CTS 2015 TUTORIALS

TUTORIAL I

Collaborative Business Intelligence for Open Innovation Governance

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TUTORIAL DESCRIPTION

In a globalized and dynamic market, innovation has evolved from creative ability in the hands of a few geniuses towards the Open Innovation scenario, where innovation is a collaborative activity that goes beyond the boundaries of the enterprise, including suppliers, partners, and customers. The openness and dynamicity of Open Innovation and the inherent uncertainty of innovative activities, makes the development of methods and tools for the innovation governance a necessity.

The tutorial aims to provide insights on Collaborative Business Intelligence for Open Innovation Governance. The tutorial introduces participants to concepts and frameworks for innovation monitoring. The relations between different types of innovation organizations and Business Intelligence architectures will be analyzed, from centralized organization to collaboration among autonomous organizations at strategic level.

Participants will get insights on latest trends in Business Intelligence for collaborative networked organizations. State-of-the-art models and methods for the sharing of strategic goals will be presented in terms of Key Performance Indicators (KPIs) and data mart integration.

In the second part of the tutorial, participants will learn how semantic technologies can support the governance of innovation. An ontology-based framework for innovation governance will be presented, showing real-world examples of collaborative innovation governance, from the set-up of collaboration objectives to the monitoring of KPIs.

At the end, a number of directions for future research will be outlined, including dynamic integration of external data sources, and scalability issues.

TUTORIAL OUTLINE
In this tutorial, we cover the following topics:

1. Introduction to Open Innovation
2. Types of Innovation organizations
3. Introduction to the Innovation governance concept
4. Monitoring frameworks for innovation governance
5. Business Intelligence architectures for networked organizations: centralized, distributed and collaborative approaches
6. Semantic technologies for collaborative monitoring
7. SemPI: a semantic framework for innovation governance:
   1. KPIOnto ontology for indicators definition
   2. Reasoning services for objectives set-up
   3. Monitoring indicators
   4. Collaborative maintenance of KPIOnto
8. Conclusions and future trends

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5. C. Diamantini, D. Potena, M. Proietti, F. Smith, E. Storti, F. Taglino, A semantic framework for knowledge management in virtual innovation factories, Int. Journal of Information System Modeling and Design (IJISMD) 4 (2013) 70–92.
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REQUIREMENTS AND TARGET AUDIENCE
No specific preconditions are requested. The expected target audience is wide but primarily oriented on researchers, innovation managers, data scientists, Chief Data Officer, CIO.

TUTORIAL DURATION
The tutorial material will be presented in a 3 to 4-hour session.

TUTORIAL FORMAT
Talks and demo. Beyond projector and screen, we need an internet connection.
A/V AND EQUIPMENT

Projector & screen. hands-on sessions and discussion will be held in order to encourage interaction. As SNA is a flexible method that can be applied in different ways, we will create space in the course for discussing and elaborating on the possibilities of SNA to the research or working areas of the participants.

INSTRUCTOR BIOGRAPHY AND PHOTO

**Claudia Diamantini** is Associate Professor at the Università Politecnica delle Marche, Dipartimento di Ingegneria dell’Informazione, where she coordinates the degree courses and the PhD curriculum in Computer and Automation Engineering. She received the PhD from University of Ancona with a thesis on average misclassification risk machine learning. At present her main research interests are in semantic models for integrated interoperable data analytics and mining. She has been working on these topics within national and international research projects and collaborations.

**Domenico Potena** received the PhD in Information Systems Engineering from the Università Politecnica delle Marche, Italy, in 2004. From June 2005 to October 2008, he was post-doctoral fellow at the Dipartimento di Ingegneria Informatica, Gestionale e dell'Automazione - Università Politecnica delle Marche. At present, he is an assistant professor at the Università Politecnica delle Marche, Dipartimento di Ingegneria dell’Informazione. His research interests include knowledge discovery in databases, data warehousing, data semantics, innovation management systems.
TUTORIAL II

COLLABORATIVE ARGUMENT MAPPING IN AGORA-NET

MICHAEL H.G. HOFFMANN
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TUTORIAL DESCRIPTION

Collaborative argument mapping—that is, the construction of justifications for positions that are graphically represented in the cloud and that can be collaboratively developed and whose elements can be criticized and debated from all over the world—can be used for educational purposes, for public deliberation and e-governance, for coping with “wicked problems” (Rittel & Webber, 1973), for conflict management, and for the creation of knowledge.

