

ASSYST

Complex Systems Society

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Real-World Dynamics

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Real-World Dynamics

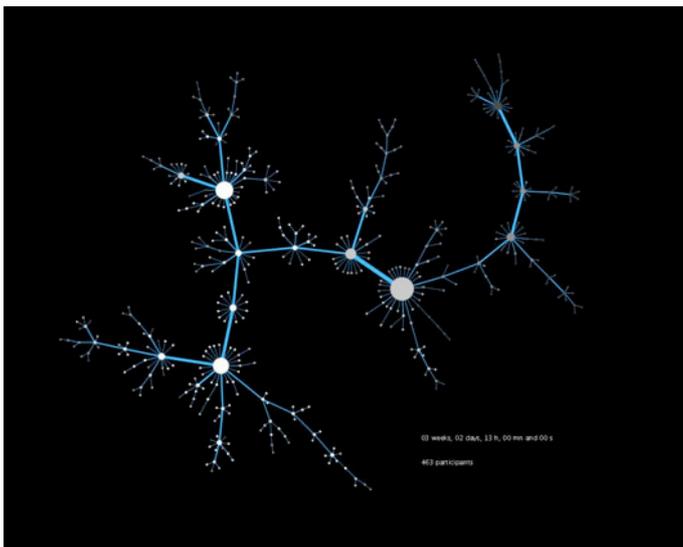
Communication networks are supporting our world, are present in many of our activities and are accessible from everywhere, around the corner or on the other side of the globe. The worldwide presence of communication networks makes the analysis of those networks dynamics essential to the understanding of human social structures.

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This edition of the ASSYST Newsletter presents two research projects concerning social dynamics in Internet. In “A Real-World Spreading Experiment in the Blogosphere”, Adrien Friggeri, Jean-Philippe Cointet and Matthieu Latapy describe a real-world experiment, identifying and characterising the spreading phenomena in Internet. Another project, proposed by Filippo Menczer and the Truthy team, with the title “Truthy.indiana.edu to search, identify smear tactics, Twitter-bombs through November election runup”, proposes a research tool that combines data mining, social network analysis and crowdsourcing to uncover deceptive tactics and misinformation in Internet.

However, the understanding of real-world dynamics demands not only studying the actual communication networks, but also considering other complementary analysis tools, making sense of large amounts of heterogeneous data gathered on various scales, regarding socio-technological systems, complex biological organisms or large organizations. This is the general objective of the Call FET Proactive: Dynamics of Multi-Level Complex System (DyM-CS), presented in page 3. This call aims to help science create a general theory on complex systems in the area of multi-level systems, and is focused in the dynamics of large and highly differentiated systems.

We wish you a pleasant reading of this October edition of the ASSYST Newsletter, including as usual the *Reading snippets*, reports on recent schools and conferences and the announcement of forthcoming events. After an exciting week at ECCS’10, we are preparing an overview of the conference, to appear next month. Stay attentive!



Happy Flu Spreading - Adrien Friggeri, Jean-Philippe Cointet and Matthieu Latapy

-- The ASSYST Team

A Real-World Spreading Experiment in the Blogosphere

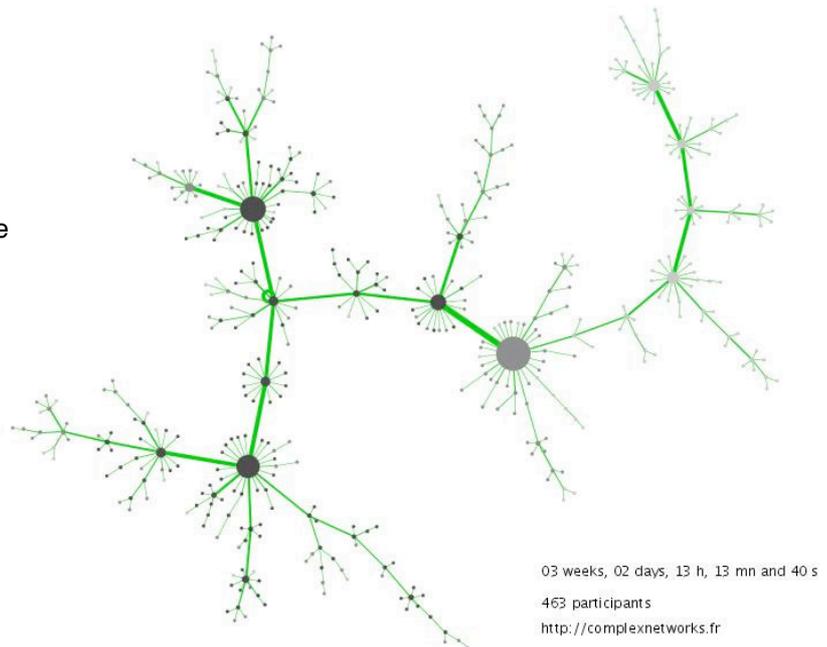
By Adrien Friggeri, Jean-Philippe Cointet and Matthieu Latapy

