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Horizons in Social Sciences 2013



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Joint meeting of the four COSI-ICT projects, and the new projects from DyM-CS initiative sponsored by FET Open Project European Commission

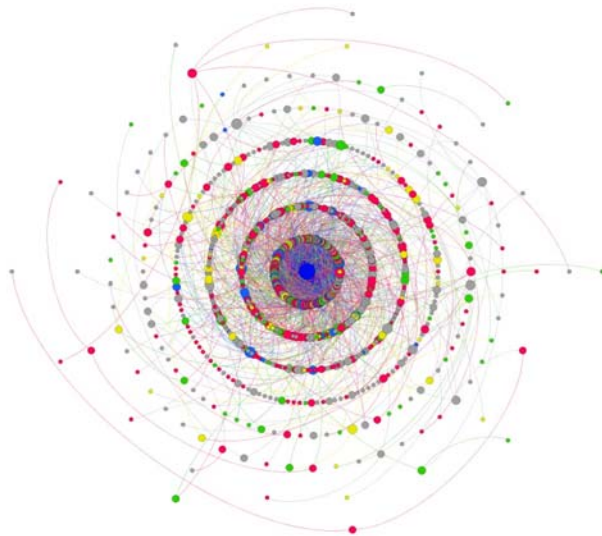
CYBEREMOTIONS EPIWORK QLECTIVES SOCIONICAL MULTIPLEX



HORIZONS IN SOCIAL SCIENCE 2013

July 11, 2013 - IMT Lucca, Italy

Via San Michele 3



Nowadays there is an ongoing intense scientific debate around the defining foundational concepts as well as about the most appropriate methodological approach to deal with the understanding of social dynamics. The challenge of understanding human behaviors is complex and intricate. Humans are intentional (and not necessarily rational) and the dynamics of social behavior are influenced by a multitude of factors. In particular, the advent of the Big Data era – i.e. the explosion of available datasets from time-mediated communication – that challenge has increased its complexity. If on the one hand we can have access to an enormous set of observable social and mobility traces, on the other hand there is a lack of theoretical concepts to ground and interpret data as an expression of individual and social behavior. The event is intended to gather the most proficient researchers and companies working at the edge of the computational social science and big data to discuss the new frontiers and challenges with an interdisciplinary, tight and non-reductive approach. The symposium is open to all researchers, scientists and practitioners.

Program

Morning Session (Chair: Walter Quattrociocchi)

9.00 - 9.15 - Roumen Borissov

9.15 - 10.00 - Alessandro Vespignani - EPIWORK - **Modeling and forecast of socio-technical systems in the data-science age**

10.00 - 10.45 - Nigel Gilbert - QLECTIVES - **Understanding and assisting Quality Collectives**

10.45 - 11.15 - Stefano Battiston - MULTIPLEX - **DebtRank: Too central to fail**

11.15 - 11.45 - Coffee Break

11.45 - 12.15 - Irena Vodenska - **Multiplex Financial Networks Dependencies**

12.15 - 12.45 Nicola Santoro - **On Distributed Computing and Social Networks**

12.45 - 13.30 David Lazer - **Big data big insights: the coming age of computational social science**

Afternoon Session (Chair Roumen Borissov)

14.45 - 15.00 - Guido Caldarelli

15.00 - 15.30 - Kamil Kloch - SOCIONICAL- **Towards Collaborative, Interactive Socio-Technical Systems**15.30 - 16.00 - Janusz Holyst - CYBEREMOTIONS - **Detection, Modelling and Possible Applications of Collective CyberEmotions**

16.00 - 16.30 - Coffe Break

16.30 - 17.00 - Mike Thelwall - CYBEREMOTIONS - **Social Web Sentiment Analysis**17.30 - 18.00 - Ronan Boulic - CYBEREMOTIONS - **Should Emotional Avatars Display the Human Facial Expression Intrinsic Asymmetry**18.00 - 19.00 - **Pre-poster presentations and Poster Session****Abstracts****Alessandro Vespignani***Modeling and forecast of socio-technical systems in the data-science age*

In recent years the increasing availability of computer power and informatics tools has enabled the gathering of reliable data quantifying the complexity of social systems. Data-driven computational models have emerged as appropriate tools to tackle the study of contagion and diffusion processes as diverse outbreaks, information spreading and Internet packet routing. These models aim at providing a rationale for understanding the emerging tipping points and properties that often underpin the most interesting characteristics of socio-technical systems. Here I review some of the recent progress in modelling complex epidemic processes that integrates the complex features and heterogeneities of real-world systems.