In education, the abilities to argue, to evaluate the quality of argumentative reasoning, and to structure reasoning by means of arguments are important learning goals. These skills are crucial not only for the scientific mind but for everybody who strives for a self-determined life without external manipulation, for competent decision making about important matters of life, for self-confident interaction with others, and for participation in public deliberation. Software tools have the potential to support the construction of arguments which is especially important in settings where students collaborate on their own in small groups, such as in problem-based learning. Collaborative argument mapping can help to scaffold student argumentation by providing specific structures that guide both interaction among students and the construction and experimental manipulation of arguments.

For public deliberation, coping with wicked problems, and conflict management, collaborative argument mapping can support the visualization of “framing” processes and stimulate “reframing.” The notions of “framing” and “reframing” have been developed in conflict research to describe the role of conflicting stakeholder perspectives and problem perceptions. People’s perception of a problem is always limited, they “frame” what they see based on certain systems of beliefs, values, world views, ideologies, cultural, social, or religious norms, and attitudes, but also needs and interests (Hoffmann, 2011). Through the visualization of what we think about an issue and how knowledge, beliefs, and values are related in argumentative structures we can learn to clarify our own thinking and to develop our own positions on issues (Hoffmann & Borenstein, 2014).

Finally, collaborative argument mapping can be used for the collaborative creation of knowledge in the cloud (logosymphesis; Hoffmann, 2013). Based on a definition of knowledge as “justified true belief,” we can envision the possibility of global, collaborative knowledge creation in a World of Arguments that is centrally stored on the Internet. Knowledge claims and hypotheses would be formulated, justified, and debated on continuously growing and improved argument maps.
This interactive tutorial will show how the newly developed, collaborative argument mapping software AGORA-net can be used for these purposes. It will present an overview of available argument mapping tools, and it will discuss challenges such as the protection of privacy, authorship, vandalism, and governance of online deliberation tools. Participants will be invited to engage in collaborative argument mapping during the session, and to provide critical feedback both with regard to the opportunities of collaborative argument mapping and its challenges.

TUTORIAL OUTLINE
We cover the following topics:
- What is collaborative argument mapping or computer-supported collaborative argument visualization (CSCAV)?
- Philosophical foundations
- Applications and opportunities:
  - Education: Science education; critical thinking; collaborative reflection; problem-based learning (PBL); “wicked problems”; MOOCs; the global classroom
  - Public deliberation and civic engagement
  - Conflict analysis and management
  - Knowledge creation through collaborative argument mapping in the cloud
- Challenges: How to construct an argument? How to deliberate? Educational scaffolding and representational guidance. Also: How to manage large numbers of topics? Privacy protection; trolls and vandalism; governance structures.
- State of the art: an overview of available technologies
- Features of AGORA-net for opportunities and challenges
- Collaborative argument mapping with the audience on a case of technology assessment

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Suthers, D. D. (2003). Representational Guidance for Collaborative Inquiry. In J. Andriessen, M. Baker & D. D. Suthers (Eds.), Arguing to learn. Confronting cognitions in computer-supported collaborative learning environments (pp. 27-46). Dordrecht: Kluwer Academic Publishers.
REQUIREMENTS AND TARGET AUDIENCE

The target audience consists of researchers in e-learning, e-governance, knowledge management, computer-supported argument visualization, and computer-supported collaborative work. No specific background knowledge is required. Please bring a laptop to participate in some collaborative argument mapping.

TUTORIAL DURATION

This interactive, workshop-style tutorial will take place in a 2 to 3-hour session.