An epidemic disease, an information or gossip, a computer virus, all spread from node to node in a complex network. This makes the study of spreading phenomena a key issue in various disciplines ranging from medicine to computer science, sociology, marketing, etc.

In practice, however, precise observation of such phenomena is extremely challenging. In general, the underlying network is unknown or only partly known, and so is the series of spreading events and their occurrence time. As a consequence, most studies focus on models fitting basic intuition or very aggregate data, or study one aspect of the question only (for instance phone call or email exchange networks, on which spreading of information occurs, but without accurate information on spreading phenomena actually occurring).

The Complex Networks team at LIP6 (Computer Science department, UPMC and CNRS, Paris, France; see <http://complexnetworks.fr>) designs and implements methods for observing real-world spreading phenomena. In the Happy Flu experiment for instance, an applet (i.e. a small program) spreads from a web page to another. Each such spreading event is recorded, thus leading to a dataset which provides insight on this particular spreading phenomenon, and opens wider perspectives for the study of real-world spreading phenomena.

The picture above represents the spreading observed in the **Happy Flu** experiment. Each node represents a web page participating to the experiment (its size reflects the number of other web pages to which it spread the applet), and each link represents a spreading from one web page to another. In addition, we record the number of visits to each participating web page, thus obtaining some



information on the potential number of participants coming from each web page. Of course, only a small fraction of them copy the applet to their web page, but the experiment finally reached almost 500 participants and 100,000 visitors. We make the obtained dataset publicly available for study.

Team website: <http://complexnetworks.fr>

Happy Flu website: <http://happyflu.com>

Happy Flu movie:
http://www.complexnetworks.fr/videos.php?video_id=7

Happy Flu paper:

A Real-World Spreading Experiment in the Blogosphere, Adrien Friggeri, Jean-Philippe Cointet and Matthieu Latapy, to appear in *Complex Systems*.

FET Proactive: Dynamics of Multi-Level Complex System (DyM-CS)

Multi-level systems are general and fundamental in the universe. Does science have a theory capable of explaining their dynamics?

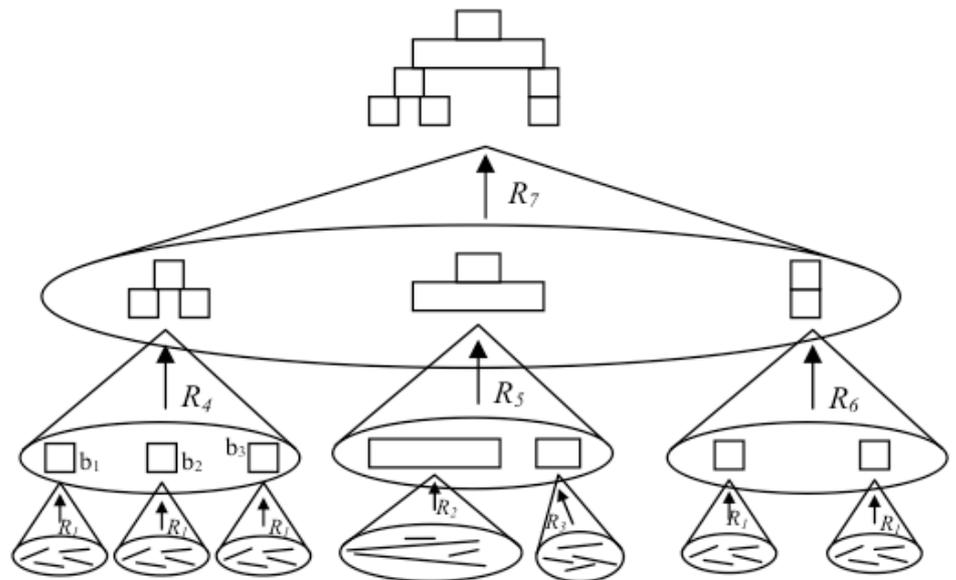
A call to help science create a general theory on complex systems in the area of multi-level systems will open during 2011. It targets exactly the dynamics of large and highly differentiated systems.

