

EANN2015

16th International Conference on
ENGINEERING APPLICATIONS OF NEURAL NETWORKS

PROGRAM



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OF THESSALONIKI



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	FRI 25	SAT 26	SUN 27
08:30-09:00	REGISTRATION	REGISTRATION	REGISTRATION
09:00-10:00	KEYNOTE Kassabov <i>pages 10, 24</i>	KEYNOTE Verschure <i>pages 12, 30</i>	KEYNOTE Hammer <i>pages 8, 33</i>
10:00-11:30	SESSION 01 IMOD <i>page 24</i>	SESSION 05 FUZ-NEU <i>page 30</i>	SESSION 10 LEA <i>page 33</i>
	WORKSHOP IPMSC1 <i>pages 20, 25</i>	TUTORIAL 1 <i>pages 14, 30</i>	
	WORKSHOP AIAB1 <i>pages 16, 25</i>		
11:30-12:00	COFFEE	COFFEE	COFFEE
12:00-13:30	SESSION 02 CLA-PR1 <i>page 26</i>	SESSION 06 SVM <i>page 31</i>	SESSION 11 ROB-IVP <i>page 34</i>
	WORKSHOP MHDW1 <i>pages 18, 27</i>	TUTORIAL 2 <i>pages 15, 31</i>	
	WORKSHOP AIAB2 <i>pages 16, 27</i>		
13:30-14:30	LUNCH	LUNCH	LUNCH
14:30-16:00	SESSION 03 REC-RBF <i>page 26</i>	SESSION 07 CLA-PR2 <i>page 31</i>	SESSION 12 CLU <i>page 34</i>
	WORKSHOP MHDW2 <i>pages 18, 27</i>	SESSION 08 BIO-MED <i>page 31</i>	
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16:00-16:30	COFFEE	COFFEE	↑ ROOM A
16:30-18:00	SESSION 04 INDE <i>page 28</i>	SESSION 09 LIFE-EA <i>page 32</i>	
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19:30	WELCOME RECEPTION		
21:00		GALA PARTY	

It has been more than 60 years since John McCarthy introduced the term AI (Artificial Intelligence) to the scientific community. Since then, for the vast majority of the population, AI sounds more like a mythical future prediction not very close to reality. Common people use AI in their daily lives but they do not actually realize it. For example, cars make extensive use of Artificial Narrow Intelligence (ANI) to figure out when the anti-lock brakes should be used, or to control the fuel injection systems. The same use of ANI applies in our smart cell phones or in the Google search engine.

Artificial Neural Networks (ANNs) are a very important chapter of AI and more specifically a branch of Computational Intelligence and Soft Computing. Their applications expand in diverse scientific areas like: medical science, finance and management, environment, control systems and telecommunications. For example ANNs are used in flights booking and dynamic allocation of seats, in credit evaluation, in mortgage screening, pattern recognition, image and video analysis. Even NASA used ANNs to develop the IFCS (Intelligent Flight Control System).

TWENTY YEARS OF EANN!

The Engineering Applications of Neural Networks (EANN) conference was established in Otaniemi Finland in 1995 exactly 20 years ago. Since then it has become a well-established event with a very long and successful history. For the following years it has a continuous and dynamic presence as a major European scientific event with participants from all over the globe. An important milestone is year 2009, when its guidance by a steering committee of the INNS (*EANN Special Interest Group*) was initiated. Thus, from that moment the conference has been continuously supported technically, by the International Neural Network Society (INNS). Especially for this year, it is scientifically and administratively supported by the Aristotle University of Thessaloniki and the Democritus University of Thrace, Greece. The event was held (25th-28th of September 2015) in the "Amilia Mare" Resort and Conference center in Rhodes island, Greece.

The Organizing Committee was delighted by the overwhelming response to the call for papers. Totally 84 original research papers were submitted to the EANN'2015 conference. The diverse nature of papers submitted, demonstrates the vitality of neural computing and related soft computing approaches and proves the very wide range of ANNs applications as well.

All papers have passed through a review process by at least two independent academic referees. Where needed a third referee was consulted to resolve any conflicts. Overall 45% of the submitted manuscripts (totally 38) were accepted for inclusion in this volume, in the Communications in Computer and Information Science (CCIS) Series by Springer.

