latter a scientific divulgation volume.

Enric Trillas has been awarded the three major prizes in the field of fuzzy logic : the "Pioneer Award" of the European Society for Fuzzy Logic and Technologies (EUSFLAT) in 1999 , the "Fellow" of the International Fuzzy System Association (IFSA) in 1999 , and the "Pioneer Award Fuzzy Systems" from the IEEE Computational Intelligence Society, in 2005.

He also holds several awards as, for instance, the Order of Merit of the Italian Republic "Large Uffiziale" category (1986), the Grand Cross of Aeronautical Merit (1991) and the Narcis Monturiol Medal for scientific and technological merit granted by the Generalitat de Catalunya (2000).

Currently, Enric Trillas is an emeritus researcher at the European Centre for Soft Computing in Mieres (Asturias).

# Ph.D. Thesis defended by Laura Garrido

## Department of Statistics and O.R., University of Oviedo, Spain

Laura Garrido defended her PhD Thesis entitled 'Approximation of fuzzy random sets seen from an ontic perspective". Her supervisor is Inés Couso from the University of Oviedo.

Fuzzy random sets represent random experiments where the outcomes are fuzzy sets. In this work, fuzzy sets have a "conjunctive" reading and they are seen as complex entities, where the degree of of membership of each element of the universe evaluates to what extent it participates to the global entity. In our setting, there is a further source of uncertainty: we cannot directly observe the elements of the universe, but we just observe the value of a (collection of) attributes associated to it. The attribute generates a partition formed by equivalence classes of indistinguishable elements (two elements are indistinguishable when they are associated to the same value of the attribute). In this setting, our incomplete information about each fuzzy outcome is naturally represented by means of a pair of nested fuzzy sets called the lower and the upper approximations that determine a collection of fuzzy random sets, one of which is the "right" one. The main goal of this PhD thesis is to find the best characterization of the information about the probability distribution induced by the fuzzy random set, as well as about some remarkable parameters (expectation, variance, etc.). The first chapter provides a formal relational study about measures of (dis)similitude between fuzzy sets, needed in the rest of the paper. The second chapter explores the notions of "expectation" and "dispersion" of fuzzy random sets, leading to the notions of "centroid" and "pair-wise expected dissimilitude". The last chapter studies the characterization of the probability distribution induced by the fuzzy random set, and provides a tool to quantify the accuracy of the information provided about the fuzzy random set, based on the expected dissimilitude between the pair of lower and upper approximations.

# FSTA 2014 The twelve international conference on Fuzzy Set Theory and Applications

## Liptovský Ján (Slovak Republic) 26-31 January 2014
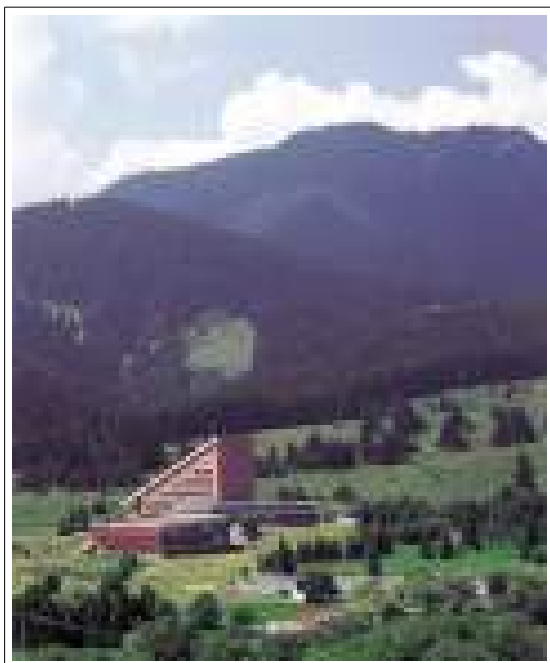


Web page:`www.math.sk/fsta`

## Organization

The Twelfth Conference on Fuzzy Set Theory and Applications FSTA 2014 will take place under the auspices of the Slovak University of Technology in Bratislava, the Armed Forces Academy of General Milan Rastislav Štefánik in Liptovský Mikuláš and the Working Group for Fuzzy Set Theory and Applications of the Slovak Mathematical and Physical Association, in co-operation with EUSFLAT and SIPKES.

## International Scientific Programme Committee

Honorary Chairman: ZADEH Lotfi A. (U.S.A.)

