JOUAL Workshop 2009

*** Just One Universal Algorithm ***

Experiments with emergence
in computational systems modeling spacetime and nature
Pisa, July 10-11, 2009

http://fmt.isti.cnr.it/JOUAL2009/

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Support

CNR/ISTI - Project XXL
Wolfram Research

'Joual' is a French dialect, named after the antique pronunciation of 'cheval' (horse), and associated with the French speaking working class in Montreal. Logo sculpture by Jim Mullan.

Background

Could all the complexity we observe in the physical universe emerge by just iterating a few simple transition rules, and be virtually reproducible by running a few lines of code?

Could spacetime originate from an information processing mechanism analogous to that of Wolfram's Elementary Cellular Automata or Conway's Game of Life? Could it be a Turing machine, or a graph-rewriting system? Or would the choice among alternative models of computation be immaterial, each yielding the same physics and universe?

Could this fundamental universal algorithm (if any) be discovered just by computer experiments, and by exhaustively mining portions of the computational universe?

In the last few decades, several scientists (K. Zuse, J. A. Wheeler, R. Feynman, E. Fredkin, S. Wolfram, G. 't Hooft, S. Lloyd, J. Schmidhuber, M. Tegmark, to mention a few) have contributed, in a variety of ways and degrees, to creating a positive attitude about the 'computational universe picture', in an effort, sometimes called 'digital physics', whose interplay with other approaches in theoretical physics – notably in Quantum Gravity – should still be thoroughly investigated.

Workshop objectives

The central questions posed by a computation-oriented view at the physical universe can be, and have been addressed by a variety of approaches in several disciplines, from mathematics to philosophy. However, the first edition of the JOUAL Workshop is strictly characterized by three attributes: *experimental*, *emergent*, *simple* (...'but no simpler'). The purpose is to collect computer experiments that attempt to model physical/natural phenomena of any kind, from gravity to quantum fluctuations of empty space, from elementary particles to processes in the biosphere, by the emergent features of very simple computational rules. This includes, for example, evolutionary algorithms, but excludes ad-hoc programs that encode explicit information from the target domain.

If the ultimate rules of nature are simple, hopefully their illustration can be made simple too: an effort is required from workshop contributors to keep their presentations at a level that could be accessed by researchers from multiple disciplines, and possibly by the interested layman.

Important dates

Paper submission: March 31, 2009 (16 pages, PDF)
Paper acceptance: May 10, 2009
Final paper due: June 1, 2009

Submission

Please send your PDF file to *both* email adresses below:
t.bolognesi@isti.cnr.it   hector.zenil-chavez@malix.univ-paris1.fr

Proceedings

Submitted papers shall be selected for presentation and publication in the Workshop Proceedings based on adherence to the Workshop theme and on the key attributes mentioned above. Accepted papers will be considered for publication in special issues of the journal Complex Systems and/or Journal of Unconventional Computing. Conditional to the quality of the contributions and available support, an effort is planned for the divulgation of the Workshop results, e.g. via Web publication, for stimulating interest and curiosity, in the scientific community and in the general public, about the idea of searching for the (ultimate?) laws of nature by mining the computational universe.