Nigel Gilbert*Understanding and assisting Quality Collectives*

The QLectives project has been seeking to understand how communities of peer producers can be supported to enhance the quality of their work. Example 'Quality Collectives' that we aim to help are communities of scientists and communities of peer-to-peer file sharers. The project has employed a range of methods (including game theory, reputation and recommendation systems, P2P software technologies, and studies of the members' concepts of quality) and a range of theories (including socio-physics, computer science, psychology and sociology). In this talk, I shall review the work we have done during the project and suggest areas that require further exploration.

Stefano Battiston*DebtRank: Too central to fail*

Financial crises are on the one hand a technical issues because certain architectures of the financial system and certain instruments are more likely to generate risk. On the other hand, the social component is crucial because markets rely on trust among players. Moreover, in issues like the too-big-to-fail policies that regulators engage in the strategic interactions on an intricate network of socio-economic relations which ultimately include citizens and IT users. In the first part I will present some extensions and applications of DebtRank, a measure of systemic impact in financial networks inspired by feedback-centrality. In the second part I will discuss how the notion of too-central-to-fail relates to broader issues such as data disclosure and public good games.

Irena Vodenska*Multiplex Financial Networks Dependencies*

Coupled networks have gained increased research attention lately. In a system of interdependent networks the dynamics of one network depends on another. Multiplex networks have been shown to be more fragile to shocks compared to single networks. Here, we study the dependencies of a stock market index network and foreign exchange rate network on the other. We examine daily returns of stock market indices and foreign exchange rates between 1999 and 2009 in 20 countries. We create two networks where nodes represent countries and connectivity links are defined as probabilities of contagion derived from correlations between nodes weighted by the countries' Gross Domestic Products. Using two correlation computational approaches, partial correlation and Pearson correlation, we find that during financial crisis periods, the correlations within the stock market network increase, while the correlations within the currency markets show a decline. Moreover, correlations between the stock market and foreign exchange layers during crisis periods become negative. We develop a model for systemic risk propagation in stock market and foreign exchange coupled networks to study the dynamics of this multiplex system, and to assess the systemic importance of countries for the complex financial structure investigated in this study. We initially introduce a shock into the system by either damaging a stock market index node or a foreign exchange rate node to observe how risk propagates through the interdependent financial network and find that certain countries are more efficient in spreading risk across both network layers compared to others. While the Pearson correlation identifies the UK and the US as countries with largest influence, partial correlation identifies the weaker influence of the US in spreading the crisis when initially a stock market node is shocked. This may be due to the emergence of negative partial correlations between the US and other countries within the stock market index network, indicating that correlations in this network may be dominated by the global trends. In addition, while the model indicates that, in general, smaller countries have lower influence in spreading systemic risk, the results show that Greece, exhibits significant influence in crisis propagation to other countries, and its systemic importance for the global financial system is not marginal.

Nicola Santoro*On Distributed Computing and Social Networks*

Social networks have stimulated the latent interest in the time-varying structures created by the dynamic interactions occurring within a "population". The study of the properties of such structures in relation to the nature of the interactions is an ambitious but inevitable task, whose undertaking is active not only within the social and the complex systems communities but also within the distributed and communication communities. Indeed, in the latter communities, a wealth of analytical methods has been developed over the years in a variety of contexts, ranging from infrastructure-less highly dynamic networks (e.g., ad-hoc wireless networks)

networks, mobile sensor networks, etc), to structured systems where the semantic of the behaviour is highly dynamic (e.g., repetitive polling systems, contamination/decontamination processes, etc). In these investigations, the common keyword is "locality", the tools are discrete, the approach is algorithmic, the methodology is axiomatic. Some of these methods, tools and techniques can be usefully employed in the study of other time-varying systems, social networks, in particular, providing a different outlook, perhaps shedding a light on aspects not (easily) identifiable by other computational models. Aim of this talk is to introduce to this subject.