The authors of accepted papers came from 21 different countries from all over Europe (e.g. Austria, Czech Republic, Finland, Germany, Greece, Hungary, Italy, Netherlands, Poland, Portugal, Russia, Spain, United Kingdom), Americas (e.g. Brazil, Chile, USA), Asia (e.g., Israel, India, Iran), Africa (e.g. Algeria) and Oceania (New Zealand).

Three keynote speakers are invited to give lectures in timely aspects of AI and ANN.

1. Professor **Nikola Kasabov** of the School of Computing and Mathematical Sciences at Auckland University of Technology, Australia, delivers a talk on: *"Neuromorphic Predictive Systems based on Deep Learning"*
2. Professor **Barbara Hammer** of the Bielefeld University, Germany, delivers a talk on *"Autonomous Model Selection for Prototype Based Architectures"*
3. Professor **Paul Verschure** of the Universitat Pompeu Fabra, Barcelona, Spain, delivers a talk on: *"Engineering Biologically and Psychologically Grounded Living Machines: The Distributed Adaptive Control Theory of Mind, Brain and Behaviour"*

In addition, two highly interesting tutorials are given in the framework of the EANN'2015. The first one is delivered by Assistant Professor **Giacomo Boracchi** from the Department of Electronics and Informatics, Politecnico di Milano, Italy. It was entitled *"Learning under Concept Drift: Methodologies and Applications"*. The second tutorial is delivered by Professor **Vera Kurkova** from the Institute of Computer Science, Czech Academy of Sciences, Czech Republic. The subject was *"Strength and Limitations of Shallow Networks"*. We wish to express our sincere thanks to both distinguished scientists.

Finally, three workshops on timely AI subjects are organized successfully and collocated with EANN'2015:

1. the 4th *Mining Humanistic Data* (MHDW) Workshop supported by the Ionian University and the University of Patras. We wish to express our gratitude to Professors **Christos Makris**, **Katia Linda Kermanidis** and Dr. **Ioannis Karydis** for their common effort towards the organization of the 4th MHDW Workshop.

2. the 5th *Workshop on Artificial Intelligence Applications in Biomedicine* (AIAB) supported by the Frederick University Cyprus, University of Piraeus Greece, and the Democritus University of Thrace Greece. We are grateful to Professors **Harris Papadopoulos**, **Efthymoulos Kyriacou**, **Ilias Maglogiannis** and **George Anastassopoulos**, for their kind efforts towards the management of the 5th AIAB Workshop.
3. the 2nd *Innovative European Policies and Applied Measures for Developing Smart Cities* (IPMSC) Workshop, supported by the Hellenic Telecommunications Organization (OTE). The IPMSC was driven by the hard work of Drs. **Ioannis P. Chochliouros** and **Ioannis M. Stephanakis** (OTE, Greece).

The papers of the above workshops plus some selected papers of high quality submitted to EANN'2015 have been included in an extra volume of proceedings published by ACM.

We hope that both volumes of proceedings will help researchers worldwide to understand and to be aware of new ANN aspects. We do believe that they will be of major interest for scientists over the globe and that they will stimulate further research in the domain of Artificial Neural Networks and AI in general.

September 2015
Lazaros Iliadis, Chrisina Jayne

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Barbara Hammer



Barbara Hammer received her Ph.D. in Computer Science in 1995 and her venia legendi in Computer Science in 2003, both from the University of Osnabrueck, Germany. From 2000-2004, she was chair of the junior research group 'Learning with Neural Methods on Structured Data' at University of Osnabrueck before accepting an offer as professor for Theoretical Computer Science at Clausthal University of Technology, Germany, in 2004. Since 2010, she is holding a professorship for Theoretical Computer Science for Cognitive Systems at the CITEC cluster of excellence at Bielefeld University, Germany. Several research stays have taken her to Italy, U.K., India, France, the Netherlands, and the U.S.A. Her areas of expertise include hybrid systems, self-organizing maps, clustering, and recurrent networks as well as applications in bioinformatics, industrial process monitoring, or cognitive science. She has been chairing the IEEE CIS Technical Committee on Data Mining in 2013 and 2014, and she is chair of the Fachgruppe Neural Networks of the GI and vice-chair of the GNNS. She has published more than 200 contributions to international conferences / journals, and she is coauthor/editor of four books.

