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Artificial Immune Systems

11th International Conference, ICARIS 2012
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Proceedings

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Preface

ICARIS, the International Conference on Artificial Immune Systems, is evolving. In the eight years since ICARIS was last hosted in Sicily, we have seen some dramatic changes within this field. It is intriguing to look back at the proceedings of the 3rd ICARIS from eight years ago and to compare them with ICARIS today. In 2004, the proceedings were dominated by engineering applications of immune inspired algorithms. The two keynote speakers, Dr. Alan Perelson and Prof. Robin Callard provided the only immunology-related talks, with the remainder of the conference focused on what we now term first generation AIS. The field now also encompasses the dynamic and innovative field of computational immunology, and the specialisms of the delegates have changed accordingly. ICARIS has evolved by introducing aspects of computational immunology, first as a stream within the conference and now as a full track within the program. This conference is composed of two tracks, Computational Immunology and Immune-Inspired Systems. ICARIS now acts as a mechanism by which researchers from both sides of AIS can come together to exchange knowledge and to form future collaborations.

Continuing in the spirit of ICARIS 2011 at the University of Cambridge, we adopted a two-track system, with each track running over two days. The Computational Immunology track was hosted on the first and second day of the conference. The submissions to this track consisted of extended abstracts and posters. From these we accepted 32 abstracts. We are delighted to have hosted a fascinating plenary lecture, given by Piero Mastroeni from the University of Cambridge, UK, on “Mathematical and Systems Biology Approaches to Understanding Infection, Immunity and Vaccination at the Single Cell Level”. In addition to the plenary lecture, Heiko Muller and Luca Zammataro from the Italian Institute of Technology, Milan, Italy, delivered two tutorials for this session on sequencing data: “NGS: From the Sequencing Machine to the Data Archive” and “A Database for the Analysis of Mutation Spectra in Human Cancer and Immune Systems”. An interactive poster session also formed part of this track.

The Immune-Inspired Systems track ran on days three and four of this conference. We accepted 19 full papers for this track, which were all double blind peer reviewed. In order to ensure the inclusion of the highest quality AIS papers, each submission had at least four reviews. Together with the full papers, we accepted 14 abstracts for this track. We invited the submission of abstracts to be published online, for oral or poster presentation, which are akin to the positional papers formerly featured as part of ICARIS. The invited tutorial for this track was presented by Christian Blum from the Universitat Politècnica de Catalunya, Spain, on the topic of “Swarm Intelligence”. This ties ICARIS to the PPSN (Parallel Problem Solving from Nature) conference, held in Taormina right after ICARIS (1–5 September 2012). We hope that this helped to raise the interest of the

natural computation community in AIS. An interactive poster session was given to showcase work in progress and to open up discussion among researchers. It was our great pleasure to host Stephanie Forrest, University of New Mexico, USA, who delivered a plenary lecture on “The Biology of Software”, which we hope was of interest to participants of both tracks. Prof. Forrest is the recipient of the ACM Allen Newell Award and her research was instrumental in the rise of AIS as a unique field of scientific study. Her more recent research is currently making an impact on the Computational Immunology track of ICARIS.

The aim of this, the 11th ICARIS conference, was not only to strengthen the research for both tracks, but to forge strong links between the two communities. To this end the conference program contained a number of structured interactive events, some of which are new to ICARIS. On the second day of the conference we hosted a panel session dedicated to the “Advancement of Computational Systems Immunology and Immunoinformatics”. We would like to thank the participants of this panel, including Hugues Bersini, Chang-Zheng Chen, Marc Thilo Figge, Stephanie Forrest, Koichi Kobayashi, Melanie Moses, Veronique Thomas-Vaslin, and Jon Timmis. We offered delegates the opportunity to ask informal questions of the panel via ‘speed networking’. This was done in order to encourage contribution from the less experienced members of our community, giving them the opportunity to speak to some of the world leaders in this field.

Poster sessions are becoming a popular mainstay of ICARIS. This year we further raised the profile of these poster sessions through the use of a poster introduction session, where each presenter had one minute and one slide to introduce their poster. The final crossover activity of ICARIS 2012 was the workshop on Bio- and Immune-Inspired Algorithms and Models for Multi-level Complex Systems for which five invited papers were presented: Giuditta Franco “A Computational Analysis of Repeat Sharing Gene Networks”; Raffaele Giancarlo and Filippo Utro “Stability-Based Model Selection for High Throughput Genomic Data: An Algorithmic Paradigm”; Niall Murphy and Alfonso Rodríguez-Patón “Distributed Computing with Prokaryotic Immune Systems”; Alberto Castellini, Vincenzo Manca and Mauro Zucchelli “Towards an Evolutionary Procedure for Reverse-Engineering Biological Networks”, and Emanuela Merelli and Mario Rasetti “The Immune System as a Metaphor for Topology Driven Patterns Formation in Complex Systems”.

Providing a balance between computational immunology and immune-inspired systems is not trivial and as an organizing committee we worked hard to correctly strike this balance. In these difficult economic times when it is becoming harder to fund large interdisciplinary projects, it is vital that as a community, we are capable of transferring knowledge among researchers. We hope that the additional activities further assisted in promoting interdisciplinary collaboration in AIS. As a sign of the progress in the field, since the first ICARIS event, we have seen an increasing number of students choosing computational immunology and immunoinformatics as their main PhD topics. There is also an important

number of tenured positions at prestigious universities that involve research on such topics. Finally, we would like to thank the plenary speakers, panel participants, tutorial speakers, workshop speakers, the two program committees, and the delegates for their participation and input, resulting in a high quality, interesting, and engaging conference.

August 2012

Carlos A. Coello Coello
Julie Greensmith
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Giuseppe Nicosia
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ICARIS 2012 was organized and hosted by the Optimization and BioComputing Group of the Department of Mathematics and Computer Science, University of Catania, Italy. The University of Catania is the 29th oldest University in the world. Its establishment dates back to 1434.

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