A/V AND EQUIPMENT

Projector, screen, internet connection, and flip chart or white board with markers. It would be nice if there could be additionally wireless internet in the room so that the audience could engage in collaborative argument mapping.

INSTRUCTOR BIOGRAPHY AND PHOTO

Michael Hoffmann is an Associate Professor for Philosophy in the School of Public Policy at the Georgia Institute of Technology. Before coming to Georgia Tech, he worked for ten years at an interdisciplinary research center for mathematics education in Germany. His research focuses on the role of diagrammatic representations for cognitive processes involved in learning, creativity, and deliberation. This research is based on Charles S. Peirce’s semiotics and the Peircean concept of “diagrammatic reasoning.” Dr. Hoffmann’s most recent project focuses on the development of the collaborative argument visualization tool "AGORA-net" (http://agora.gatech.edu) and an approach to problem-based learning in which collaboration and reasoning in teams of students is structured and guided by the AGORA software. Dr. Hoffmann is the PI on a FIPSE grant from the U.S. Department of Education that supports the development of the software since 2010 (Grant P116S100006). As part of this project, Michael Hoffmann developed ArguSkill, an instrument for the quantitative assessment of the ability to understand the structure of complex arguments. He published four books and more than 60 articles and book chapters.
TUTORIAL III

Improving Patient Care: Zero-touch Technologies in the Clinical Environment

Dr. David Harris-Birtill
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TUTORIAL DESCRIPTION
This tutorial will explore the potential for interactive and collaborative computational tools for the clinical environment. The tutorial will discuss how zero-touch devices can improve interaction in surgical settings and how camera-based technology can be utilised in the clinic to monitor vital signs, speed diagnosis and improve the patient experience. The tutorial will cover an overview of how computation is used in the clinic, explaining the technologies used, the clinical workflow and how current scientific research can lead to future improvements in patient care. The tutorial will use a worked example highlighting the uses of the Microsoft Kinect to discuss this technology's potential, demonstrating how it can be used to collaboratively control selection of medical images in a surgical environment, showcasing its potential to monitor the patient’s heart rate and blood oxygenation level before, during, and after treatment.

TUTORIAL OUTLINE
This tutorial will cover the following topics:
- Background and history of technology in medicine.
- State of the art technology in healthcare, including collaborative and embedded systems.
- Worked example of gesture-based control, and monitoring of patients using the Microsoft Kinect and related technologies.

REQUIREMENTS AND TARGET AUDIENCE
Scientific researchers, government and industry personnel interested in deploying their systems in a clinical environment, or interested in technology in healthcare in general.

TUTORIAL DURATION
The tutorial material will be presented in a 2-hour session.

A/V AND EQUIPMENT
Projector and laptop required.
**David Harris-Birtill** is a Research Fellow at the University of St Andrews, where he lectures on topics including Medical Imaging and Research Methods for User Experience. He is a Physicist and Computer Scientist, leading the SICSA (Scottish Informatics and Computer Science Alliance) theme on Medical Imaging and Sensing in Computing, and collaborates with clinicians and industry to develop innovative medical imaging systems.

David completed his PhD in Physics at the Institute of Cancer Research in London. He then became a Post-Doctoral Researcher in Imperial College London, working for the department of Surgery and Cancer in the Hamlyn Centre for Medical Robotics. Throughout his career David has used his programming skills to create high-impact image and data analysis programs to help researchers around the world. He also has a great deal of experimental experience creating and optimising medical imaging systems, microscopy systems, using lasers for cancer therapy and imaging, and chemical analysis of gold nano-particles.