Autonomous Model Selection for Prototype Based Architectures

Prototype-based learning techniques enjoy a wide popularity due to their intuitive training techniques and model interpretability. Applications include biomedical data analysis, image classification, or fault detection in technical systems. One striking property of such models consists in the fact that they represent data in terms of typical representatives; this property allows an efficient extension of the techniques to life-long learning and model adaptation for streaming data. Within the talk, we will mainly focus on modern variants of so-called learning vector quantization (LVQ) due to their strong learning theoretical background and exact mathematical derivative from explicit cost functions. We will focus on three aspects which are of particular interest if these models are used as autonomous learning models: 1) metric learning in prototype based models, 2) incremental learning with adaptive model complexity, and 3) optimum reject options. Metric learning autonomously adjusts the used metric, usually the Euclidean one, towards a richer and more problem-adjusted representation of the data. Metric learning does not only greatly enhance the model performance, but it usually also increases model interpretability, a very important property e.g. in biomedical data applications. We will discuss

recent results which investigate metric learning mechanisms with a focus on their uniqueness, and we will present efficient schemes which account for a regularization of this process in particular for high dimensional data. Further, we will show that metric learning in LVQ techniques can be extended towards non-vectorial data such as sequences. Incremental learning and the possibility to reject classification are tightly interwoven aspects. These properties enable to autonomously adjust model complexity, and they enhance the system with the capability to judge its limitations in classification accuracy. We will present recent work which investigates different measurements which allow the quantification of the model insecurity, including the notion of conformal measures as one approach with very clear statistical background. Based on such measures, we will present incremental models with self-adjusted model complexity, on the one hand, and an efficient strategy for an optimum combination of rejects in a mathematically precise sense, on the other hand.

Nikola Kasabov



Professor Nikola Kasabov is Fellow of IEEE, Fellow of the Royal Society of New Zealand and DVF of the Royal Academy of Engineering, UK. He is the Director of the Knowledge Engineering and Discovery Research Institute (KEDRI), Auckland. He holds a Chair of Knowledge Engineering at the School of Computing and Mathematical Sciences at Auckland University of Technology. Kasabov is a Past President and Governors Board member of the International Neural Network Society (INNS) and also of the Asia Pacific Neural

Network Assembly (APNNA). He is a member of several technical committees of IEEE Computational Intelligence Society and a Distinguished Lecturer of the IEEE CIS (2011-2013). He is a Co-Editor-in-Chief of the Springer journal Evolving Systems and has served as Associate Editor of Neural Networks, IEEE TrNN, IEEE TrFS, Information Science and other journals. Kasabov holds MSc and PhD from the TU Sofia, Bulgaria. His main research interests are in the areas of neural networks, intelligent information systems, soft computing, bioinformatics, neuroinformatics. He has published more than 560 publications that include 15 books, 180 journal papers, 90 book chapters, 30 patents and numerous conference papers. He has extensive academic experience at various academic and research organisations in Europe and Asia, including: TU Sofia, University of Essex, University of Trento, University of Otago, Guest professor at the Shanghai Jiao Tong University, Guest Professor at ETH/University of Zurich, DAA Professor TU Kaiserslautern. Prof. Kasabov has received the APNNA 'Outstanding Achievements Award', the INNS Gabor Award for 'Outstanding contributions to engineering applications of neural networks', the EU Marie Curie Fellowship, the Bayer Science Innovation Award, the APNNA Excellent Service Award, the RSNZ Science and Technology Medal, and others. He has supervised to completion 40 PhD students. More information of Prof. Kasabov can be found on the KEDRI web site: <http://www.kedri.aut.ac.nz>

Neuromorphic Predictive Systems Based on Deep Learning

The current development of the third generation of artificial neural networks - the spiking neural networks (SNN) along with the technological development of highly parallel neuromorphic hardware systems of millions of artificial spiking neurons as processing elements, makes it possible to model big and fast data in a fast on-line manner, enabling large-scale problem solving across domain areas including building better predictive systems. The latter topic is covered in this talk. The talk first presents some principles of deep learning inspired by the human brain, such as automated feature selection, 'chain fire', polychronisation.

