

## Welcome Message

The organizing committee welcomes you to the 2014 International Symposium on Innovations in Intelligent Systems and Applications (IEEE INISTA 2014), held in Alberobello, Italy, on June 23-25, 2014. This meeting series has been initiated in 2005 by Yildiz Technical University, and grew year after year. This edition is sponsored by the IEEE Italy Section, supported and promoted by the IEEE Italy Section Chapters of the Computational Intelligence Society, Computer Society, Engineering in Medicine & Biology Society, Industry Applications Society, Instrumentation & Measurement Society, Robotics & Automation Society, Signal Processing Society, Systems Council, and Systems Man and Cybernetics Society. Organization of the meeting is supported by Università degli Studi di Milano.

The conference aims to bring together the researchers from the entire spectrum of the multi-disciplinary fields of intelligent systems and establish effective means of communication between them. In particular, it focuses on all aspects of intelligent systems and the related applications, from the points of view of both theory and practice. Specifically: artificial intelligence algorithms, artificial neural networks, bioinformatics, data mining, evolutionary computation, expert systems, fuzzy logic, genetic algorithms, machine learning, memetic computing, natural language processing, particle swarms, smart sensors and materials, hardware implementations for intelligent systems, human-computer interaction, intelligent agents, intelligent applications in biomedical engineering, intelligent approaches in robotic and automation, intelligent approaches in signal and image processing, intelligent approaches in system identification/modeling, intelligent control systems, intelligent defense/security systems, intelligent life, and various other topics related with intelligent systems.

The three-day conference program provides a friendly forum for the attendees to carry out presentations, information exchanges, extensive discussions on theory, methodology and applications in the field of interest of the conference, as well as to foster networking, planning for future collaborations and new research projects that will further advance intelligent systems and the related applications. To promote interaction and discussion in the audience, sufficient time is allotted to presenters not only to introduce their achievements, but also to engage in extended discussions with the participants. Subjects of discussion include, but are not restricted to, critical evaluation of approaches and results, the rationale underlying particular methodologies, experimental and theoretical examinations, practical difficulties, insights, and extensions to other application areas.

We hope you will find IEEE INISTA 2014 a challenging and productive experience. We trust that you will also enjoy the location, the culture and the food: Alberobello will be an exciting experience!

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## Tutorials

### Tutorial 1

**Monday, June 23, 9:30 AM - 10:30 AM**

**Room:** Mimosa Room

**Title:** *Reconstruction of 3D surfaces*

**Speaker:** Stefano Ferrari

**Authors:** Francesco Bellocchio

Alberto N. Borghese

Stefano Ferrari

Vincenzo Piuri

#### **Abstract:**

The surface reconstruction problem consists in fitting a surface model on a given set of features, usually sampled points. This problem can be reframed in computational intelligence as a supervised learning problem, where two coordinates of the points can be used as the input instances and the third one as the desired output values. The resulting approximation function provides the surface model that allows the continuous reconstruction of the surface.

Surface reconstruction problems occur in several application fields (e.g., design, archeology, medicine, and entertainment), where the 3D models can be used for simulation or visualization. The use of 3D models of real objects is also encouraged by the recent availability of 3D scanners, which provide a cloud of noisy points by a physical measurement of the 3D geometry of the objects. From this data, the 3D model can be obtained by applying a function fitting technique.

Several approaches have been developed, encompassing classic polynomial regression, enhanced vector quantization, K-means, and computational intelligence techniques. This tutorial focuses on some computational intelligence approaches to surface reconstruction, as highly flexible techniques. For the solution of the function approximation problem, neural techniques, generally, show a good trade-off between computational complexity, accuracy and robustness of the solution with respect to other methods. In this context, there are many different paradigms which are able to find the approximation function, e.g., Multi-layer Perceptron Networks, Radial Basis Function (RBF) Networks, Self-Organizing Maps (SOM), and Support Vector Machines (SVM). However, other paradigms such as Genetic Algorithms have been used to improve the performances of traditional approaches of surface reconstruction. In general, there is not a single paradigm better than the others, but each one performs differently depending on the application context. Since the real objects has generally a complex structure, that can be described at different levels of detail, a hierarchical multi-scale representation allows for a more accurate tuning of the reconstruction, with a lower complexity of the final model.

This tutorial is directed to introduce the basic concepts of surface reconstruction by using approaches based on computational intelligence. The approaches based on some hierarchical techniques (namely, HRBF and HSVR) will be analyzed and discussed in detail, and the most recent results of research will be presented. Some examples will also be briefly overviewed for surface reconstruction in some relevant application cases.

#### **Biography:**

Stefano Ferrari received the M.Sc. degree in computer science from the Università degli Studi di Milano in 1995 and the Ph.D. in computer and automation engineering from the Politecnico di Milano, in 2001. Since 2002, he is Assistant Professor at the Computer Science Department, Università degli Studi di Milano. His research interests are related mainly to neural networks and soft-computing paradigms and their application to the computer graphics, signal processing and measurement systems. More information is available at <http://www.di.unimi.it/ferrari>.

