

## **The 25<sup>th</sup> Anniversary of the Seminar for Fuzzy Systems & A.I. *Grigore C. Moisil***

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In 2005 we celebrate 25 years from the founding of the Seminar for Fuzzy Systems & A.I. “*Grigore C. Moisil*” and 15 years from the creation of the Romanian Society for Fuzzy Systems. The Seminar has started as an informal, unofficial seminar in the Technical University of Iași (then, the Polytechnic Institute of Iași), at the initiative of Horia-Nicolai Teodorescu.

### **The National and the International Context**

The first volume of fuzzy logic has been published in 1974 by Arnold Kaufman, in France. Romanian scientists played a special part at the beginning of the development of the domain. First of all, Grigore C. Moisil, the famous Romanian mathematician and humanist, was actively investigating, since the 1950's, the multivalued logics and alternate, non-Chrysipian logics. He dubbed these logics the *nuance logics*. In 1975, Virgil Negoita and Dan Ralescu published the second volume in the world on fuzzy logic, in Romania.

### **The First 10 Years**

The Seminar for fuzzy systems *Grigore C. Moisil* started as unofficial meetings of a group formed by a few persons from the universities and research institutes of Iași. Among the first participants who joined Horia-Nicolai Teodorescu were Roman Siretchi (Technical University of Iași), Mircea Chelaru (at that time, at the Research Institute *Petru Poni*, Iași), Constantin Posa (Technical University of Iași), Dan Cristea (University *Al.I. Cuza* of Iași), and Ioan Tofan (at that time, Technical University of Iași). They have been joined later by Silviu Nistor, Ioan Bogdan, and several students.

After the foundation of the Iași Branch of the Institute for Computing Technology (*Institutul de Tehnica de Calcul*, ITC) in Iași, in 1986, several young researchers from that institute joined the Seminar.

The sessions of the Seminar included presentations of recent advances in fuzzy systems and in other related topics, like neural networks, other topics in artificial

intelligence (A.I.), and mathematics. Researches by the members of the group were presented too.

Although the sessions of the Seminar were carefully prepared and generally took place in a fixed day of the week, the sessions remained informal and unofficial. For those not knowing the conditions before 1990 in Romania, we notice that at that time any meeting in larger groups had to be approved; the demands for approval were regarded with reticence and suspicion and quite frequently got no approval.

The group in Iași was aware of the volumes by C.V. Negoita and D. Ralescu and by Kaufmann, moreover of several other papers in the field, including some papers by L. Zadeh. Also, they were aware of some researches in the National Institute for Informatics (Bucharest) and of some researches in the Academy for Economics. The group learned about the researches of Prof. Dan Butnariu (originally from Iași) only after he moved to Israel. The group was also aware of the researches performed in Japan and had some connections with Prof. Takeshi Yamakawa since 1987, and with groups in Poland and in Bulgaria (Prof. V. Topencharov and Dr. Peeva). But it was only starting 1985 that the group was able to make direct contacts with these researchers. Nevertheless, those early international contacts with scientists in Eastern Europe have been instrumental.

The early papers on fuzzy systems authored by the members of the group have been published in volumes of national symposia and conferences. After 1985, H.N. Teodorescu started publishing several papers of fuzzy logic in image processing and medical applications, fuzzy arithmetic, and in fuzzy dynamic systems and chaos in fuzzy systems. The papers have been published in Japan, France, U.K., Poland etc. A few years later, I. Tofan and S. Nistor, sometimes in cooperation with H.N. Teodorescu published papers on mathematics of fuzzy sets, fuzzy algebra, and the mathematics of fuzzy systems.

In 1988, the then Rector of the Technical University of Iași, Prof. Cameluta Beldie, has agreed to the existence of the Seminar as a regular internal scientific meeting and the internal publication of a small volume on fuzzy systems. The volume, authored by H.N. Teodorescu, I. Tofan, M. Chelaru, D. Gâlea and S. Nistor, was published in the spring of 1989.

A special grateful mention for three people who supported and appreciated the activities of the Seminar, and whose goodwill may have helped its continuation: Prof. Dimitrie Mangeron, Prof. Adolf Haimovici, and Acad. Cristofor Simionescu. They all have been encouraging us in the early years.

### **After 1990**

In 1990, the leadership of the Technical University of Iași has fully recognized the Seminar as a regular scientific group including researchers from several institutions. Moreover, the then Rector of the university, Prof. Vitalie Belousov, has personally supported this scientific initiative. One year later, with the support of the same Rector, the Ministry of Education and Research recognized the

tradition and the results obtained in the framework of the Seminar by establishing a research center devoted to the topic promoted in the Seminar. The center has been named *Center for Education and Research in Fuzzy Systems and A.I.* (CERFS) and has been placed under the direct jurisdiction of the Research Department of the Ministry. While the jurisdiction has changed, the center CERFS still exists and has been recognized as *center of excellence* by CNCSIS – the organism of the Ministry that confers such distinctions to the research centers.

### **The Fuzzy Systems School represented by the Seminar**

Possibly, the most important contribution of the Seminar has been the creation of a research school in fuzzy logic, fuzzy systems and related domains, like neural networks, nonlinear dynamics and genetic algorithms. The school has produced a large number of specialists in the field, who significantly contributed to the research at the national and the international levels, especially after 1990. A distinctive feature of this school is that it is active in several domains, including mathematics, control, computer science, economics, and medicine, with several people very active in these domains. We can say that it is a *distributed* school.