Many artificial and natural systems are characterized by a high level of differentiation in structure and organization; they exist in areas as diverse as the Internet, energy management, climate, financial markets, infrastructures (including ICT), biology, transport, epidemics, meteorology, urban planning, social simulation and policy impact assessment. In order to describe and control these systems there is a need to observe and reconstruct their dynamics and make sense of large amounts of heterogeneous data gathered on various scales. Most of these areas would benefit from an international effort in collecting and sharing data, models and from looking for a general, common theoretical approach. The science of complex systems (CSS) offers a framework for this theoretical approach.

The objective of this Initiative is to make steps towards a general theory on complex systems through contributions in the area of dynamics of multi-level systems.

Target outcomes:

a) New mathematical and computational formalisms on dynamics of multi-level systems developed and validated on real-world applications involving large and heterogeneous data sets. This could involve, for example, addressing emergence of and interactions between scales, combining the concepts of 'programmability' and 'self-



organisation', or addressing 'out of equilibrium' considerations. Priority application areas should present clearly defined challenges to ICT and/or have a relevant user/social/economic component. Through these areas, CSS should be able to provide solutions for current ICT systems or lay the foundations for new ICT paradigms. For the validation, appropriate organizational structures should be chosen, e.g. large socio-technological systems, complex biological organisms or large organizations. The latter can be validation partners, testing the theory on themselves.

b) World-class international research cooperation, global alliances in this research area, and links with similar actions outside Europe, in particular with participants from USA, Japan and China.

The details for this initiative can be downloaded from the Cordis ICT work program 2011-2012 available online.

ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/ict-wp-2011-12_en.pdf

Truthy.indiana.edu to search, identify smear tactics, Twitter-bombs through November election runup

Astroturfers, Twitter-bombers and smear campaigners need beware this election season as a group of leading Indiana University information and computer scientists today unleashed Truthy.indiana.edu, a sophisticated new Twitter-based research tool that combines data mining, social network analysis and crowdsourcing to uncover deceptive tactics and misinformation leading up to the Nov. 2 elections.

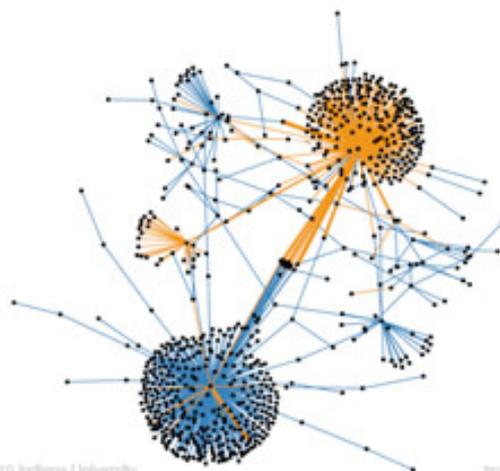
Combing through thousands of tweets per hour in search of political keywords, the team based out of IU's School of Informatics and Computing will isolate patterns of interest and then insert those memes (ideas or patterns passed by imitation) into Twitter's application programming interface (API) to obtain more information about the meme's history.

"When we identify a trend we go back and examine how it was started, where the main injection points were, and any associated memes," said Filippo Menczer, an associate professor of computer science and informatics. "When we drill down we'll be able to see statistics and visualizations relating to tweets that mention the meme and basically reconstruct its history."