David’s work has been published in journals including the Journal of Biomedical Nanotechnology, the Journal of Biomedical Optics, and Astronomy and Astrophysics, and has presented his research at conferences across the globe, including San Francisco, San Jose, London, Edinburgh, and Hong Kong.
TUTORIAL IV

Trust Management: Multimodal Data Perspective

Krishnaprasad Thirunarayan
Kno.e.sis - Ohio Center of Excellence in Knowledge-enabled Computing
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TUTORIAL DESCRIPTION

Trust relationships occur naturally in many diverse contexts such as ecommerce, social interactions, social networks (SN), emergency response scenarios, mobile ad hoc networks (MANET), Internet of Things (IoT), decision-support systems, and distributed systems. As the connections and interactions between humans and/or machines (collectively called agents) evolve, and as the agents providing content and services become increasingly removed from the agents that consume them, miscreants attempt to corrupt, subvert or attack existing infrastructure. This in turn calls for support for robust trust inference (e.g., gleaning, aggregation, propagation) and update (also called trust management). Interpersonal trust plays a crucial role in everyday decision making. Unfortunately, there is neither a universal notion of trust that is applicable to all domains nor a clear explication of its semantics in many situations. Because Web, social and sensor data often provide complementary and overlapping information about an activity or event that are critical for overall situational awareness, there is a unique need for developing an understanding of and techniques for managing trust that span all modalities. In this tutorial, we motivate the trust problem, summarize the trust research, discuss challenges confronting us, and present an overview of our research accomplishments. Specifically, we provide a comprehensive broad overview of the trust landscape, with the nitty-gritties of a handful of approaches. We also provide details of the theoretical underpinnings and comparative analysis of Bayesian approaches to binary and multi-level trust, to automatically determine trustworthiness in a variety of reputation-based systems.

TUTORIAL OUTLINE

We cover the following topics:

- Real-life examples of trust to shed light on the characteristics of trust.
- Definition of concepts such as trust, trustworthiness, reputation, and security.
- Trust Ontology to provide basic concepts and vocabulary.
- Motivation and explanation of Beta-distribution and Dirichlet distribution that provides mathematical foundation for reputation-based trust systems.
- Illustrative examples of trust metrics and automatic gleaning of trustworthiness.
- Overview of trust propagation frameworks: aggregation and chaining.
- Research challenges in sensor networks, social networks and interpersonal networks.
REFERENCES

[T+11] K. Thirunarayan and P. Anantharam, Trust Networks: Interpersonal, Sensor, and Social, In: Proceedings of 2011 International Conference on Collaborative Technologies and Systems (CTS 2011), 13-21, Philadelphia, Pennsylvania, USA, May 23-27, 2011 (invited paper).

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[JIB-07] A. Josang, R. Ismail, and C. Boyd, “A Survey of Trust and Reputation Systems for Online Service Provision, Decision Support Systems,” Volume 43, no. 2, pp. 618--644, March 2007.

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REQUIREMENTS AND TARGET AUDIENCE
Beginner-level – The tutorial is self-contained and no specific background is assumed.

TUTORIAL DURATION
The tutorial material will be presented in a 2-hour session.

A/V AND EQUIPMENT
Require a laptop and related facilities to project MS Powerpoint presentation; Internet Connection to run demos.

INSTRUCTORS BIOGRAPHY
Krishnaprasad Thirunarayan (T. K. Prasad) is a Professor at Kno.e.sis - Ohio Center of Excellence in Knowledge-enabled Computing, Wright State University, Dayton, OH-45435. His research interests include Trust Networks, Big Data Analytics, Web 3.0, Mobile Health, and Information Extraction/Retrieval. His recent research has been funded by AFRL, NIH, and NSF. He has B. Tech. degree in Electrical Engineering from I.I.T., Madras, M. E. degree in Computer Science from I.I.Sc., Bangalore, and Ph.D. in Computer Science from State University of New York at Stony Brook. Recently, he received 2014-2015 College of Engineering and Computer Science Outstanding Faculty Award.
TUTORIAL V