These principles are implemented in a recent evolving SNN (eSNN) architecture called NeuCube and its software development system that is made available from: www.kedri.aut.ac.nz/neucube/. These principles allow for an eSNN system to predict events and outcomes, so that once the eSNN is trained on whole spatio-temporal patterns, it can be made to spike early, when only a part of a new pattern is presented as input data. The talk presents a methodology for the design and implementation of NeuCube-based eSNN systems for deep learning and early and accurate outcome prediction from large-scale spatio-/spectro temporal data, referred here as spatio-temporal data machines (STDM). A STDM has modules for: preliminary data analysis, data encoding, pattern learning, classification, regression, prediction and knowledge discovery. This is illustrated on early event prediction tasks using benchmark large spatio/spectro-temporal data with different spatial/temporal characteristics, such as: EEG data for brain computer interfaces; personalised and climate data for stroke occurrence prediction and for the prediction of ecological and seismic events. The talk discusses implementation on highly parallel neuromorphic hardware platforms such as the Manchester SpiNNaker and the ETH Zurich chip. The STDM are not only significantly more accurate and faster than traditional machine learning methods and systems, but they lead to a significantly better understanding of the data and the processes that generated it.

Paul Verschure



Paul Verschure is an ICREA Research Professor in the Department of Information and Communication Technologies at Universitat Pompeu Fabra (UPF). He received both his Master and Ph.D. in psychology. He has pursued his research at different leading institutes: the Neurosciences Institute and the Salk Institute (both in San Diego), the University of Amsterdam, University of Zurich and the Swiss Federal Institute of Technology-ETH and currently with ICREA and UPF. Editorial Board of Acta Neurobiologiae Experimentalis (Polish

Neuroscience Society). Conference Chair for the Barcelona Cognition, Brain & Technology Summer School 2008, 2009, 2010, 2011, 2012, 2013 and 2014. Advisory Board Member for: Ernst Strüngmann Forum 2011 and the 2010 & 2011 CCL Linnaeus Environment (Cognition, Communication and Learning). Dr. Verschure has published over 250 peer-reviewed papers in leading scientific journals including Nature, Science, Neuron, PLoS Biology and PLoS Computational Science, Proceedings of the National Academy of Sciences USA, the Royal Society London and Public Library of Science. He holds 2 patents. Relevant technology projects include Ada: Intelligent Space at Expo'02 (Switzerland). SPECS is the 1 of only 6 labs worldwide to receive the European humanoid platform iCub in the first iCub competitive call.

Engineering Biologically and Psychologically Grounded Living Machines: The Distributed Adaptive Control Theory of Mind, Brain and Behaviour

Our society is facing a number of fundamental challenges in a range of domains that will require a new class of machines. I will call these Living Machines and will describe how their engineering will depend on extracting fundamental design principles from nature. In particular I will emphasize the emergence of a new class of machines that are based on our advancing understanding of mind and brain. The argument that this can lead to a new form of engineering is based on the Distributed Adaptive Control (DAC) that has been applied in a range of domains including robotics, the clinic and in education. DAC is based on the assumption that the brain evolved to maintain a dynamic equilibrium between an organism and its environment through action. The fundamental question that such a brain has to solve in order to deal with the how of action in a physical world is: why (motivation), what (objects), where (space), when (time) or the H4W problem. Post the Cambrian explosion of about 560M years ago, a

last factor became of great importance for survival: the who of other agents. I propose that H5W defines the top-level objectives of the brain and will argue that brain and body evolved to provide specific solutions to it by relying on a layered control architecture that is captured in DAC. I will show how DAC addresses H5W through interactions across multiple layers of neuronal organization, suggesting a very specific structuring of the brain, which can be captured in robot control architectures. In explaining how the function of the brain is realized I will show how the DAC theory provides for very specific predictions that have been validated at the level of behaviour and the neuronal substrate. Subsequently I will show how the DAC theory has given rise to a qualitative new class of clinical interventions for the rehabilitation of deficits following stroke illustrating the notion of deductive medicine. These examples will show that robot based models of mind and brain do not only advance our understanding of ourselves and other animals but can also lead to novel technical solutions to complex applied problems.