The team will then generate diffusion network images that visitors to Truthy.indiana.edu can view as groups of nodes and edges that identify retweets, mentions, and the extent of the epidemic. Visitors to the site will also see the output of a sentiment analysis algorithm that examines and extracts mood-identifying words and then assesses them on a known psychometric scale. That algorithm identifies the meme on scales ranging from anxious to calm, hostile to kind, unsure to sure, and confused to aware.

Menczer got the idea for the Truthy website after hearing researchers from Wellesley College speak earlier this year on their research analyzing a well-known Twitter bomb campaign conducted by the conservative group American Future Fund (AFF) against Martha Coakley, a democrat who lost the Massachusetts senatorial seat formerly held by the late Edward Kennedy. Republican challenger Scott Brown won the seat after AFF set up nine Twitter accounts in early morning hours prior to the election and then sent out 929 tweets in two hours before Twitter realized the information was spam. By then the messages had reached 60,000 people.

Menczer explained that because search engines now include Twitter trends in search results, an astroturfing campaign -- where the concerted efforts of special interests are disguised as a spontaneous grassroots movement -- that includes Twitter bombs can jack up how high a result shows up on Google even if the information is false.



Copyright 2010 Indiana University

truthy.indiana.edu

This is one reason Truthy.indiana.edu also relies on input from users to denote a meme as "truthy," or misinformation represented as fact. Having a crowdsourcing component will help the data mining effort and hopefully keep the loop between social media and search engines honest, researchers said.

"One of the concerns about social media is that people are being manipulated without realizing it because a meme can be given instant global popularity by a high search engine ranking, in turn perpetuating the falsehood," Menczer said.

As information scientists, the group is interested in understanding meme diffusion from various perspectives: Menczer, associate director of IU's Center for Complex Networks and Systems Research, focuses on data mining and meme burst modeling; Rudy Professor of Informatics Alessandro Vespignani's work relates to epidemic and contagion modeling; Associate Professor of Informatics Alessandro Flammini, also director of IU's Complex Systems Program, conducts complex network analysis, especially related to online text and social media; and Johan Bollen, associate professor of informatics and computing, has a background in cognitive science and specializes in sentiment and mood analysis from online text.

The website's name, Truthy, references a "stunt word" first employed by television comedian and political pundit Stephen Colbert in 2005 to satirize the use of emotional appeal as fact.

As appeared in *Indiana University Press Release*:
<http://newsinfo.iu.edu/news/page/normal/15742.html>

Truthy: <http://truthy.indiana.edu/>

News and Announcements

19th European Conference on Artificial Intelligence

Lisbon, 16-20 August 2010

By Luis Correia



The 19th European Conference on Artificial Intelligence - ECAI 2010 took place in the Faculty of Sciences of the University of Lisbon (FCUL), from August 16th to 20th. It was organized by the Agent Modelling Laboratory (LabMAG) of FCUL, in cooperation with the Portuguese Association for Artificial Intelligence (APPIA) and the European Coordination Committee for Artificial Intelligence (ECCAI).

ECAI is the most prestigious European conference in the area of Artificial Intelligence and the Portuguese venue represented an acknowledgement of the importance of local research in AI. The 2010 edition gathered 580 researchers from all over the world many of them also participating in associated events, namely 18 thematic workshops, 6 tutorials, the sixth Prestigious Applications of Intelligent Systems - PAIS 2010, or the fifth European Starting AI Researcher Symposium - STAIRS 2010.

YoCo Young researchers Community

Engaging young scientists in Complex Systems

Following ECCS'10 Young Researchers Session (<http://phd.eccs2010.eu>), the Complex Systems Society promoted a meeting between Young Researchers present at the conference. The main topic in the agenda was a brainstorm about the involvement of young scientists in the activities of the Complex Systems Society and on the process of disseminating the field of Complex Systems Research across labs and institutions.