From the beginning, several directions of learning and research have been included in the interest of the Seminar: mathematics of fuzzy sets, mathematics of fuzzy systems, nonlinear dynamics in fuzzy systems, information processing based on fuzzy logic, engineering applications of fuzzy systems, medical applications of fuzzy logic and systems. To these directions, the research in applications of fuzzy logic and systems in economics and management have been added after 1990.

Among the participants to the seminars that became interested in the theory of fuzzy systems and who contributed to the domain, beyond the older members (Horia-Nicolai Teodorescu, founder, Ioan Tofan, Mircea Chelaru, Dan Gâlea, Silviu Nistor, Dan Cristea), are Dr. Adrian Stoica, presently principal investigator at JPL – NASA, one of the best specialists in evolvable hardware, Prof. Constantin Poșa (deceased), Dr. Mircea Chelaru (now, at Duke University), Prof. Dragos Arotaritei, currently Chair at the University of Medicine and Pharmacy –UMF–*Gr.T. Popa* Iași, Assoc. Prof. Florin Grigoraș (University of Arts, where he developed the first education track in multimedia in arts, at the national level), Assoc. Prof. Adrian Brezulianu (Technical University of Iași – TUI), Dr. Cristian Bonciu (currently in Canada), Dr. Ionel Gheorghe (now in Canada), Assoc. Prof. Lucian Boiculesei (University of Medicine and Pharmacy *Gr.T. Popa* Iași), Prof. Hariton Costin (at the same university), and Dr. Mihaela Costin (Institute for Theoretical Informatics – IIT).

Other participants have been Dr. Otilia Paduraru (IIT), Assoc. Prof. Monica Dascalu (Polytechnic University of Bucharest), Prof. Emil Sofron (University of Pitesti), Eng. Constantin Gherasim (Canada), Dr. Doina Jitca (IIT), Prof. Victor Grigoraș (UTI), Assoc. Prof. Carmen Grigoraș (UMF), eng. Mihaela Anghelescu, Assoc. Prof. Catalin Buhuși (Duke University) and many others (see the list of the former and present Seminar members).

This partial list shows that the impact of the Seminar has been significant not only at the local and national level, but to the international level too. The Seminar for fuzzy systems *Grigore C. Moisil* has contributed to a pool of more than 100 specialists (including students that had their graduation thesis in the relevant domains, supervised by members of the Seminar) in fuzzy logic, neural networks, evolutionary systems and related domains.

### **The Organizational Impact of the Seminar**

After the liberalization of the scientific activities in 1990 in Romania, the first task assumed by the members of the Seminar has been the creation of the Romanian Society for Fuzzy Systems (RSFS). This society has been established in the spring of 1990. The society has been the nucleus for the organization, in 1992, of the Balkan Union for Fuzzy Systems and A.I., which included members from Bulgaria, Greece, R. Moldova, Romania, Turkey, and the former Yugoslavia.

The results of the Seminar and its scientific merits have attracted the attention of the Romanian Academy and essentially led to the transformation of the former Iași Branch of the Institute for Computer Technology (to which many members of the Seminar belonged) into the current Institute for Theoretical Informatics of the Romanian Academy.

Moreover, the Seminar *Grigore C. Moisil* has been – and still is – the nucleus for the *Commission for Fuzzy Systems and A.I. of the Romanian Academy – Iași Branch*, in 1994.

Together with the Romanian Society for Fuzzy Systems, the Seminar for fuzzy systems *Grigore C. Moisil* has organized more than 10 international symposia and conferences in Iași (1990, 1991, 1992, 1994, 1996, 2000, 2002, 2003, 2004, 2005). Conferences have also been organized in Bucharest (1995), and Trabzon, Turkey (1993). Moreover, the Seminar has yearly contributed to the organization of a symposium in the frame of the *Iași Academic Days* of the Iași Branch of the Romanian Academy.

### **Contribution to the Scientific Literature in the Field**

The Seminar for fuzzy systems *Grigore C. Moisil* was instrumental in the inception of the journal *Fuzzy Systems & A.I. – Reports and Letters*, published by the Romanian Academy.

The members of the Seminar have published, during their active participation in the Seminar, several hundred papers in the field. Out of them, more than 200 are published in the international journals or conference proceedings.

Also, the members of the Seminar have published, in relation to their activities in the Seminar, more than 25 volumes, in Romania and abroad, some of them with well established publishers, like Kluwer, Springer Verlag, CRC Press, Academic Press, etc.

### **Instead of Conclusions**

The Seminar for Fuzzy Systems and A.I. *Grigore C. Moisil* has played and plays a significant role in the academic life of Romania and abroad, during its 25 years of existence, in the fields of soft computing, A.I., and intelligent systems.

The Seminar has developed and pursues co-operations with similar bodies around the world, including the Fuzzy Logic System Institute (Japan), the Bio-Medical Fuzzy Systems Association (BMFSA, Japan), Chaos e Complessita (Italy), Swiss Federal University of Lausanne, IFSA, the Japanese Society for Fuzzy Systems (SOFT), NAFIPS (USA), etc.

Among the future activities we envisage are the organization in 2006 the anniversary of 100 years since the birth of Grigore C. Moisil and a related international conference.