Giacomo Boracchi



*Department of Electronics and Informatics,
Politecnico di Milano, Italy*

Learning Under Concept Drift: Methodologies and Applications

Most machine learning techniques assume that the process generating the data is stationary. This guarantees that the model learned during the initial training phase remains valid during the subsequent operation. Unfortunately, stationarity is often an oversimplifying assumption because real-world processes typically change overtime. In the classification literature, changes in the data-generating process are referred to as concept drift.

Learning under concept-drift is a challenging research topic. In fact, in addition to the online-learning issues, the learner has to deal with possible changes, which would make it obsolete and unfit. Given the fact that changes are often unpredictable, as they might occur at any time and shift the data-generating process to an unforeseen state, the learner has to either undergo continuous adaptation to match the recent operating conditions (passive approach) or to steadily monitor the data stream to detect changes and, eventually, react (active approaches). In the last few years, there has been a flourishing of algorithms designed for learning under concept drift, also given the large number of applications where these techniques can be employed.

The tutorial introduces the main issues of learning under concept drift, the active and passive approaches as two extreme adaptation strategies, and few relevant applications such as those related to fraud-detection or those meant for detecting anomalies/changes in streams of signals and images

Vera Kurkova



*Institute of Computer Science,
Czech Academy of Sciences, Czech Republic*

Strength and Limitations of Shallow Networks

Although originally biologically inspired neural networks were introduced as multilayer computational models, later shallow (one-hidden-layer) architectures became dominant in applications. Recently, interest in architectures with several hidden layers was renewed due to successes of deep convolutional networks. These experimental results motivated theoretical research aiming to characterize tasks which can be computed more efficiently by deep networks than by shallow ones. This tutorial will review recent developments regarding theoretical analysis of strength and limitations of shallow networks. The tutorial will focus on the following topics:

- Universality and tractability of representations of multivariable mappings by shallow networks.
- Trade-off between maximal generalization capability and model complexity.
- Limitations of computation of highly-varying functions by shallow networks.
- Probability distributions of functions which cannot be tractably represented by shallow networks.
- Examples of representations of high-dimensional classification tasks by one and two-hidden-layer networks.

Attendees will learn about consequences of these theoretical results for the methodology of choosing a neural network architecture and about open problems related to deep and shallow architectures.

5th Workshop on Artificial Intelligence Applications in Biomedicine (AIAB 2015)

Recent technological advances in computer science and biomedicine facilitated the development of complex biomedical systems including sophisticated medical imaging, signal processing systems and computer based decision support tools, assisting diagnosis for better delivery of health care services. Meanwhile, applications of Machine Learning, Neural Computing, Expert Systems, Fuzzy Logic and Evolutionary Computing in biomedicine are continuously emerging. Therefore AI tools and techniques are a vital part of modern computer based systems that handle medical data. The aim of this workshop is to serve as a forum for the presentation of new and ongoing work and the exchange of ideas between researchers interested in the application of AI in any aspect of biomedicine and electronic healthcare.

The subject areas of the workshop include, but are not limited to, the following:

- Clinical decision support systems
- Intelligent medical image analysis
- Intelligent medical signal processing
- Medical knowledge engineering
- Knowledge-based and agent-based systems
- Medical text analysis
- Computational intelligence in bio- and clinical medicine
- Biomedical data mining
- Intelligent medical information systems
- Clinical expert systems
- Modelling and simulation of medical processes
- Drug discovery
- Intelligent analysis and fusion of genomic and proteomic data
- Personalised medicine
- Intelligent devices and instruments
- Automated reasoning and metareasoning in medicine
- AI in medical education

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4th Mining Humanistic Data Workshop (MHDW 2015)

The abundance of available data that is retrieved from or is related to the areas of Humanities and the human condition challenges the research community in processing and analyzing it. The aim is two-fold: on the one hand, to extract knowledge that will help understand human behavior, creativity, way of thinking, reasoning, learning, decision making, socializing and even biological processes; on the other hand, to exploit the extracted knowledge by incorporating it into intelligent systems that will support humans in their everyday activities.