Around 20 people with different backgrounds participated in the meeting and from the discussion a page at the Complex Systems website was created to foster further dialog and exchange of ideas. The discussion is open to all CSS members. If you want to participate please join the YoCo page at <http://csssociety.org/Yoco>

TSCS'2010 and TWCS'2010

Turunc Summer School and Workshop on on Complex Systems 2010

Two events were organized by Haluk Bingol and Muhittin Mungan of Bogazici University in late August under the ASSYST work package "WP2.2 Organising Scientific Meetings in Turkey and Associate Member States". The purpose of the work package is to facilitate scientific interchange in Europe, integrate associate member states, stimulate more meetings, bring more people into the CSS, and determine the state of the art in CS and COSI-ICT for use in developing the ASSYST Roadmap (available at <http://css.csregistry.org/tiki-index.php?page=Living%20Roadmap>). These events were held at the beautifully situated Institute of Theoretical and Applied Physics (ITAP) near to Marmaris, Turkey. Various agencies, including ASSYST, jointly supported these two events.

The **Turunc Summer School on Complex Systems (TSCS'2010)** was an international summer school focused mainly on complex networks. It was held on Aug 23-27, 2010 and was supported by the State Planning Organization of Turkey (DPT), ITAP and ASSYST. Among the faculty were Alain Barrat, Haluk Bingol, Taylan Cemgil, Vittoria Colizza, Alkan Kabakcioglu, Renaud Lambiotte, Muhittin Mungan, and Jose Ramasco. There were 30 participants from many countries including Portugal, Italy, Iran, Greece and Turkey. The students were introduced to the emergent field of Complex Networks. This started with introductory material such as probability, statistical physics, and continue with advance applications such as epidemics, social networks. More details are available at <http://www.cmpe.boun.edu.tr/soslab/doku.php/activity/tscs2010>

TSCS was followed by the **Turunc Workshop on Complex Systems (TWCS'2010)**, which was a workshop focused mainly on social applications of Complex System. It was held on Aug 30-Sep 1, 2010. TWCS'2010 was supported by the State Planning Organization of Turkey (DPT), ITAP, COST MP0801 (http://www-f1.ijs.si/~tadic/COST_MP0801/) and ASSYST. The Scientific Committee was composed of Renaud Lambiotte, Anxo Sanchez, Janos Kertesz. Altogether nineteen participants from eleven different countries took part. More details, including a book of abstracts can be accessed at <http://www.cmpe.boun.edu.tr/soslab/doku.php/activity/twcs2010>

The timetables of both events were arranged to facilitate discussions and collaborations. Feedback from attendees spoke warmly of the time spent at Turunc and praised the facilities and cuisine. Many were keen to return for another meeting.

A Stochastic model of social interaction in wild house mice

By Nicolas Perony, Barbara König and Frank Schweitzer

If some emerging properties of a group's social structure result from simple behavioural mechanisms, it may be that what is often thought to be an explicitly social behaviour does not require as much cognitive capacities as it is assumed.

In ECCS'10 Track C
<http://www.eccs2010.eu/>

EU launches CO2 capture and storage technologies network project

The EU is targeting a 50% reduction in carbon dioxide (CO2) emissions by 2050. As part of efforts to achieve this goal, the European Commission launched on 17 September a tool supporting early large-scale demonstration of CO2 capture and storage (CCS) technologies.

In Cordis
<http://assystcomplexity.eu/short/?id=76>

Bidirectionally coupled synchronization of the generalized Lorenz systems

Wu, Chen, and Cai (2007) investigated chaos synchronization of two identical generalized Lorenz systems unidirectionally coupled by a linear state error feedback controller. However, bidirectional coupling in real life such as complex dynamical networks is more universal. This paper provides a unified method for analyzing chaos synchronization of two bidirectionally coupled generalized Lorenz systems.

In Journal of Systems Science and Complexity
<http://assystcomplexity.eu/short/?id=77>

Researchers show that the big bang was followed by chaos

Seven years ago Northwestern University physicist Adilson E. Motter conjectured that the expansion of the universe at the time of the big bang was highly chaotic. Now he and a colleague have proven it using rigorous mathematical arguments.

In PhyOrg.com
<http://www.phyorg.com/news203097805.html>

Adaptive network models of swarm dynamics

By Cristián Huepe, Gerd Zschaler, Anne-Ly Do and Thilo Gross

A simple adaptive network model describing recent swarming experiments is introduced. By exploiting an analogy with human decision-making models, its dynamics is captured using a low-dimensional system of equations permitting analytical investigation. The model reproduces several characteristic features of swarms, including: spontaneous symmetry breaking, noise- and density-driven order-disorder transitions that can be of first or second order, intermittency, and metastable configurations displaying memory effects. By considering only minimal components of the swarming dynamics, it highlights the essential elements required to reproduce the observed behavior.

