

MAS*BIOMED

Workshop on Multi-Agent Systems in Medicine, Computational Biology, and Bioinformatics

Call for papers/participation

Motivation and Description

There is growing evidence that agent technology can be useful in designing and implementing solutions aimed at supporting the automation of medical and biological procedures. While it is essential for computer scientists and software developers to understand the specific problems in medicine and biology, it is also essential for an expert of either domain to understand the capabilities of agent technology.

The main purpose of this workshop is to bring together and create synergies between researchers on these fields in order to discuss relevant issues and approaches aimed at assessing and promoting the adoption of agent technology. It is intended that the workshop mainly focuses on the benefits of adopting agent technology in: (i) storing, accessing, and distributing relevant medical or biological data, (ii) implementing the automation of information-gathering and information-inference processes in medical and biological settings, (iii) supporting e-Health, (iv) simulating and modelling biological systems.

This workshop aims to attract both theoretically and practically oriented papers in these thriving areas in the intersection of medicine and biology with computer science. The workshop will also focus on supporting infrastructures, such as agent-based systems, tools, languages, ontologies, and networking facilities for medicine, bioinformatics and computational biology. Papers on the application and evaluation of agent approaches to the solution of problems in these fields will be particularly sought.

We envision this workshop to be a mixture of presentations and open discussions of the attendees. A key open discussion can focus on the strength and limitations of software agents in medical and biological domains. Possible questions to be addressed can be: Why can agent technology provide a better solution than existing ones? What are the limitations of agent technology with respect to medical and biological problems? Why can software agents succeed where traditional Artificial Intelligence technology/expert systems have reached their limits? What are the priorities of actions when introducing this technology in the medical and biological fields?

Medicine and Health Care

There is barely a country that is not suffering from the ever increasing impacts and costs for its health care system which is not the least boosted by the steadily increasing number of drugs, diagnosis tools and methods, and treatment procedures that appear continuously on the market. On the other hand, in today's globalized world, a fast and reliable medical prevention, diagnosis and treatment is of eminent importance as can be seen, for example, from the recent problems with SARS or the bird flu. Such highly contagious and lethal diseases can threaten the globe if they were not fought immediately with the highest level of efficiency and reliability. This requires, first of all, a fast and reliable pre-detection and diagnosis, regardless of where the affected person may currently stay in the world. The situations mentioned above are some of the many that prove that

the medical domain is marked by requirements for high dynamicity, distribution, flexibility, scalability, extensibility, efficiency, cooperative work and collaboration, proactivity and autonomy. Most of these features are especially strongholds of multi-agent systems/autonomous agent technology. Thus, it is proper to say that agent technology will play an increasingly important role in medicine and health care in now and the future, and will significantly enhance the ability to model, design, and build complex, inherently distributed, software systems in medical and health care domains.

Computational Biology and Bioinformatics

With the exponential growth of data being produced and made available to genetics researchers via the Internet, there are several challenges for using this information effectively to further genetics and biomedical research. For instance, sequence and structural information exists in databases along with various tools distributed throughout the world in various formats and platforms. Also, while the GO (genome ontology) project is addressing the problem, new and sometimes conflicting terminology and vocabulary are emerging for phenotyping and annotating sequences. There is a need for autonomous and semi-autonomous methods for learning and discovering relational and conceptual knowledge, as well as by intelligently combining these distributed data and information sources. In order to harness the benefits of this continuously growing amount of information, new information and communication technologies and approaches should be adopted.

Topics of interest include but are not limited to:

- Multi-Agent Interaction in Medical or Biological
 - SettingsCoordination of tasks and data
 - Collaboration in peer-to-peer networks
 - Multi-strategy and meta-learning for cooperative information agents
- Analysis and Modelling of Data and Tasks
 - Multi-agent systems for medical pre-detection, diagnosis, and treatment
 - Multi-agent systems for patient scheduling, transplant management, community care, information access, training, internal hospital and clinic tasks, etc.
 - Integrated genotyping and gene linkage analysis
 - Multi-agent approaches to gene expression analysis
 - Modelling of biological processes
- Architectures, Languages, Tools, and Applications
 - Agent-based architectures and frameworks tailored for medical or biological domains
 - Customization of agent-based tools, languages, and libraries for medical or biological domains
- Knowledge management
 - Agent-based integration of biological knowledge
 - Agent-based data mining and knowledge discovery in medical or biological domains
 - Multi-agent information gathering in medical or biological settings
 - Integration of heterogeneous data sources and/or services
- Ontologies for Medical or Biological Domains
 - Collaborative ontology construction
 - Distributed ontology management

Those wishing to participate in the workshop are requested to submit an original research paper, not

published or submitted elsewhere. Papers will be peer reviewed by at least two referees from the workshop's program committee based on the technical relevance, quality, clarity of presentation, objective analysis of the reported experiences, and novelty. High-profile survey papers could be also considered for publication. The length of a paper must not exceed 15 single-spaced A4 pages including figures, tables, and references. Papers should be formatted using the Springer LNCS style. Templates are available at Springer. The language of the workshop is English. At least one of the authors per each accepted paper should be able to register with and attend the workshop and present the paper.