The nature of humanistic data can be multimodal, semantically heterogeneous, dynamic, time and space-dependent, and highly complicated. Translating humanistic information, e.g. behavior, state of mind, artistic creation, linguistic utterance, learning and genomic information into numerical or categorical low-level data is a significant challenge on its own. New techniques, appropriate to deal with this type of data, need to be proposed and existing ones adapted to its special characteristics.

The workshop aims to bring together interdisciplinary approaches that focus on the application of innovative as well as existing data matching, fusion and mining and knowledge discovery and management techniques (like decision rules, decision trees, association rules, ontologies and alignments, clustering, filtering, learning, classifier systems, neural networks, support vector machines, preprocessing, post processing, feature selection, visualization techniques) to data derived from all areas of Humanistic Sciences, e.g. linguistic, historical, behavioral, psychological, artistic, musical, educational, social etc., Ubiquitous Computing and Bioinformatics.

Ubiquitous Computing applications (aka Pervasive Computing, Mobile Computing, Ambient Intelligence, etc.) collect large volumes of usually heterogeneous data in order to effect adaptation, learning and in general context awareness. Data matching, fusion and mining techniques are necessary to ensure human centred application functionality.

An important aspect of humanistics centers around managing, processing and computationally analyzing Biological and Biomedical data. Hence, one of the aims of this workshop will be to also attract researchers that are interested in designing, developing and applying efficient data and text mining techniques for discovering the underlying knowledge existing in Biomedical data, such as sequences, gene expressions and pathways.

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Spyros Sioutas, *Ionian University, Greece*

Kyriakos Sgarbas, *University of Patras, Greece*

Giannis Tzimas, *Technological Educational Institute of Western Greece, Greece*

Konstantinos Theofilatos, *University of Patras, Greece*

Evangelos Theodoridis, *University of Patras, Greece*

Athanasios Tsakalidis, *University of Patras, Greece*

2nd Workshop on Innovative European Policies and Applied Measures for Developing Smart Cities (IPMSC2015)

Internet grows into a more “complex” and “sophisticated” entity than originally intended. It is much more than “simply a modern communication system” as it comprises numerous essential parts and/or “components” of modern networks, platforms, infrastructures and related (usually innovative) facilities together with multi-source generated “content” and a variety of connected equipment and end-user devices. Internet is the essential “core” of our modern world towards creating a real knowledge-based society and a variety of businesses. It offers numerous challenges for development and growth. This strongly affects the way of how citizens perceive and apply all modern digital facilities that improve their work, their entertainment and their living standards (especially within modern cities). Novel applications and services are nowadays emerging from cutting-edge technological developments. They are perceptions of an astounding dream future. Internet’s rapid evolution influences socio-economic, environmental and cultural aspects of modern society as well. Future (Internet-based) Networks enable smart connectivity for all, anywhere, at any time at the highest speed and efficiency fulfilling, thus, the overwhelming demands of our modern way of living regarding communication, security and privacy.

Cities and urban spaces are anticipated to evolve into “smarter ecosystems” offering enhanced connectivity. They exploit Future Internet in order to organise, optimise and provide facilities to citizens (corporate, residential, municipal and State authorities, etc.). Future Internet will transform the public sector, citizens’ lives and business and focus on content, things and people themselves. Resourcefulness and spirit of innovation are prerequisites for reaching out and tackling actual problems of our cities. Achieving planned and sustainable innovation for our future society and making modern cities a good place to live and work requires broader, more collaborative and innovative approaches. Up today, user-driven open innovation methodologies have confirmed that they can radically advance the effectiveness of the modernization process by combining R&D aspects with real market requirements.

Cloud Computing is a method of computing offering elastic IT-related capabilities and on-demand utility-like services to customers in an optimized and cost-effective way using Internet technologies. Being one of the major drives in IT industry, it has put on incredible momentum and promises to revolutionize the way market actors and enterprises generate and distribute IT solutions. This has an impact upon ICT services connecting critical infrastructures (CI) as more sectors incorporate cloud services in their computing environment. Such ICT services

include transportation systems and infrastructure surveillance that are decisive parts of citizens’ living standards. Internet-of-things affects our everyday life and promotes major opportunities “bridging” real and virtual worlds. This unified approach generates novel and pervasive services that are based upon robust and flexible internet infrastructures. In addition, this sets multiple network-related challenges, within a fully converged “digital environment” where there are no distinct frontiers between the underlying networks/infrastructures, the developed services/facilities, the equipment/devices used and the content offered in various “formats”.