In arXiv
<http://arxiv.org/abs/1009.2349>

Emotional Reactions and the Pulse of Public Opinion: Measuring the Impact of Political Events on the Sentiment of Online Discussions

By Sandra Gonzalez-Bailon, Rafael E. Banchs, Andreas Kaltenbrunner

We measure the emotional content of online discussions in three dimensions (valence, arousal and dominance), paying special attention to deviation around average values, which we use as a proxy for disagreement and polarisation.

In arXiv
<http://arxiv.org/abs/1009.4019>

Indicators of the Interdisciplinarity of Journals: Diversity, Centrality, and Citations

By Loet Leydesdorff, Ismael Rafols

In this study, we investigate network indicators (betweenness centrality), journal indicators (Shannon entropy, the Gini coefficient), and more recently proposed Rao-Stirling measures for "interdisciplinarity." The latter index combines the statistics of both citation distributions of journals (vector-based) and distances in citation networks among journals (matrix-based).

In arXiv
<http://arxiv.org/abs/1003.3613>

Conferences and workshops

<http://assystcomplexity.eu/conferences.jsp>

SASO-2010 Fourth IEEE International Conference on Self-Adaptive and Self-Organizing Systems Budapest, Hungary 27 Sep 2010 to 1 Oct 2010	ServAgents 2010 First International Workshop on Services and Agents Kolkata, India 12 Nov 2010 to 15 Nov 2010	BASNA10 IEEE International Workshop on Business Application of Social Network Analysis Bangalore, India 15 Dec 2010 to 15 Dec 2010
qteso 2010 2nd International Workshop on Quality in Techno-Social Systems Budapest, Hungary 28 Sep 2010 to 28 Sep 2010	PRIMA-2010 The 13th International Conference on Principles and Practice of Multi-Agent Systems Kolkata, India 12 Nov 2010 to 15 Nov 2010	EUMAS2010 8th European Workshop on Multi-Agent Systems Pars, France 16 Dec 2010 to 17 Dec 2010
Future Internet and Society 2010 Future Internet and Society: A Complex Systems Perspective Acquafredda di Maratea, Italy 2 Oct 2010 to 7 Oct 2010	INCoS 2010 International Conference on Intelligent Networking and Collaborative Systems Thessaloniki, Greece 24 Nov 2010 to 26 Nov 2010	ICAART2011 3rd International Conference on Agents and Artificial Intelligence Rome, Italy 28 Jan 2011 to 30 Jan 2011
New Frontiers in Complex Networks New Frontiers in Complex Networks : Statphys24 satellite meeting Seoul National University, Seoul, Korea 13 Oct 2010 to 15 Oct 2010	Bionetics 2010 5th International ICST Conference on Bio-Inspired Models of Network, Information, and Computing Systems 1 Dec 2010 to 3 Dec 2010	WiVS 2011 1st International Workshop WiVS 2011: Flexible Workflows in Distributed Systems Kiel, Germany 8 Mar 2011 to 11 Mar 2011
CompleNET 2010 2nd Workshop on Complex Networks Rio de Janeiro, Brazil 13 Oct 2010 to 15 Oct 2010	CSSWC@NIPS2010 Computational Social Science and the Wisdom of Crowds Workshop at NIPS 2010 Whistler, Canada 10 Dec 2010 to 11 Dec 2010	IMCIC 2011 The 2nd International Multi-Conference on Complexity, Informatics and Cybernetics Orlando, Florida USA 27 Mar 2011 to 30 Mar 2011
BWSS2010 Second Brazilian Workshop on Social Simulation FEI University Campos, São Bernardo do Campo, Brazil 23 Oct 2010 to 28 Oct 2010	Extreme Environmental Events Extreme Environmental Events Selwyn College - Cambridge, United Kingdom 13 Dec 2010 to 17 Dec 2010	ADS11 Agent-Directed Simulation Symposium Boston Marriott Long Wharf Hotel; Boston, MA, USA 4 Apr 2011 to 9 Apr 2011
META10 International Conference on Metaheuristics and Nature Inspired Computing Djerba Island, Tunisia 28 Oct 2010 to 30 Oct 2010	ACIT2010 International Arab Conference on Information Technology University of Garyounis in Benghazi, Libya 14 Dec 2010 to 16 Dec 2010	WSS 2011 The 4th International Symposium on Web Services Hammamet, Tunisia 20 Apr 2011 to 21 Apr 2011
IBERAMIA 2010 12th edition of the Ibero-American Conference on Artificial Intelligence Bah�a Blanca, Argentina 1 Nov 2010 to 5 Nov 2010	IMSAA10 4th International Conference on Internet Multimedia Systems Architecture and Application Bangalore, India 15 Dec 2010 to 17 Dec 2010	SPSD2011 International Community on Spatial Planning and Sustainable Development Kanazawa, Japan 29 Aug 2011 to 31 Aug 2011
Econophysics Colloquium 2010 Econophysics Colloquium 2010 Taipei, Taiwan 4 Nov 2010 to 6 Nov 2010		