## **Tutorial 2**

**Monday, June 23, 9:30 AM - 10:30 AM**

**Room:** Glicine Room

**Title:** *New Applications of Virtual and Augmented Reality*

**Speaker:** Lucio Tommaso De Paolis

### **Abstract:**

Virtual Reality (VR) is a simulation in which computer graphics is used to create a realistic-looking world. Moreover the synthetic world is not static, but responds to the user inputs and it can be modified in real time. Interactivity and captivating power contribute to the feeling of immersion in the virtual world, of being part of the action that the user experiences. It is not only possible to see and manipulate the virtual objects, but also to feel and touch them using specific haptic devices.

Mixed Reality (MR) and Augmented Reality (AR) technologies permit the real-time fusion of computer-generated digital content with the real world and allow the creation of fascinating new types of user interfaces. Augmented Reality enhances the users' perception and improves their interaction in the real environment. The virtual objects, displaying information that they cannot directly detect with their own senses, help them to perform real-world tasks better.

MR/AR concepts are applicable to a wide range of applications (medical, entertainment, military, design, manufacture, maintenance, arts and cultural heritage) moving from pure academic research into industrial and potential consumer areas. Recently, new concepts such as Natural User Interfaces (NAI) have emerged and permit to combine AR/MR technologies with new mobile human machine interfaces.

The tutorial will present a review of current Virtual Reality and Augmented Reality technologies and will provide a detailed analysis of the engineering, scientific and functional aspects of VR systems and the fundamentals of VR modeling and programming. The aim is to bring a community of researchers from academia and industry, computer scientists, engineers, physicians together in order to share points of views and emerging impressions on the present applications of Virtual Reality and Augmented Reality technologies.

### **Biography:**

Lucio Tommaso De Paolis is an assistant professor and the director of the Augmented and Virtual Reality Laboratory (AVR Lab) at the Department of Innovation Engineering of the University of Salento, Italy. His research interest concerns the development of applications of virtual and augmented reality in medicine and surgery. De Paolis has been a visiting professor in 2014 at the Tallinn University of Technology (Estonia), in 2012 at the Vytautas Magnus University of Kaunas (Lithuania) and in 2011 at the University of Tallinn.

### **Tutorial 3**

**Monday, June 23, 10:30 AM - 11:00 AM**

**Room:** Mimosa Room

**Title:** *Crowd-Investment: The Italian Hub, How Italy is Leading the Equity Crowdfunding Market for Innovation Projects*

**Speaker:** Alessandro M. Lerro

#### **Abstract:**

Crowdfunding is a disruptive financial tool that allows entrepreneurs to raise money from the crowd and that allows the crowd to invest in innovation.

Among the different kinds of crowdfunding, crowd-investment is not aiming at supporting social projects with donations, being indeed an investment tool. While the global value of crowdfunding exceeded \$ 6 billions in 2013, growing at double digit each year, crowd-investment is just taking off. According to a World Bank report, in 2025 crowd-investment will exceed \$ 92 billions per year. While the first experience of crowd-investment was the lending-based model, other models are run through reward-based formulas, whereby the campaign owner asks for funding against a product which is still to be produced and sometime still to be implemented, or whereby he offers a royalty in case of success.

The typical crowd-investment, indeed, is run through the equity-based formula, whereby investors become shareholders, enjoy advantages and run risks with the campaign owner. Equity crowdfunding as a structured industry started in Australia, but it was President Obama in April 2012 who signed the first law allowing people to collect equity investments on-line. While US law has not yet been enacted, it is Italy the first country, which not only approved a law but also fully enacted it.

Crowd-investment has already demonstrated to be a very effective tool to start a business, to increase sales and even to get further funding from professional investors.

#### **Biography:**

Alessandro M. Lerro is an Italian attorney who has been advising for 25 years in innovation and new technologies, matching a deep expertise in both intellectual property and finance. Member of the Annual Worldwide Council Of Global Crowdfunding Leaders, Lerro is one of the most well known crowdfunding experts in the world and a leading European lawyer in this area. He is an appreciated international speaker, lecturer and writer in Italian and English about innovation and crowdfunding.

Former Managing Director, member of the board of directors and of the surveillance board of several companies in Italy, Germany, Luxembourg, engaged in the areas of innovation and high tech, he has also been advisor of the Italian Environment Ministry for ten years.

After getting his bachelor degree in International Law at LUISS University, Roma, in 1990, he attended several post-degree courses in Italy and abroad. As an attorney, he has been admitted to plead before the Supreme Court.