Intelligent Transportation is a modern challenge for urban areas that promotes ICT-based solutions promising a friendlier ecosystem. The adoption of applications of “smart” vehicles (like, for example, vehicle-to-infrastructure (V2I) communications, or vehicle-to-vehicle (V2V) communications) offers new opportunities and raises the living standards of the citizens.

Video and other multimedia communications may drastically affect the way corporate and residential users realize a variety of activities within modern urban environments, i.e. e-Education, e-Learning, e-Health (patients’ tele-monitoring), emergency services, municipal services and e-Cultural services. This boosts interactive involvement of several market actors as well as local authorities.

WORKSHOP CHAIRS

Kostas Berberidis, *University of Patras, Greece*

Ioannis P. Chochliouros, *Hellenic Telecommunications Organization (OTE) S.A., Greece*

Ioannis M. Stephanakis, *Hellenic Telecommunications Organization (OTE) S.A., Greece*

George Lyberopoulos, *COSMOTE - Mobile Telecommunications S.A., Greece*

PROGRAM COMMITTEE

Vishanth Weerakkody, *Brunel University, UK*

Ramzi El-Haddadeh, *Brunel University, UK*

Nikolaos Vassilas, *ATEI of Athens, Greece*

George Caridakis, *University of the Aegean, Greece*

Kelly Georgiadou, *OTE, Greece*

Maria Belesioti, *OTE, Greece*

Evangelos Sfakianakis, *OTE, Greece*

George Diakonikolaou, *OTE, Greece*

George C. Anastassopoulos, *Democritus University of Thrace, Greece*

2nd Workshop on Innovative European Policies and Applied Measures for Developing Smart Cities (IPMSC2015)

PROGRAM COMMITTEE (continued)

Anastasios Dagiuklas, *Hellenic Open University, Greece*

Stefanos Kollias, *National Technical University of Athens, Greece*

Christos Mavrokefalidis, *University of Patras, Greece*

Evangelos Vlachos, *University of Patras, Greece*

Christophoros Nikou, *University of Ioannina, Greece*

Noor-ul-Hassan Shirazi, *Lancaster University, UK*

Helmut Leopold

*Head of Department of Safety and Security
AIT Cyber Security Research
AIT Austrian Institute of Technology*



Assurance of Security and Trust in Cloud Environments - a prerequisite for market acceptance for critical infrastructure IT

Information and Communication Technology (ICT) systems and networks became one of the most relevant critical infrastructures of our society. Virtualization of IT-Services based on Cloud Computing will be one of the main disruptive drivers in all future markets: production (industry 4.0), energy, eHealth, eGovernment, smart cities, eEnvironment, etc. Existing security mechanisms do not address the Advanced Persistent Threats (APT) scenarios of the future. Considering the cyber threats of the future, we will require new functionalities to be able to detect cyber incidents early on, assess potential risks and related negative effects and put in place corresponding preventive counter-measures. AIT Austrian Institute of Technology is focusing applied research on three cyber security fields: (i) CAIS Cyber Attack Information System by anomaly detection as well as a trustworthy exchange of information among different stakeholders - CIIS Cyber Incident Information Sharing; (ii) next generation cloud computing environments with highest security, availability and privacy by advanced encryption concepts based on secret sharing as well as security assessment mechanisms of cloud infrastructures; and (iii) risk management methods and tools for ICT based critical infrastructures.

08:30
↓
09:00

Registration

RoomA

KEYNOTE

1

Multi-Paradigm Neuromorphic Predictive Systems
based on Deep Learning

Nikola Kasabov

Chair **Marley Vellasco**

RoomA

SESSION

1

Intelligent
Modeling
(IMOD)Chair **Ilias Maglogiannis****Luca Benvenuti, Christoph Kloss,
Stefan Pirker***Characterization of DEM particles by Means
of Artificial Neural Networks and Macroscopic
Experiments***Marc Le Goc, Fabien Barthelot,
Eric Pascual***Seasonality of Human Behavior in Smart
Buildings***Serafin Alonso, Miguel A. Prada,
Juan J. Fuertes, Ignacio Diaz ,
Manuel Dominguez***Analysis of Electricity Bill Data Using Interactive
Dimensionality Reduction*10:00
↓
11:3011:30
↓
12:00