David Lazer

Big data big insights: the coming age of computational social science

We live an increasing fraction of our lives interacting via technologies that capture minute details of our behavior-- what we are saying, to whom, and where. Resulting data have the potential to revolutionize our understanding of large scale, complex human systems. The objective of this talk is to examine some possibilities, offering a few examples from mobile phone and social media data, as well as pointing to challenges that we confront in these early days of computational social science.

Janusz Hołyst

Detection, Modelling and Possible Applications of Collective CyberEmotions

CYBEREMOTIONS (2009-2013) was an EU Large Scale Integrating Project in the 7th Framework Programme in the FET ICT domain, Theme 3 Scientific systems for socially intelligent ICT. Its main objectives were to understand the role of collective emotions in creating, forming and breaking up of ICT communities and to prepare the background for next generations of emotionally-intelligent ICT services. Project Partners collected large amounts of data on e-communities as well as behavioral and psychophysiological data on emotions evoked by on-line discussions, developed data-driven models of cyberemotions, created emotion-detection and-expression related software.

Data collected in the Project from blogs, forums, portals, IRC channels, Twitter, and MySpace are ranked among "the 70 Online Databases that Define Our World". Several experimental setups provided a microscopic view on affective processes associated with reading and writing contents on the Internet giving clues on how emotions propagate. Our SentiStrength program is considered one of the most advanced tools in sentiment detection. Theoretical models based on an agent-based approach, complex networks and stochastic processes are able to describe several phenomena of emotional dynamics in social groups, communicating via social media. Outputs of the project can be used for creating new affective dialog systems as interactive tools, as well as semi-automated simulations of facial expressions. A 3D avatar that can facilitate the process of the online affective communication. Developed network visualization programs form effective tools for demonstrating emotional contagion processes in social networks. The project offers diverse opportunities for business commercialization.

Mike Thelwall

Social Web Sentiment Analysis

Sentiment analysis is a powerful technique that can help to give insights into the role of emotion in online communication. Understanding and measuring sentiment help us to build more powerful models of online communication and can strengthen some types of existing software. This presentation will describe and demonstrate a sentiment analysis application, SentiStrength, which is designed to detect the strength of positive and negative sentiment in social web texts. SentiStrength uses a sentiment lexicon and a set of simple rules to cope with alternative ways to express sentiment, including social web devices such as emoticons and deliberate misspellings. The presentation will give examples of sentiment analysis applied to Tweets related to major media events and to the comments on YouTube videos. It will show how sentiment analysis can give insights into how people use the social web to express sentiment and how sentiment can drive online communication in different environments. The presentation will also describe how some commercial users employ SentiStrength and how it participated in the celebrations of the London 2012 Olympic Games.

Ronan Boulic

Should Emotional Avatars Display the Human Facial Expression Intrinsic Asymmetry ?

Through our research within the CyberEmotions project, we have shown that complementing on-line text exchanges with the visual modality of an avatar produces a stronger chatting enjoyment and emotional connection among participants. We achieve the instantaneous facial expression of emotions by linking Arousal-Dominance (VAD) 3D input emotion provided by the text analysis to the activation of twelve Facial Part Actions. In that framework, we have evaluated how some degree of asymmetry in the facial expression would help to convey a richer set of complex emotions in addition to the full range of symmetric ones produced by the VAD emotion space. This presentation will present the first results of such an experiment with 58 subjects.

SPEAKERS



Stefano Battiston, senior researcher at ETH Zurich, is one of the most active European young researchers in the area of Economic and Financial Networks. His work applies the complex networks approach both to the empirical analysis of large economic networks and to the modeling of their dynamics. His main activity at the frontier of Physics and Economics has made an impact on both communities, on topics such as corporate control, innovation, decision making and financial risk. In the recent years, his main interests have been on social contagion, default cascades and propagation of financial distress, where he combines the insights from the statistical mechanics of complex systems with the analysis of economic incentives. He is currently involved in the coordination of the European Project FOC and SIMP (anticipating structural instabilities in global financial networks, and in the a Swiss project on the impact of OTC derivatives on systemic risk). Recently some of his work on the structure of the transnational corporate network and on the DebtRank algorithm to detect

important banks was widely covered in the media.



