Emergence, Complexity and Computation

Volume 12

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The Emergence, Complexity and Computation (ECC) series publishes new developments, advancements and selected topics in the fields of complexity, computation and emergence. The series focuses on all aspects of reality-based computation approaches from an interdisciplinary point of view especially from applied sciences, biology, physics, or Chemistry. It presents new ideas and interdisciplinary insight on the mutual intersection of subareas of computation, complexity and emergence and its impact and limits to any computing based on physical limits (thermodynamic and quantum limits, Bremermann's limit, Seth Lloyd limits...) as well as algorithmic limits (Gödel's proof and its impact on calculation, algorithmic complexity, the Chaitin's Omega number and Kolmogorov complexity, non-traditional calculations like Turing machine process and its consequences,...) and limitations arising in artificial intelligence field. The topics are (but not limited to) membrane computing, DNA computing, immune computing, quantum computing, swarm computing, analogic computing, chaos computing and computing on the edge of chaos, computational aspects of dynamics of complex systems (systems with self-organization, multiagent systems, cellular automata, artificial life,...), emergence of complex systems and its computational aspects, and agent based computation. The main aim of this series it to discuss the above mentioned topics from an interdisciplinary point of view and present new ideas coming from mutual intersection of classical as well as modern methods of computation. Within the scope of the series are monographs, lecture notes, selected contributions from specialized conferences and workshops, special contribution from international experts.

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Automata, Universality, Computation

Tribute to Maurice Margenstern

Springer

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Preface

A Tribute to Maurice Margenstern

A few figures witness Maurice Margenstern's scientific accomplishments. He authored or co-authored 210 papers (some more being on the way...). His 54 co-authors are from all over the world: France, Belgium, Switzerland, Germany, Austria, Italy, Spain, Ireland, United Kingdom, Finland, Hungary, Moldavia, Romania, Russia, Israel, China, Malaysia, Japan, Chili, USA. Besides his research papers, he wrote 6 books, organized and edited the proceedings of 8 international conferences, supervised 5 students.

And, most importantly, he pioneered new areas of research at the intersection of mathematics and computer science.

How did Maurice become the scientist we so much appreciate?

Maurice was born in Paris on June 6, 1947. After high school he was accepted in prestigious French "grandes écoles". Resigning from the École Polytechnique he entered the École Normale Supérieure de Cachan. After he passed the French "agrégation de mathématiques", he got an academic position at the mathematics department of the University of Paris-Sud (Orsay) in 1970.

Attracted by constructive mathematics, then a very marginal subject in France, he went in the early 70's to Leningrad to study with Nicolaï A. Shanin, then the head of the famous Russian school in constructive mathematics founded by A.A. Markov. This is where he worked on his thesis on *Constructive topological properties of spaces of almost periodic functions.*

Then his scientific inclinations gradually moved from constructive mathematics to computability, a subject then much revived after Matijasevich's famous result on Hilbert's 10th problem. In the late 80's he joined the computer science laboratory LITP (now LIAFA) in Paris and started his amazing investigation of the simplest (resp. most complex) machines with an undecidable (resp. decidable) halting problem. Despite the previous works by Yuri Rogogine in Moldavia and Ludmila Pavlotskaia in Russia, this topic was then rather confidential. Maurice is to be credited for putting it up as one of the important themes in computability. He did so via his

own contributions and via a triennial international conference *Machines, Computations and Universality* he set up in 1995 and which still goes on. I remember how Josef Gruska (speaking as the last chairman of the first conference, held in Paris) stressed how much energy Maurice had to show in order to create from scratch such a successful international event.

Maurice passed his Habilitation in 1994 "*Study of the frontier between decidability and undecidability of the halting problem of small or constrained Turing machines.*" He was then appointed as a professor in computer science by the university of Lorraine at Metz. There he created the LITA laboratory and spent much energy to make it a solid research center. Some years ago, he was promoted "professeur de classe exceptionnelle", the highest rank in French Academia.

In the early 2000's Maurice developed the subject of computation with cellular automata in the hyperbolic world (dimension 2, 3 or 4) and brought solutions to long open difficult tiling problems. Besides these technical achievements, Maurice proved that hyperbolic computability allows to overcome known unfeasibility results of the Euclidean world.

The classical tool in hyperbolic geometry is the theory of groups but Maurice invented completely new tools: combinatorial ones. As is usual with new ideas, experts in hyperbolic geometry showed reluctance towards such an innovative approach and it was a real relief for Maurice when Donald Knuth wrote to him to express that he found these new tools "quite fascinating" and will refer to them in the Art of Computer Programming.

Of course, the two themes presented above do not exhaust the subjects Maurice investigated but they witness his creative talent and impressive energy.

Maurice recently retired and is now emeritus professor at the university of Lorraine. Having no more to teach and manage a research team, Maurice simply spends more time to continue producing prominent works.

Having had the privilege to know him since the mid 70's, it is my pleasure to say, in the name of all contributors of this volume: Maurice, thank you for what you have accomplished and let's continue our friendship and scientific collaboration.

Serge Grigorieff
Paris

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