Jobs

<http://jobs.cssociety.org>

PhD

Analysis and Control of models of biological regulatory systems Application: growth control in E. coli
INRIA Research Unit, Sophia -Antipolis, near Nizza, South of France. http://www-sop.inria.fr/index_en.php
France - Fri 01 of Oct., 2010

Postdoc/Lecturer

Research Associate: Theoretical Physics
School of Physics & Astronomy, University of Manchester
United Kingdom – Fri 19 of Nov., 2010

Postdoc/Lecturer

Modelling of biological systems and statistical physics
Laboratoire IMNC CNRS UMR 8165/Université Paris Sud-11/Université Paris Diderot-Paris 7
France - Fri 31 of Dec., 2010

Postdoc/Lecturer

Statistical methods for the brain functional connectivity networks : robustness, fusion with anatomical connectivity.
Grenoble Institute of Neuroscience (<http://neurosciences.ujf-grenoble.fr/>) and the department of Images and Signal within the GIPSA-lab laboratory, France (<http://www.gipsa-lab.inpg.fr/>) - Sat 01 of Jan., 2011

Postdoc/Lecturer

Studentship & Post-Doctoral Fellowship in Quantitative Biology
Laboratoire de Spectrométrie Physique in Grenoble
France – Sun 02 of Jan., 2011

Others

CARL (Cellular Automata Research Lab) is looking to collaborate with Biotech industry players to initiate exploration of opportunities to jointly build solutions that would accelerate Bio-informatics enhanced drug discovery, gene analysis, identification of gene and protein sequences, personalized medicine and new enzyme synthesis. While the models have been proven with close to 100% accuracy with public domain databases (RCSB – PDB, DSSP, CATH etc), CARL is looking for industry partners to demonstrate the solution in real-life biotech and drug research problems

Details <http://www.carlbio.org/>

Contacts

ASSYST - Action for the Science of complex Systems and Socially intelligent icT

Web: <http://assystcomplexity.eu>

RSS: <http://assystcomplexity.eu/rss.xml>

Twitter: <http://twitter.com/assystcomplex>

FriendFeed: <http://friendfeed.com/assystcomplex>

Email: newsletter@assystcomplexity.eu

The ASSYST project acknowledges the financial support of the Future and Emerging Technologies (FET) programme within the ICT theme of the Seventh Framework Programme for Research of the European Commission.

CSS – Complex Systems Society

Web: <http://cssociety.org>

RSS: http://cssociety.org/tiki-calendars_rss.php

Suggestions: <http://cssociety.org/suggestions>

Contributors to this edition:

Haluk **Bingol**, Jane **Bromley**, Luis **Correia**, Jeff **Johnson**, Matthieu **Latapy**, Jorge **Louçã**, Filippo **Menczer** and David MS **Rodrigues**.

Story submission guidelines:

If you are a Complex System researcher/practitioner and want to share a success story about your work / research please submit it to newsletter@assystcomplexity.eu.

The story should be no longer than 500 words (if you want to submit an extended story please contact us) and should be sent in ODT, RTF, DOC or TXT format.