Ronan Boulic is a Senior Scientist and PhD Advisor at the EPFL (Ecole Polytechnique Fédérale de Lausanne). He currently leads the Immersive Interaction research group (IIG) from the School of Computer and Communication Sciences. He received the Ph



Computer Science in 1986 from the University of Rennes, France, and the Habilitation degree in Computer Science from the Grenoble, France, in 1995. He is senior member of IEEE and of ACM, and member of Eurographics. His research interests include 3D interactions, motion capture, modeling, and synthesis for virtual humans and robots. One major key is to provide computationally efficient numerical algorithms for easing real-time 3D interactions with any type of reality (virtual, mixed, information space, etc). Ronan Boulic has co-authored more than 130 refereed publications, including 36 in ISI-indexed journals.

contributed to 8 books.

He was paper co-chair of the Eurographics/SIGGRAPH Symposium on Computer Animation 2004 in Grenoble, and general chair of the same symposium in Lausanne. He is associate editor of the IEEE Trans. on Visualization and Computer Graphics since 2012. He has served on over 50 program committees at conferences in computer graphics, computer animation and virtual reality.



Nigel Gilbert is Professor of Sociology and Director of the Centre for Research in Social Simulation (CRESS) at the University of Southampton. He is the Coordinator of the FP7 FET Integrated Project, QLeCtives (2009-13). Over the last twenty years, he has helped to develop computational sociology and has published widely on the application of agent-based modelling to social phenomena. He has interests in science and technology, innovation, environmental management, and internet communities.



Janusz Holyst is a Professor at Faculty of Physics, Warsaw University of Technology, where he leads the Lab Physics in Earth and Space Sciences and a Visiting Professor at Wolverhampton University. His research field includes evolving networks, models of emotion and opinion formation, econophysics and non-equilibrium statistical physics. He is the Coordinator of the FP7 FET ICT Project Collective Emotions in Cyberspace (CYBEREMOTIONS, 2009-2013). He acts as an Editor of European Physical Journal B and European Physical Journal Data Science. He is the President of KRAB (National Council for Research Projects Coordinators) and a member of the Polish Physical Society (Physics in Economy and Social Sciences, Division of the Polish Physical Society).



David Lazer is a Professor in Northeastern University's Department of Political Science and the College of Computer and Information Science. His work focuses on the nexus of social networks, computational social science, and collaborative intelligence. He is a review editor for Science, Proceedings of the National Academy of Science, and the Administrative Science Quarterly, and his research has been published in such journals as Science, Proceedings of the National Academy of Science, the Political Science Review, and the Administrative Science Quarterly.



Kamil Kloch is a Senior Researcher at the German Research Center for Artificial Intelligence. His current work is focused on the indoor localisation on mobile devices. He received Ph.D. in Computer Science in 2008 from the Jagiellonian University in Kraków, Poland. Ph.D. he investigated algorithms for the on-line scheduling problem. He is the deputy coordinator of the FP7 FET ICT Integrated Project Complex Socio-Technical System in Ambient Intelligence (SOCIONICAL, 2009-2013).



Nicola Santoro is Distinguished Research Professor at Carleton University's School of Computer Science. Initially interested in physics, he is one of the first computer science graduates in Italy (Laurea - Pisa 1974), discovering the beauty of algorithms and data structures. He received a Ph.D. on information structure at Waterloo (Ph.D. - Waterloo 1979), he discovers the net (then called ARPANET) and email, and starts distributed computing. Involved in distributed computing since the beginning, he contributes seminal papers focusing on the algorithmic aspects of distributed computing. He is the author of the book *Design and Analysis of Distributed Algorithms* (Wiley 2007) and co-author of the forthcoming book *Computing by Oblivious Mobile Robots* (Morgan & Claypool 2012). He has been awarded the 2010 SIROCCO Prize for Lifetime Achievement in Distributed Computing. His current research interests are distributed computations by mobile entities (agents, robots, sensors) in time-varying networks (delay-tolerant, vehicular).