Complexity in Collaborative Environments

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TUTORIAL DESCRIPTION
Modeling complexity can pose challenges when we attempt to model the intricacy of computation in collaborative environments. Network of connections, where simple local interaction can create global phenomena, are some examples of computationally generated complexity and emergence available for such interaction. Emergence of large-scale behaviors, self-organization, adaptation, and new unanticipated forms of interactions are some examples of such systems found in nature yet hard to simulate computationally. Complex systems provide theoretical underpinning to model such interactions. We will discuss theoretical limits of computation in the complexity area. The discussion will be followed by examples of local interaction at different scales. The tutorial has three main components: first will be a gentle introduction to Complexity [1,2]. Next, we will discuss a simulation environment called NetLogo™ followed by an example of our experience with NetLogo™ [3,4]. Our third example will be a discussion of popular massively multiplayer online role-playing games (MMORPGs). MMORPGs provide many examples of new forms of interactions emerging. Rich interactions suits are provided by MMORPG platforms where multiple participants can coexist in the same environment even though separated by physical distances. Emergence and patterns are commonplace in game play in MMORPGs and contribute to their success and popularity. Thus, this tutorial is expected to be useful for researchers and graduate students who are interested in understanding complexity of interactions in a collaborative environment that are being created by possibilities of working in real and/or virtual worlds, wearable computing, mobile/wireless internet enabled devices in augmented, ubiquitous, and social virtual environments. We will end with an example of game interaction using Unity3D™.

TUTORIAL OUTLINE
We cover the following topics:

- Complex systems: A basis of designing collaborative virtual environments and designing future collaborative technologies. (1 hour)
- Break (10 minutes)
- NetLogo™ Presentation and Discussion, and an example (10 minutes)
- MMORPGs: Discussion of emergence of patterns in MMORPGs (10 minutes)
- Example of a game using Unity3D™ showing emergence in interactive collaborative environments. (10 minutes)
- Wrap-up and Summary of Possible Future Directions (10 minutes)
- Question and Answers (10 minutes)
- Total time: 2 hours.
REFERENCES

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2) Melaine Mitchell: Complexity: A Guided Tour, Oxford University Press, pp.1-345.
3) Luis R. Izquierdo, “NetLogo 4.0 – Quick Guide”, http://luis.izquierdo.name
4) George Mudrak and Sudhanshu Kumar Semwal, Modeling Aggression and Bullying: A Complex Systems Approach, accepted for oral presentation and publication at the 20th Annual CyberPsychology, CyberTherapy Social Networking Conference (CYPsy2015), SanDiego, CA.
5) Pete Early, Crazy: A Father’s Search Through America’s Mental Health Madness. 2007 Pulitzer Prize Finalist.
6) Sudhanshu Kumar Semwal, George Mudrak and Mike Bolei, “Introduction to Complexity in Collaborative Environments, Tutorial T-7 at The 2-12 International Conference on Collaboration Technologies and Systems (CTS2012), in cooperation with ACM, IEEE, and IFIP, May 21-25th, 2012, Denver, Colorado (2012).

REQUIREMENTS AND TARGET AUDIENCE

Gentle introduction to complex systems will be targeted for researchers and graduate students who are interested in studying emergence in mobile, wearable, collaborative environments, and motivated to study patterns resulting from such an interaction. Downloadable copy of the tutorial notes will be provided to all registered participants one week before the day of the tutorial.

TUTORIAL DURATION

The tutorial material will be presented in a 2-hour session.

A/V AND EQUIPMENT

Projector will be needed to connect with Mac notebook.

INSTRUCTOR BIOGRAPHY AND PHOTO

Dr. Sudhanshu Kumar Semwal is a tenured professor at the University of Colorado, Colorado Springs (UCCS). He has over eighty technical publications in the areas of Computer Graphics, Virtual Reality, Wearable Computing, and Complex Systems. He is the director of the Games and Media Integration (GMI) Program at UCCS. Dr. Semwal co-organized several Crossover applications conference at UCCS: Technology for the Visually Impaired and the Blind from 2010-2012. He has held visiting researcher positions at the Advanced Telecommunication Research (ATR) Laboratory, Kyoto; Central Research Laboratory (CRL), Matsushita (Panasonic) Osaka (1991-92), Japan; and visiting scientist position at the Sandia National Laboratory, Albuquerque, NM. His work has been presented at the national and international conferences in the US, Singapore, Japan, Belgium, Czech Republic, and Canada.