Cartagena de Indias
November 2 to 4th

Summer School on
Computational Intelligence
and Applications
2016 IEEE CIS Colombia

Contact:

lacci2016@ieee.org.co

http://la-cci.org/school-lasci/

Summer School on Computational Intelligence and Applications

Tutorials

	Neural networks: what did we learn from the theory and where are we going? Cesare Alippi, PhD. Politecnico di Milano, Italy and Università della Svizzera Italiana, Switzerland
	Introduction to Data Mining Carlos Alberto Cobos Lozada. PhD. Universidad del Cauca
	Evolutionary Many-Objective Optimization Algorithms Gary G. Yen, Regents Professor, FIEEE, FIET Oklahoma State University School of Electrical and Computer Engineering
	Interactive dimensionality reduction Diego Hernán Peluffo-Ordóñez. PhD. Universidad Técnica del Norte
	Computational intelligence applications in Smart grid operations G. Kumar Venayagamoorthy, PhD, MBA, FIET, FSAIEE, SMIEE Clemson University
	Recurrent Neural Networks and Natural Language Processing Tutorial Fabio A. González. PhD. Universidad Nacional de Colombia

Registration

Class of Registration	Registration Fees
IEEE Member	COP$350.000
IEEE Non Member	COP$470.000

Registration Includes:

- Participant Kit (Badge, Pencil, Notebook)
- Lunchs
- Coffee Breaks
- Certificate
- Access to plenary conferences of the IEEE LA-CCI 2016

Program

Time/Day	November 2nd	November 3rd	November 4th
8:30 - 9:00		Intelligence in the cyber-physical revolution Cesare Alippi Ph.D Politecnico di Milano, Italy and Università della Svizzera Italiana, Switzerland	State-of-the-Art Many-Objective Evolutionary Algorithms For Optimization Gary Yen Ph.D Oklahoma State University
9:00 - 10:00	Opening Registration		
10:00 - 10:25	Opening Ceremony	Computational Intelligence Technologies for Smart Grid Monitoring and Control Kumar Venayagamoorthy Ph. D Clemson University	The role of AI/CI in this new human revolution and potential in Latin America Fernando Buarque Ph. D University of Pernambuco
10:30 - 11:00	Big Data Analysis using Deep Learning and Information Theoretical Learning: Applications to Time-Domain Astronomy Pablo Estevez Ph.D University of Chile	Coffee Break	Coffee Break
11:00 - 11:30			
11:30 - 13:00	TUTORIAL 1: Neural networks: what did we learn from the theory and where are we going? Cesare Alippi Ph.D Politecnico di Milano, Italy and Università della Svizzera Italiana, Switzerland	TUTORIAL 3: Evolutionary Many-Objective Optimization Algorithms Gary Yen Ph.D Oklahoma State University	TUTORIAL 5: Computational Intelligence Applications in Smart Grid Operations Kumar Venayagamoorthy Ph. D Clemson University
13:00 - 14:00	Lunch	Lunch	Lunch
14:00 - 16:00	TUTORIAL 2: Introduction to Data Mining Carlos Cobos Ph.D Universidad del Cauca	TUTORIAL 4: Recurrent Neural Networks and Natural Language Processing Tutorial Fabio Gonzales Ph.D Universidad Nacional de Colombia	TUTORIAL 6: Interactive dimensionality reduction Diego Peluffo Ph.D Universidad Técnica del Norte
16:00 - 16:30	Coffee Break	Coffee Break	Coffee Break
16:30 - 18:00	Deep learning: the rebirth of neural networks Fabio Gonzales Ph.D Universidad Nacional de Colombia	Poster Session	Panel
18:00	Welcome Reception	Meeting Steering Committee LA-CIS	Closing Ceremony

Contact:

This Summer School is co-located with the IEEE Latin America Conference on Computational Intelligence LA-CCI 2016

http://la-cci.org/school-lasci/
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TUTORIAL 1:

Neural networks: what did we learn from the theory and where are we going?
Cesare Alippi, PhD.
Politecnico di Milano, Italy and Università della Svizzera Italiana, Switzerland

Many of us have been practicing with artificial neural networks for decades, some others have started after convolutional neural networks and deep learning showed their amazing impact on applications. Some others are following the Big data and data analytics mood. Feedforward, recurrent, spiking, convolutional neural networks represent valid alternatives for many applications with the complexity of the model family and the learning procedure fully justifying both further investigation and neural accelerators.

