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Unconventional Computation and Natural Computation

12th International Conference, UCNC 2013
Milan, Italy, July 1-5, 2013
Proceedings

Volume Editors

Giancarlo Mauri

Alberto Dennunzio

Luca Manzoni

Antonio E. Porreca

Università degli Studi di Milano-Bicocca

Dipartimento di Informatica, Sistemistica e Comunicazione

Viale Sarca 336/14, 20126 Milan, Italy

E-mail: {mauri, dennunzio, luca.manzoni, porreca}@disco.unimib.it

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Preface

Starting in 2012, the conference series previously known as Unconventional Computation (UC) changed its name to Unconventional Computation and Natural Computation (UCNC). The name change was initiated to reflect the evolution in the variety of fields in the past decade or so. The series is genuinely interdisciplinary and it covers theory as well as experiments and applications. It is concerned with computation that goes beyond the classic Turing model, such as human-designed computation inspired by nature, and with the computational properties of processes taking place in nature.

The topics of the conference typically include: quantum, cellular, molecular, neural, DNA, membrane, and evolutionary computing; cellular automata; computation based on chaos and dynamical systems; massive parallel computation; collective intelligence; computation based on physical principles such as relativistic, optical, spatial, collision-based computing; amorphous computing; physarum computing; hypercomputation; fuzzy and rough computing; swarm intelligence; artificial immune systems; physics of computation; chemical computation; evolving hardware; the computational nature of self-assembly, developmental processes, bacterial communication, and brain processes.

The first venue of the UCNC (previously UC) series was Auckland, New Zealand, in 1998. Subsequent sites of the conference were Brussels, Belgium, in 2000; Kobe, Japan, in 2002; Seville, Spain, in 2005; York, UK, in 2006; Kingston, Canada, in 2007; Vienna, Austria, in 2008; Ponta Delgada, Portugal, in 2009; Tokyo, Japan, in 2010; Turku, Finland, in 2011 and Orléans, France, in 2012. Each meeting was accompanied by its own proceedings¹.

The 12th conference in the series, UCNC 2013, was organized in 2013 in Milan (Italy) by the Department of Informatics, Systems and Communication (DISCO) on the beautiful campus of the University of Milano-Bicocca during July 1–5, 2013.

Milan is situated in the north of Italy, in the middle of the vast area of the Padan Plain, in a truly strategic position for the paths that lead to the heart of Europe. It is the Italian capital of finance and advanced tertiary sector.

Milan is truly one of the few “complete” Italian cities, able to reconcile economic and social realities. It is active in many fields of culture and research. It is a busy and advanced metropolis that attracts millions of people every year, offering a multitude of opportunities in the fields of education, employment, entertainment, and tourism.

¹ See <http://www.cs.auckland.ac.nz/CDMTCS/conferences/uc/uc.html>.

The roots of Milan are planted in a past that has bestowed on us an artistic and cultural heritage; this is not rare for towns in Italy, but not all of them have so much to offer:

- The world-famous *L'Ultima Cena* (*The Last Supper*) by Leonardo Da Vinci
- The Opera House, La Scala
- The Sforza Castle
- The numerous museums and art galleries: many of the treasures of Milan are hidden to the less attentive eyes of its inhabitants, but it is all there, waiting to be discovered

Milan also has a rich calendar of events to cater for all tastes, be they cultural, recreational or sports; the city certainly has something to offer for everyone.

UCNC 2013 was co-located with Computability in Europe 2013 (CiE 2013), with three common invited speakers: Gilles Brassard (Université de Montréal), Grzegorz Rozenberg (Leiden Institute of Advanced Computer Science and University of Colorado at Boulder), and Endre Szemerédi (Hungarian Academy of Sciences, Rutgers University). Other invited speakers were Enrico Formenti (Université Nice Sophia Antipolis, France), John V. Tucker (Swansea University, UK), and Xin Yao (University of Birmingham, UK).

There were 46 submissions from 26 countries including Austria, Bangladesh, Canada, Finland, France, Germany, Hungary, India, Iran, Italy, Japan, Latvia, Malaysia, Moldova, Morocco, New Zealand, Norway, Philippines, Poland, Portugal, Romania, Spain, Sweden, Turkey, UK, and the USA. Each paper was reviewed by three referees and discussed by the members of the Program Committee. Finally, 20 regular papers were selected for presentation at the conference. In addition, there were eight posters on display at the conference.

We warmly thank all the invited speakers and all the authors of the submitted papers. Their efforts were the basis of the success of the conference. We would like to thank all the members of the Program Committee and the external referees. Their work in evaluating the papers and comments during the discussions was essential to the decisions on the contributed papers. We would also like to thank all the members of the UCNC Steering Committee, for their ideas and efforts in forming the Program Committee and selecting the invited speakers.

We wish to thank the conference sponsors: the University of Milano-Bicocca, the Italian Chapter of the European Association for Theoretical Computer Science, and Micron Foundation.

The conference has a long history of hosting workshops. The 2013 edition in Milan hosted three workshops:

- CoSMoS 2013, the 6th International Workshop on Complex Systems Modelling and Simulation² (Monday, July 1)

² <http://www.cosmos-research.org/cosmos2013.html>

- BioChemIT 2013, the Third COBRA Workshop on Biological and Chemical Information Technologies³ (Friday, July 5)
- WIVACE 2013, the Italian Workshop on Artificial Life and Evolutionary Computation⁴ (July 1-2)

July 2013

Giancarlo Mauri
Alberto Dennunzio
Luca Manzoni
Antonio E. Porreca

³ http://www.cobra-project.eu/biochemit2013_call.html

⁴ <http://wivace2013.disco.unimib.it/>

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