All the accepted papers will be printed in the workshop proceedings of the workshop. A selection of the best papers presented at this workshop will be considered for a special issue on the same theme at "Multiagent and Grid Systems - an International Journal" by IOS press.

Schedule

The workshop will be a full day, with one session or two parallel sessions, depending on the number of accepted contributions.

To start the workshop, the organizers will present an overview on the state-of-the-art and relevant ongoing projects in medicine and biology, as well as brief statements collected from the participants about the topics of the discussion session.

Based on the outcome of this discussion and on the contributions to this workshop, we plan to publish a special issue on this topic at "Multiagent Systems and Grid computing- an International Journal" by IOS press.

Submission Procedure

Contributors are invited to submit full papers no longer than 15 single-spaced A4 pages, including figures, tables, and references. All submissions should be sent by email, either in PDF or in PostScript format, to biomed05@diee.unica.it. The subject of the email should contain "medicine" or "biology" within square brackets to facilitate the organizing committee in the task of associating papers to referees.

Important Dates

Submission Deadline: Thursday March 14, 2005 (no extensions)
Notification of Acceptance: Tuesday April 18, 2005
Workshop: July 25 or 26, 2005

Organizing Committee

Giuliano Armano (giuliano.armano@diee.unica.it)
Dept. of Electrical and Electronic Engineering – Univ. of Cagliari (Italy)
Piazza D'Armi – 09123 Cagliari (Italy)

Joerg Denzinger (denzinge@cpsc.ucalgary.ca)
Department of Computer Science – Univ. of Calgary, Canada
2500 University Drive NW, Calgary, Alberta, Canada T2N 1N4

Andrew Martin (martin@biochem.ucl.ac.uk)
Dept. of Biochemistry & Molecular Biology – Univ. College London (UK)
Darwin Building - Gower Street London WC1E 6BT - England

Emanuela Merelli (emanuela.merelli@unicam.it)
Dept. of Mathematics and Computer Science – Univ. of Camerino (Italy)
Via Madonna delle Carceri, 62032 Camerino (MC), Italy

Simon Miles (sm@ecs.soton.ac.uk)
School of Electronics and Computer Science - University of Southampton (UK)
SO17 1BJ, Southampton - UK

Huaglory Tianfield (h.tianfield@gcal.ac.uk)
Glasgow Caledonian University, School of Computing and Mathematical Sciences, SRIF/SHEFC
Centre for Virtual Organization Technology Enabling Research (VOTER) – Director
70 Cowcaddens Road, Glasgow, G4 0BA, UK

Rainer Unland (UnlandR@informatik.uni-essen.de)
Inst. for Computer Science and Business Information Systems (ICB), University of Duisburg-Essen
Schuetzenbahn 70, 45117 Essen, Germany

Program Committee

Kevin Bryson
Dept. of Computer Science - Univ. College London (UK)

Nicola Cannata
CRIBI biotechnology centre - Univ. of Padova (Italy)

David Wolfe Corne
Department of Computer Science - The University of Exeter (UK)

Hans Czup
Wirtschaftsinformatik - Univ. of Trier (Germany)

Keith Decker
Univ. of Delaware (US)

Pablo Gonzalez
DEIS - Univ. of Bologna-Cesena (Italy)

Stefan Kirn
Institut für Betriebswirtschaftslehre - Univ. of Univ. of Hohenheim (Germany)

Patty Kostkova
Institute of Health Sciences - The City University, London (UK)

Michael Luck
School of Electronics and Computer Science - Univ. of Southampton (UK)

Luciano Milanese
Institute of Biomedical Technologies I.T.B. (Italy)

Steffen Möller
Proteome Center Rostock - Univ. of Rostock (Germany)

Agostino Poggi
DII - Univ. of Parma (Italy)

Milena Radenkovic
Univ. of Nottingham (UK)

David Riaño Ramos
Dept. d'Enginyeria Informatica y Matematicas - Escola Technica Superior d'Enginyeria (Spain)

Eloisa Vargiu
Dept. of Electrical and Electronic Engineering - Univ. of Cagliari (Italy)