What's beyond the plug-and-play magic? And what about the satisfaction of some hypotheses we do make to have the theory amenable?

Biography:

CESARE ALIPPI received the degree in electronic engineering cum laude in 1990 and the PhD in 1995 from Politecnico di Milano, Italy. Currently, he is a Full Professor of information processing systems with the Politecnico di Milano. He has been a visiting researcher at UCL (UK), MIT (USA), ESPCI (F), CASIA (RC), USI(CH), A*STAR (SIN), UKobe (JP).

Alippi is an IEEE Fellow, Vice-President education of the IEEE Computational Intelligence Society, member of the Board of Governors of the International Neural Networks Society, Associate editor (AE) of the IEEE Computational Intelligence Magazine, past AE of the IEEE-Trans Instrumentation and Measurements, IEEE-Trans. Neural Networks, and member and chair of other IEEE committees.

In 2016 he received the INNS Gabor award and the IEEE Transactions on Neural Networks and Learning Systems outstanding paper award; in 2004 the IEEE Instrumentation and Measurement Society Young Engineer Award; in 2011 has been awarded Knight of the Order of Merit of the Italian Republic; in 2013 he received the IBM Faculty Award.

Among the others, Alippi was General chair of the International Joint Conference on Neural Networks (IJCNN) in 2012, Program chair in 2014, Co-Chair in 2011 and General chair of the IEEE Symposium Series on Computational Intelligence 2014.

Current research activity addresses adaptation and learning in non-stationary environments and Intelligent embedded systems.

Alippi holds 5 patents, has published in 2014 a monograph with Springer on "Intelligence for embedded systems" and (co)-authored about 200 papers in international journals and conference proceedings.

Home Page: http://home.dei.polimi.it/alippi/

TUTORIAL 2:

Introduction to Data Mining
PhD. Carlos Alberto Cobos Lozada
Universidad del Cauca

In this tutorial, participants are going to be introduced into main tasks and techniques of data mining, including: classification, clustering and association rules. A practical example will be developed using Weka (a free data mining tool) and RapidMiner.

En este tutorial, los participantes serán introducidos en las principales tareas y técnicas de minería de datos, incluyendo: clasificación, agrupación y reglas de asociación. Se desarrollará un ejemplo práctico utilizando Weka (una herramienta de minería de datos libre) y RapidMiner.

Contenido a desarrollar:
1. Definición
2. Falacias
3. Tareas
4. Clasificación
5. Estimación
6. Clustering
7. Reglas de Asociación
8. Experiencias desarrolladas en GTI (Universidad del Cauca)

Language: Spanish

Biography:

Carlos Cobos is a Full Time Professor in Computer Science at the University of Cauca (Colombia), director of the Information Technology Research Group (GTI at the University of Cauca), and coordinator of the master program in computation at the University of Cauca since 2014. He has been researcher on several projects related to data mining, text mining, metaheuristics and e-learning. He has been responsible for coordinating the Systems Engineering Program at the University of Cauca, Manager of the Systems Department (Computer Science), and has taught a wide range of courses, among them: Data mining, Information retrieval, Metaheuristics, Databases, Software Engineering and Programming. He has written papers, reports and other material on information retrieval, data mining, metaheuristics, learning management systems and mobile learning. He has also worked as a reviewer of several indexed journals like Information Sciences (Elsevier), Applied Mathematics & Computation (Elsevier), Expert Systems with Applications (Elsevier) and the Journal of Intelligent and Fuzzy Systems (IOS Press), among others.