## Keynote Speech

**Monday, June 23, 12:00 PM - 1:00 PM**

**Title:** *A Fuzzy View to Sentic Computing*

**Speaker:** Vincenzo Loia, Università degli Studi di Salerno, Italy

### **Abstract:**

The social Web is the de-facto platform for public communication where the users have acquired the acquired awareness of being active part of the global network: the web users interact, share and collaborate through social networks, online communities, blogs, wikis, feeds and chats. The Web has evolved from informative to social content that where the web-users are more inclined to express their opinions, sentiments about daily life, movies, commercial assets and products, etc. At the same time, the widespread of "e-services" (i.e., e-commerce, e-tourism, e-business, etc.) provides a crucial role to users' opinion and judgment which are often more listened to than experts' viewpoints. Users spend some time on the Web to search for user-generated reviews in order to estimate the actual utility value of products, often considering user opinions as a feasible source of information about products. Introducing the human dimension into text comprehension guarantees to guess the user feeling, expectation and preferences, suggests ad-hoc advertisement and addresses profitable market analysis. In an effort to explore potential resolutions to this issue, the recent research proceeds towards the elicitation of emotion-based I knowledge, in order to filter the sentiments and moods that govern the users' actions and behavior on the Web. Companies exploit sentiment analysis and opinion mining tools for their marketing strategies, in order to evaluate the public attitudes towards their brands; social events, political actions are directed by collective sentiments; even recommendation systems begin considering opinions and sentiments as additional aspects to take into account, besides the traditional positive or negative feedback. But, the tricky understanding of the natural language text makes the interpretation of human feelings a very complicated task. Opinions and emotions are enclosed in the written language and it is complex to infer such concepts that have an affective valence.

Recent trends emphasize the role of the emotions in the text understanding. Sentic Computing, is a novel paradigm that aims at grabbing the sentiments in text. It exploits the common sense in the natural language for capturing emotions in web resources, such as, webposts, blog posts, forum entries, RSS feeds, tweets and instant messages. It classifies the emotions in four emotional dimensions, according to the Hourglass of Emotions, a variant of the Plutchik's emotion categorization model. Besides the Sentic Computing paradigm, in this talk the modeling of the emotions is done using Fuzzy Logic. The fuzziness, as a means of modelling linguistic uncertainty, lends itself well to analyze emotions by providing a more realistic interpretation of the text. Our approach allows enriching linguistic expressions that describe linguistic patterns, in addition to the processing of the single words. This modeling enables the recognition of possible emotions associated to the sentences, words or the text analyzed. Yet, sometimes too many (degrees of) emotions are collected, with the consequent difficulty on the understanding of which emotions are more meaningful in the analyzed text. In order to get a synthetic emotional state, described by the most representative emotion for each emotional dimension, a further step consists in employing a fuzzy linguistic modeling of the emotional dimensions, along with the linguistic aggregation operators such as LOWA (Linguistic Ordered Weighted Averaging) of the Computing with Words (CWW) paradigm. This way, a natural and more concise representation of the main emotions governed by the dimensions in the analyzed text is obtained.

**Biography:**

Vincenzo Loia received the PhD in Computer Science from the University of Paris VI, France in 1989, and the bachelor degree in Computer Science from the University of Salerno in 1984. From 1989 he is Faculty member at the University of Salerno where he teaches Multi Agent-based Systems and Neural Systems & Knowledge Discovery. His current position is as Full Professor of Computer Science at Department of Computer Science. He was principal investigator in a number of industrial R&D projects and in academic research projects. He is author of over 300 original research papers in international journals, book chapters, and in international conference proceedings. He edited four research books around agent technology, Internet, and soft computing methodologies. He is founder of the CO.RI.SA. (Research Consortium on Agent System). He is Co-Editor in Chief of Soft Computing, and Editor in Chief of Ambient Intelligence and Humanized Computing, both published from Springer-Verlag. He serves as Associate Editor in several international Journals, among them IEEE Transaction on Industrial Informatics, IEEE Transaction on Systems, Men, Cybernetics, International Journal on Memetic Computation. He held in the last years several roles in IEEE Society in particular for Computational Intelligence Society (Chair of Emergent Technologies Technical Committee, IEEE CIS European Representative, Vice-Chair of Intelligent Systems Applications Technical Committee). His current research interests focus on merging soft computing and agent technology to design technologically complex environments, with particular interest in Web Intelligence applications.

## Special Session

**Tuesday, June 24, 12:00 PM - 1:00 PM**  
**Intelligent Systems Projects in Puglia Region**

The Apulia Regional Government and Innova Puglia organize a presentation day to disseminate the researches and the results of the APULIA LIVING LABS program, in conjunction with the 2014 IEEE INISTA conference.

The conference attendees are welcome to participate in the presentation day and meet the companies and the research centers which performed these researches.

More detailed information is available at: [http://livinglabs.regione.puglia.it/archivio-news/-/asset\\_publisher/XL48EsACa71q/content/id/155707](http://livinglabs.regione.puglia.it/archivio-news/-/asset_publisher/XL48EsACa71q/content/id/155707)

