UNIVERSITÀ DEGLI STUDI DI BARI ALDO MORO

Seminar Announcement

DIPARTIMENTO DI INFORMATICA

The Seminars on "Information Technology Outlook" - PhD Program in Computer Science and Mathematics

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15:30

Sala Consiglio 7° floor
Dept. of Computer Science

Computations with numerical infinities and infinitesimals

In this lecture, a recent computational methodology is described. It has been introduced with the intention to allow one to work with infinities and infinitesimals numerically in a unique computational framework. It is based on the principle 'The part is less than the whole' applied to all quantities (finite, infinite, and infinitesimal) and to all sets and processes (finite and infinite). The methodology uses as a computational device the Infinity Computer (patented in several countries) working numerically with infinite and infinitesimal numbers that can be written in a positional system with an infinite radix called grossone. On a number of examples (numerical differentiation, optimization, Turing machines, divergent series, ordinary differential equations, fractals, set theory, etc.) it is shown that the new methodology can be useful from both theoretical and computational points of view. The accuracy of the obtained results is continuously compared with results obtained by traditional tools used to work with mathematical objects involving infinity. Reviews, videos, more than 70 papers of authors from several research areas using this methodology in their applications can be downloaded from https://www.theinfinitycomputer.com The web page https://www.numericalinfinities.com developed at the University of East Anglia contains materials related to teaching this methodology.

Yaroslav D. Sergeyev,. is Distinguished Professor and Head of Numerical Calculus Laboratory at the University of Calabria, Italy, since 2002. He is also part-time Professor at Lobachevsky State University, Nizhniy Novgorod, Russia. His research interests include numerical analysis, infinity computing and calculus, global optimization (he was President of the International Society of Global Optimization, 2017-2021), philosophy of computations, set theory, number theory, fractals, parallel computing, and interval analysis. His list of publications contains more than 300 items (among them 6 authored and 6 edited books). Prof. Sergeyev was awarded several research prizes; among others, we cite: Caratheodory, ICNAAM, and Gioacchino da Fiore International Awards (all in 2023); Distinguished Lecturer, Lancaster University, UK, 2020; Khwarizmi International Award, 2017; EUROPT Fellow, 2016; The 2014 Journal of Global Optimization (Springer) Best Paper Award;