Chair persons: KLEMENT Erich Peter (Austria), MESIAR Radko (Slovak Republic), SAMINGER-PLATZ Susanne (Austria)

## Scientific Programme

The Conference Scientific Programme will consist of special invited plenary lectures, invited and contributed parallel sessions. Rooms can be provided for workshops and special invited sessions during the conference.



## Abstracts

All accepted abstracts will be published in the Conference Proceedings which will be available at the beginning of the conference.

## General information

Language: The official conference language will be English. Simultaneous interpretation will not be available.

Venue: Lectures and sessions will take place at the Hotel SOREA Máj in Liptovský Ján. The opening ceremony will begin on Monday morning, January 27, 2014 at 9 a.m. The conference is expected to end on Friday noon, January 31, 2014.

Accommodation: The conference, including accommodation of the participants and accompanying persons, will take place at the Hotel SOREA Máj in Liptovský Ján. Room and board (five nights lodging, breakfasts, lunches and dinners from Sunday evening, January 26, 2014 till Friday afternoon, January 31, 2014) are provided.

Social and cultural events: The Organizing Committee will prepare an excursion, a concert and a reception for participants and accompanying persons. The region of Liptovský Ján is a starting point for visiting different parts of the central Slovakia. There are several possibilities to go for individual trips to the High or Low Tatras. The hotel swimming pool with thermal water and fitness centre will be open (free of charge) for all conference participants and accompanying persons.

## Organizing committee

Chair: Ladislav ŠIPEKY (ladislav.sipeky@stuba.sk), managing director of SIPKES

Members: Tomáš BACIGÁL, Gejza JENCA, Peter STRUK, Andrea STUPNANOVÁ
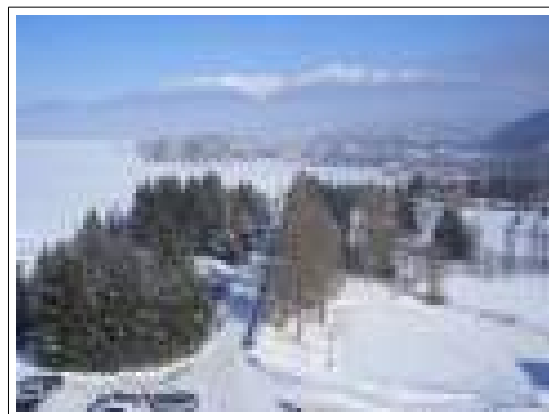
# LINZ 2014 Graded Logical Approaches and their Applications. 35th Linz Seminar on Fuzzy Set Theory

### Bildungszentrum St. Magdalena, Linz (Austria) 18-22 February 2014

Web page:http://www.flll.jku.at/div/research/linz2014/index.html

Since their inception in 1979 the Linz Seminars on Fuzzy Sets have emphasized the development of mathematical aspects of fuzzy sets by bringing together researchers in fuzzy sets and established mathematicians whose work outside the fuzzy setting can provide direction for further research. The philosophy of the seminar has always been to keep it deliberately small and intimate so that informal critical discussions remain central.

LINZ 2014 will be the 35th seminar carrying on this tradition and is devoted to the theme "**Graded logical approaches and their applications**". The goal of the seminar is to present and to discuss recent advances of graded logical approaches and their various.

Topics
Accordingly, the topics of the Seminar will include but not be limited to:

- Fuzzy Logic (Mathematical fuzzy logic, logics with evaluated syntax, many-valued logics, fuzzy modal logics, related algebraic structures)

- Probabilistic and uncertainty models on algebras of fuzzy logic (States, algebraic models for states)

- Uncertainty and Similarity-based Reasoning (Probabilistic logics, Possibilistic logic, Non-monotonic reasoning, Causal reasoning)

- Fuzziness and Uncertainty in: Logic programming, Answer set programming, Description logics, Formal concept analysis

- Logical aspects of (fuzzy) rough sets and fuzzy concept lattices

- Weighted and fuzzy automata

Invited speakers
The following invited speakers (in alphabetic order) have already confirmed their participation:

- Stefano Aguzzoli, University of Milan (Italy)

- Ioana Leustean, University of Bucharest (Romania)

- Didier Dubois, IRIT-CNRS (France)

- Gabriele Kern-Isberner, University of Dortmund (Germany)

- Rafael Peñaloza, University of Dresden (Germany)

- Anna Zamansky, Universtiy of Vienna (Austria)

The "Linz" tradition has these key features: the number of participants of the Linz Seminars is usually bounded above by 40 with broad international representation and a mix of pure and applied interests; there are no parallel sessions so that all participants focus on each presentation and fully engage in each topic; and there is ample time for discussion of each presentation, with follow-up round tables for discussion of open problems and issues raised in the talks.