TUTORIAL 3:

Evolutionary Many-Objective Optimization Algorithms
Gary G. Yen, Regents Professor, FIEEE, FIET
Oklahoma State University
School of Electrical and Computer Engineering

Evolutionary computation is the study of biologically motivated computational paradigms which exert novel ideas and inspiration from natural evolution and adaptation. The applications of population-based heuristics in solving multiobjective optimization problems have been receiving a growing attention. To search for a family of Pareto optimal solutions based on nature-inspiring problem solving paradigms, Evolutionary Multiobjective Optimization Algorithms have been successfully exploited to solve optimization problems in which the fitness measures and even constraints are uncertain and changed over time. When encounter optimization problems with many objectives, nearly all designs performs poorly because of loss of selection pressure in fitness evaluation solely based upon Pareto optimality principle. This talk will survey recently published literature along this line of research- evolutionary algorithm for many-objective optimization and its real-world applications. Based on performance metrics ensemble, we will provide a comprehensive measure among all competitors and more importantly reveal insight pertaining to specific problem characteristics that the underlying evolutionary algorithm could perform the best. The experimental results confirm the finding from the No Free Lunch theorem: any algorithm's elevated performance over one class of problems is exactly paid for in loss over another class.

Biography

Gary G. Yen received the Ph.D. degree in electrical and computer engineering from the University of Notre Dame in 1992. He is currently a Regents Professor in the School of Electrical and Computer Engineering, Oklahoma State University. His research interest includes intelligent control, computational intelligence, evolutionary multiobjective optimization, conditional health monitoring, signal processing and their industrial/defense applications.

Gary was an associate editor of the *IEEE Transactions on Neural Networks* and *IEEE Control Systems Magazine* during 1994-1999, and of the *IEEE Transactions on Control Systems Technology*, *IEEE Transactions on Systems, Man and Cybernetics* and IFAC Journal on *Automatica* and *Mechatronics* during 2000-2010. He is currently serving as an associate editor for the *IEEE Transactions on Evolutionary Computation* and *IEEE Transactions on Cybernetics*. Gary served as Vice President for the Technical Activities, IEEE Computational Intelligence Society in 2004-2005 and is the founding editor-in-chief of the *IEEE Computational Intelligence Magazine*, 2006-2009. He was the President of the IEEE Computational Intelligence Society in 2010-2011 and is elected as a Distinguished Lecturer for the term 2012-2014. He received Regents Distinguished Research Award from OSU in 2009, 2011 Andrew P Sage Best Transactions Paper award from IEEE Systems, Man and Cybernetics Society, 2013 Meritorious Service award from IEEE Computational Intelligence Society and 2014 Lockheed Martin Aeronautics Excellence Teaching award. Currently he serves as the chair of IEEE/CIS Fellow Committee and General Co-Chair of 2016 IEEE World Congress on Computational Intelligence to be held in Vancouver, Canada. He is a Fellow of IEEE and IET.

TUTORIAL 4:

Interactive dimensionality reduction
Dr. Diego Hernán Peluffo-Ordóñez
Universidad Técnica del Norte

The objective of this emergent research area is to link the field of dimensionality reduction (DR) with that of information visualization (IV), in order to harness the special properties of the latter within DR frameworks. In particular, the properties of controllability and interactivity are of interest, which should make the DR outcomes significantly more understandable and tractable for the (no-necessarily-expert) user. These two properties allow the user to have freedom to select the best way for representing data. In this workshop, an interactive model based on a linear combination of kernel matrices will be explained. Also, a generalized kernel framework for DR as well as kernel representations of DR methods will be studied.

Biography:
DIEGO HERNÁN PELUFFO-ORDÓÑEZ was born in Pasto - Colombia in 1986. He received his degree in electronic engineering, the M.Eng.and PhD. degree in industrial automation from the Universidad Nacional de Colombia, Manizales - Colombia, in 2008, 2010 and 2013, respectively. Afterwards, he worked as a post-doc at Université Catholique de Louvain at Louvain la-Neuve, Belgium. In 2014, he worked as an assistant teacher at Universidad Cooperativa de Colombia - Pasto. Currently, he is working as a researcher/professor at Universidad Técnica del Norte - Ecuador. His main research interests are dimensionality reduction and spectral methods for clustering and representation.