Mike Thelwall is Professor of Information Science and leader of the Statistical Cybermetrics Research Group at the University of Wolverhampton, UK and a research associate at the Oxford Internet Institute. Mike has developed tools for gathering and analysis of data including hyperlink analysis, sentiment analysis and content analysis for Twitter, YouTube, blogs and the general web. His publications include 152 refereed journal articles, seven book chapters and two books, including *Introduction to Webometrics*. He is an associate editor of the *Journal of the American Society for Information Science and Technology* and sits on three other editorial boards. <http://www.cs.wlv.ac.uk/~cm1993/mycv.html>



Alessandro Vespignani is Sternberg Distinguished Professor at Northeastern University in Boston, where he leads the Labor Modeling of Biological and Socio-technical Systems. He is fellow of the American Physical Society, member of the Academy of Sciences, and a fellow of the Institute for Quantitative Social Sciences at Harvard University. He is also serving in the board/leadership of a variety of organizations including the Institute for Scientific Interchange Foundation. He is president-elect of the Complex Systems Society. Vespignani's research activity is in modeling diffusion phenomena in complex systems, including data-driven computational approaches to infectious diseases.



spread.



Irena Vodenska is a Professor at Boston University. She is an expert in international finance and investments, with teaching & interests in statistical finance and applications of quantitative methods in financial modeling. Her research is focused on quantitative modeling volatility, global interdependence of financial markets, banking system dynamics, global financial crises, and studied events such as bubbles and crashes. She is principal investigator of several research projects focusing on the implementation of methods for forecasting crises. Prof. Vodenska is a Chartered Financial Analyst with experience in creating and actively managing portfolios, specializing in risk arbitrage and convertible fixed income securities. Her extensive background in finance includes management, financial analysis, and security trading on Wall Street and on European Markets.

Scientific Committee

Walter Quattrociochi (Chair)

Northeastern University, Boston, USA

IMT Lucca, Italy

Guido Caldarelli

IMT Lucca, Italy

Antonio Scala

ISC-CNR, Rome, Italy

IMT Lucca, Italy

Organizing Committee

Alice Baudone

Fabiana Campanella

Annamaria Loguercio

Registration

To register for the conference, please send an e-mail to

horizons@imtlucca.it

How to reach the symposium venue

By plane

The nearest airports to Lucca are Pisa International Airport "Galileo Galilei" and Florence International Airport "Amerigo Vespucci"

From Pisa Airport to Lucca

- By train

Every twenty minutes there is a train from Pisa Airport to Pisa Central Station where you will find train connections to Lucca.

The train station is located on the left hand side when you exit the airport (near the check-in area)

- By bus

There are direct buses from Pisa Airport to Lucca

The bus ticket office is inside the Arrivals Area and the bus leaves from a platform right outside the airport (the company is called Vaibus and the schedule is <http://www.vaibus.it>)

- By taxi

A taxi would cost about € 50,00 and it would take about 30-45 minutes to get to Lucca

From Florence Airport to Lucca

- By bus

There are direct buses from Florence Airport to Lucca

There is a dedicated bus stop immediately next to the airport. The schedule is available at <http://www.vaibus.it>

- By train

If you decide to take a train, you would have to take a city line bus from the airport to the train station of Florence Santa Maria Novella where you have connections to Lucca.

You can see the bus schedule at <http://www.ataf.net/en/ataf.aspx?idC=2&LN=en-US>

By car

From the Highway to IMT

We recommend to take the exit "Lucca Est". At the crossroads turn left and enter Viale Europa; go straight on until you reach a roundabout where you will take Viale Carducci; follow the road, keeping the marvellous walls on your left until you arrive in Piazzale Ricasoli, where the train station is located. Here you turn right, still keeping the walls on your left, and go straight on until you see Porta Elisa, a white marble entrance door to the town. As soon as you enter the town via Via Elisa, where you can follow the directions in order to leave the car in one of the parking lots nearby.

By train

Lucca Train Station is connected to the main Tuscan provinces and tourist locations such as: Pisa, Viareggio, Montecatini, Pistoia, Florence, Aulla. You can find connections and timetables at <http://www.trenitalia.com>

From the train station to IMT

Lucca train station is located in Piazzale Ricasoli: cross Piazzale Ricasoli, take the pedestrian street in front of you, cross the meadow, follow the path and go up the walls. Take the path up onto the walls and walk (right) along the walls until you reach the next exit/bastion. Come down from the walls and go straight into Fosso. Turn right in Via Elisa. The first street on the right is Via San Michele.

Accommodations

<http://www.booking.com/city/it/lucca.html>