Program chairs
Tommaso Flaminio, Varese, Italy
Lluis Godo, Barcelona, Spain
Siegfried Gottwald, Leipzig, Germany

Program Committee
Bernard De Baets, Gent, Belgium
Didier Dubois, Toulouse, France
János Fodor, Budapest, Hungary
Michel Grabisch, Paris, France
Petr Hájek, Praha, Czech Republic
Ulrich Höhle, Wuppertal, Germany
Erich Peter Klement, Linz, Austria
Wesley Kotzé, Grahamstown, South Africa
Radko Mesiar, Bratislava, Slovak Republic
Daniele Mundici, Firenze, Italy
Endre Pap, Novi Sad, Serbia
Stephen E. Rodabaugh,Youngstown, OH, USA
Susanne Saminger-Platz, Linz, Austria
Aldo Ventre, Napoli, Italy
Siegfried Weber, Mainz, Germany

# ISCAMI 2014 International Student Conference on Applied Mathematics and Informatics

## Malenovice (Czech Republic) 27-30 March 2014



Web page:http://irafm.osu.cz/iscami/Text/home-page37ce.php

### Purpose of the Conference

International Conferences for Undergraduate and Graduate Students of Applied Mathematics (SCAM/ISCAM) were organized by two faculties of the Slovak University of Technology in Bratislava. Professor Zdenka Riecanová from the Faculty of Electrical Engineering and Information Technology and professor Radko Mesiar from the Faculty of Civil Engineering were guaranties of these conferences in years 1999-2007. The original idea was to bring together graduate students in various areas of mathematics relevant for applications.

After one-year pause, the ISCAM is again organized in a new guise. Since 2009, the ISCAMI extends its scope by informatics and it is co-organized by the Department of Mathematics of Faculty of Civil Engineering (Slovak University of Technology in Bratislava) represented by Radko Mesiar and by the Institute for Research and Applications of Fuzzy Modeling (University of Ostrava) represented by Vilém Novák. Venue will alter every year between Bratislava to keep the original nature and tradition of the ISCAM conference and an unspecified locality situated in mountains close to Ostrava to provide participants with manifold surroundings.

ISCAMI 2014 will be organized in Malenovice - a beautiful village situated on the root of the Lysá hora mountain, the highest mountain in Beskydy mountains.

### Publications

Based on the quality and the topics of contributions, chosen participants will be invited to submit papers in English to special issues of international journals.

### Summer School

In 2014, based on the decision of the organizing committee and the successful experience from 2012 and 2013, ISCAMI will be organized jointly with the 3rd Summer School

on Applied Mathematics and Informatics. This means that the programme will alter between sections with student contributions and blocks of tutorials given by invited prominent reaseachers. This activity as well as the whole conference is supported by the A-MATH-NET project.

### Dates and Deadlines

- Early registration deadline: February 1, 2014
- Submission of abstracts: February 1, 2014
- Notification of acceptance: February 15, 2014
- Registration deadline: March 1, 2014
- Conference: March 27-30, 2014

### Topics (suggested, but not limitted to)

- Theory, methods and tools

    Fuzzy Sets and Fuzzy Logic, Probability and Statistics, Possibility Theory, Theoretical foundations of Soft Computing Methods, Knowledge Representation and Acquisition, Machine Learning, Mathematical Analysis, Dynamical systems, Number Theory, Financial Mathematics, Graph Theory, Algebra, Theoretical and Applied Geometry, Discrete Mathematics

- Application fields

    Intelligent Systems, Fuzzy Control, Expert Systems, Clustering, Databases, Classification, Image Processing, Intelligent Agents, Pattern Recognition, Medical Applications, Bioinformatics, Financial Engineering, Decision Support Systems, Information Retrieval and Fusion, Semantic Web, Coding and Cryptography, Data Mining

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CALLS

# ABLAT 2014 International Symposium on Aggregation on Bounded Lattices

Trabzon (Turkey) 16-20 June 2014



Web page:http://ablat.ktu.edu.tr/

The goal of the symposium is to present and discuss the recent advances in aggregation operators on bounded lattices accordingly, the topics of the symposium will include but not be limited to:

- Theoretical aspects:

    - Properties of aggregation functions

    - New forms of aggregation functions

    - Copulas and triangular norms

    - Fuzzy measures and integrals

    - Averaging aggregation operators

    - Aggregation on ordinal and on nominal scales

    - Aggregation functions for extensions of fuzzy sets

    - Implication operators

- Practical aspects:

    - Security intelligence, analysis and decision support

    - Evaluation problems

    - Medical decision problems

    - Hybrid intelligent systems and computational intelligence

    - Approximate reasoning

    - Image processing

    - Model identification and parametization

    - Diagnostics and prognostics

    - Data mining

The invited speakers of the symposium include:
Miguel Couceiro, France
Bernard DeBaets, Belgium
Mustafa Demirci, Turkey
Djavvat Khadjiev, Turkey
Radko Mesiar, Slovak Republic
Ismail Burhan Türksen, Turkey

International program committee B.Bedregal, Brazil
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# IPMU 2014 15th International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems

Montpellier (France) 15-19 July 2014



Web page:http://www.ipmu2014.univ-montp2.fr/index.html

The IPMU conference is organized every two years with the focus of bringing together scientists working on methods for the management of uncertainty and aggregation of information in intelligent systems. It provides a medium for the exchange of ideas between theoreticians and practitioners in these and related areas.

Topics and Scope of the Conference

- Theory, Methods and Tools:

    Uncertainty, Bayesian and Probabilistic Methods, Information Theory, Measures of Information and Uncertainty, Evidence and Possibility Theory, Utility Theory, Fuzzy Sets and Fuzzy Logic, Rough Sets, Multiple Criteria Decision Methods, Aggregation Methods, Knowledge Representation, Approximate Reasoning, Non-classical Logics, Default Reasoning, Belief Revision, Argumentation, Ontologies, Uncertainty in Cognition, Graphical Models, Knowledge Acquisition, Machine Learning, Evolutionary Computation, Neural Networks, Data Analysis.

- Application Fields:

    Intelligent Systems and Information Processing, Decision Support, Database and Information Systems, Information Retrieval and Fusion, Image Processing, Multi-Media, Agents, Pattern Recognition, Medicine and Bioinformatics, Finance, Software Engineering, Industrial Engineering.

IPMU-2014 solicits original research contributions of theoretical and methodological nature as well as application-oriented work. IPMU-2014 will not accept any paper which, at the time of submission, is under review or has already been accepted for publication in a journal or another conference. Authors are also expected not to submit their papers elsewhere during the review period. Contributions will be selected based upon their quality as evaluated by 2-3 referees.

Special Sessions

- Aggregation Functions

- Big Data - the Role of Fuzzy Methods

- Information Fusion Systems

- Fuzzy Measures and Integrals

- Soft Computing in Image Processing

- Intelligent Databases and Information Systems

- Intelligent Measurement and Control for Nonlinear Systems

- Imprecise Probabilities: From Foundations To Applications

- Management of Uncertainty in Social Networks

- Fuzzy implication functions

- Decision Support and uncertainty management in Agri-Environment

- Soft Computing and Sensory Analysis

- Uncertainty and Imprecision on the Web of Data

- Uncertainty Management in Machine Learning

- Affective Computational Intelligence

- Fuzzy logic in Boolean framework

- Philosophy and History of Soft Computing

- Fuzzy Logic, Formal Concept Analysis and Rough Sets

- Formal Methods for Vagueness and Uncertainty in a Many-Valued Realm

Important dates

October 14, 2013: Submission of special sessions
December 31, 2013: Submission of papers
February 24, 2014: Notification of acceptance
March 31, 2014: Submission of camera-ready versions of accepted papers

CALLS

# SMPS 2014 7th International Conference on Soft Methods in probability and statistics

Varsaw (Poland) 22-24 September 2014



Web page:http://smps2014.ibspan.waw.pl/
Scope

Probability and statistics were the only well-founded theories of uncertainty for a long time. However, during last forty years, in such areas like decision theory, artificial intelligence or information processing, numerous approaches extending or orthogonal to the existing theory of probability and mathematical statistics have been successfully developed. These new approaches have appeared, either on their own like fuzzy set theory, possibility theory, rough sets, or having their origin in probability theory itself, like imprecise probability, belief functions, fuzzy random variables.