TUTORIAL 5:

Computational intelligence applications in Smart grid operations
G. Kumar Venayagamoorthy, PhD, MBA, FIET, FSAIEE, SMIEE
Clemson University

With the emerging innovations to the electricity infrastructure (referred to as the smart grid), high levels of penetration of renewable energy, and an emphasis on competitive pricing, it will become necessary to optimize the safety margins presently allowed, and use existing equipment as optimally as possible. Maintaining reliable service and implementing emergency defense plans during major unintended disturbances and intended attacks is critical with the growth of the electric power network and its information infrastructure. The development of reliable and scalable intelligent monitoring and control algorithms, and situational awareness and intelligence technologies are needed as the smart grid is embracing synchrophasor measurement data for operation analysis, making-decisions and implementing controls.

Situational awareness (SA) is the perception of elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future. Situational intelligence (SI) is seeing ahead how the situations will unfold over time. The report on the Northeast Blackout on August 14, 2003, shows that it was difficult to get reliable information from the state estimation software/simulations, contingency analysis results, and critical status of power lines relating to the status of systems outside of the individual areas. Intelligent sense-making is essential for maintaining and enhancing the stability, security and safety of smart grid.

Data obtained from synchronized phasor measurement units (PMUs) installed at the transmission system buses can contain measurements including several voltage and current phasors (each of which has magnitude and phase angle), frequency as well as other analog and digital signals and status flags. Problems in power system data analytics starts at data acquisition all the way up to knowledge discovery. The problems are associated with heterogeneity, multiple timescales, scalability, timeliness, and complexity of data that impedes the ability of current technologies to effectively utilize them.

The objective of this tutorial is to expose system operators, engineers and researchers from the industry, academia and government to what is situational awareness (SA), when and why it is needed in control center operations, and the recent advances and on-going research in the development of SA/SI systems for smart grid control centers.

Biography:
G. Kumar Venayagamoorthy is currently the Duke Energy Distinguished Professor of Power Engineering and a Professor of Electrical and Computer Engineering and Automotive Engineering with Clemson University, Clemson, SC, USA. He is also the Founder and Director of the Real-Time Power and Intelligent Systems Laboratory (http://rtpis.org) with Clemson University. He is an Honorary Professor with the School of Engineering, University of KwaZulu–Natal, Durban, South Africa. Dr. Venayagamoorthy's interests are in the research, development and innovation of advanced computational methods for smart grid operations, including intelligent sensing and monitoring, power system optimization, stability and control, and signal processing. He has published ~ 500 refereed technical articles. His publications are cited over 11,000 times with a *h-*

index of 53. Dr. Venayagamoorthy has been involved ~ 70 sponsored projects in excess of $10 million. He has received several awards from professional societies and institutions for his contributions to research and professional activities.

Dr. Venayagamoorthy is involved in the leadership and organization of many conferences including the General Chair of the Annual Power System Conference (Clemson, SC, USA) since 2013, and Pioneer and Chair/co-Chair of the IEEE Symposium of Computational Intelligence Applications in Smart Grid (CIASG) since 2011. He is currently the Chair of the IEEE PES Working Group on Intelligent Control Systems, and the Founder and Chair of IEEE Computational Intelligence Society (CIS) Task Force on Smart Grid. Dr. Venayagamoorthy is a Senior Member of the IEEE and International Neural Network Society, and a Fellow of the IET, UK, and the SAIEE. He has served as an Editor/Guest Editor of several IEEE and Elsevier journal.

<p style="text-align:center">**TUTORIAL 6:**</p>

Recurrent Neural Networks and Natural Language Processing Tutorial
Fabio A. González. PhD.
Universidad Nacional de Colombia

Biography:

Fabio A. Gonzalez is a Full Professor at the Department of Computing Systems and Industrial Engineering at the National University of Colombia, where he leads the Machine Learning, Perception and Discovery Lab (MindLab). He earned a Computing Systems Engineer degree and a MSc in Mathematics degree from the National University of Colombia in 1993 and 1998 respectively, and a MSc and PhD degrees in Computer Science from the University of Memphis, USA, in 2003. His research work revolves around machine learning, information retrieval and computer vision, with a particular focus on the representation, indexing and automatic analysis of multimodal data (data encompassing different types of information: textual, visual, signals, etc.).