The common feature of all those attempts is to allow for a more flexible modelling of imprecision, uncertainty, vagueness and ignorance. The proposed new methods are softer than the traditional theories and techniques because being less rigid they more easily adapt to the actual nature of information.

Wide range of applications still reveals the need for soft extensions of classical probabilistic and statistics tools. For example, in data analysis and data mining it is becoming increasingly clear that integrating fuzzy sets and probability can lead to more robust and interpretable models which better capture all kinds of the information contained in data. Also, in science and engineering the need to analyze and model the true uncertainty associated with complex systems requires a more sophisticated representation of ignorance than that provided by uninformative Bayesian priors.

Several years ago, the need was felt to establish a recurrent forum for exchanging of ideas and discussing new trends that enlarge the statistical and uncertainty modelling traditions, towards a flexible and more specific handling of incomplete or subjective information. This idea resulted in a series of biannual international conferences on Soft Methods in Probability and Statistics (SMPS), organized for the first time in Warsaw in 2002. Subsequent events in this series took place in Oviedo (2004), Bristol (2006), Toulouse (2008), Oviedo/Mieres (2010) and Konstanz (2012).

The 7th International Conference on Soft Methods in Probability and Statistics - SMPS 2014 returns to Warsaw, the capital of Poland. The conference will be organized by the Polish Operational and Systems Research Society, Systems Research Institute of the Polish Academy of Sciences and Faculty of Mathematics and Information Science of Warsaw University of Technology.

The aim of the conference is to bring together theoreticians and practitioners working on soft probability, statistics and data analysis. Topics and scope of the SMPS conference include but are not limited to:

- Analysis of Censored Data
- Analysis of Fuzzy Data
- Clustering and Classification
- Dempster-Shafer Theory
- Fuzzy Random Variables
- Fuzzy Regression Methods
- Graphical Models
- Imprecise Probabilities
- Machine Learning
- Possibility Theory
- Random Sets/Random Fuzzy Sets
- Robust Statistics
- Rough Sets in Data Analysis
- Soft Computing and Statistics
- Statistical Software for Imprecise Data
- Triangular Norms and Copulas

Invited speakers
Eyke Hüllermeier
Inés Couso
Bernard De Baets
Important Dates
Paper Submission Start: February 1, 2014
Paper Submission End: March 15, 2014
Notification of Acceptance: April 28, 2014
Final Paper submissions: May 17, 2014
Early Registration End: May 31, 2014
Conference: September 22-24, 2014
(Welcome Party, Sunday evening, September 21, 2014)
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7th International Conference on Soft Methods in probability and statistics

# MDAI 2014 11th International Conference on Modeling Decisions for Artificial Intelligence

## Tokyo (Japan) 29-31 October 2014

Web page: http://www.mdai.cat/mdai2014

**Important Dates**
Submission deadline: March, 24th 2014
Acceptance notification: June, 8th 2014
Final version: June, 26th 2014
Conference: October, 29-31 2014

### Aims and goals

The aim of the MDAI conference series is to provide a forum for researchers to discuss models for decision and information fusion (aggregation operators) and their applications to AI.

In MDAI 2014, we encourage the submission of papers on decision making, information fusion, game theory, and related topics. Applications to privacy technologies as well as real world problems are welcomed.

This conference is CORE-B in the CORE 2013 Australian ranking.

- Methods and Tools:
  - Information fusion

  - Aggregation operators
  - Utility and decision theory
  - Model and operator selection
  - Learning methods for parameter determination
  - Machine learning and statistical learning
  - Soft computing
  - Optimization methods in AI and decision modeling
  - Non-additive measures and integrals

- Applications:
  - Data privacy
  - Multiagent systems
  - Social networks
  - Data mining
  - Bibliometry
  - Autonomous robots
  - Entertainment computing
  - Subjective evaluation

– Bioinformatics

– Information access

## Submission and Publication

Original technical contributions are sought. Contributions will be selected on the basis of their quality. Papers should not exceed 12 pages in total (using LNCS/LNAI style). Proceedings with accepted papers are expected to be published in the LNAI/LNCS series (Springer-Verlag) and distributed at the conference, as done in previous MDAI conferences. See LNAI volumes 3131, 3558, 3885, 4617, 5285, 5861, 6408, 6820, 7647, and 8234. Besides, papers, that according to the evaluation of the referees, are not suitable for the LNAI but that have some merits will be published in a USB proceedings (with ISBN) and scheduled in the MDAI program.

## Contact

mdai@mdai.cat

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