Coffee break

RoomB

Innovative European
Policies and Applied
Measures for Developing
Smart CitiesWORKSHOP
IPMSC
1Chairs **Giorgos Anastasopoulos,
Giorgos Bardis**Invited talk: **Dr. Helmut Leopold****Konstantinos Deltouzos
and Spyros Denazis***Distributed Balancer of Mobile Nodes'
Bandwidth and Battery Resources in P2P VoD
Systems***Ioannis Stephanakis, Ioannis P.
Chochliouros, Noorulhassan Shirazi,
Evangelos Sfakianakis***Anomaly Detection in Secure Cloud
Environments Using a Self-Organizing
Feature Map (SOFM) Model for Clustering
Sets of R-Ordered Vector-Structured Features***Ioannis P. Chochliouros, Dimitrios N.
Arvanitosis, Anastasia S. Spiliopoulou,
Evangelos Sfakianakis, Maria Belesioti,
Evangelia Georgiadou, Ioannis M.
Stephanakis, Nina Mitsopoulou***Security and Protection of Critical
Infrastructures: A Conceptual and Regulatory
Overview for Network and Information
Security in the European Framework, also
focusing upon the Cloud Perspective*

RoomC

Artificial Intelligence
Applications
in BiomedicineWORKSHOP
AIAB
1Chair **Harris Papadopoulos****Theodoros Iliou, Christos-Nikolaos
Anagnostopoulos, Marina Nerantzaki,
George Anastassopoulos***A Novel Machine Learning Data Preprocessing
Method for Enhancing Classification
Algorithms Performance***Androniki Tamvakis, Christos-Nikolaos
Anagnostopoulos, George Tsekouras,
George Anastassopoulos***Optimizing Voting Classification Using Cluster
Analysis on Medical Diagnosis Data***Noah Eyal, Mark Last, Eitan Rubin**
*Comparison of Three Classifiers for Breast
Cancer Outcome Prediction*10:00
↓
11:3011:30
↓
12:00

Room A

SESSION
2Classification Pattern
Recognition
(CLA)
1Chair **George Tsekouras****Afshin Shahriari, Hamid Parvin,
Hamid Alinejad***Exploring Weights of Hierarchical and
Equivalency Relationship in General Persian
Texts***Leandro Y. Mano, Gabriel T. Giancrisofaro,
Bruno S. Façal, Giampaolo L. Libralon,
Gustavo Pessin, Pedro H.***Exploiting the Use of Ensemble Classifiers to
Enhance the Precision of User's Emotion***Stamatis Karlos, Nikos Fazakis,
Sotiris Kotsiantis and Kyriakos Sgarbas**
*Self-train LogitBoost for Semi-supervised
Learning*

Room B

Mining Humanistic Data
WorkshopWORKSHOP
MHDW
1Chair **Spyros Sioutas****Basilis Charalampakis, Dimitris Spathis,
Elias Kouslis, Katia Kermanidis***Detecting Irony on Greek Political Tweets: A
Text Mining Approach***Phivos Mylonas***An Overview of Context Types within
Multimedia and Social Computing***Panagiotis Gourgarris and Christos Makris**
A Density Based k-Means Initialization Scheme

Room C

Artificial Intelligence
Applications
in BiomedicineWORKSHOP
AIAB
2Chair **Christos Makris****Ilias Maglogiannis, Theodosios Goudas,
Antonis Biliris, Haralampos Karanikas,
Ioannis Valavanis, Olga Papadodima,
Aristotelis Chatziioannou***Redesigning EHRs and Clinical Decision
Support Systems for the Precision Medicine Era***Dimitrios Galiatsatos, Georgia
Konstantopoulou, George
Anastassopoulos, Marina Nerantzaki,
Konstantinos Assimakopoulos,
Dimitrios Lymberopoulos***Classification of the most Significant
Psychological Symptoms in Mental Patients
with Depression Using Bayesian***Harris Papadopoulos,
Efthymoulos Kyriacou, Andrew Nicolaides,
Constantinos Pattichis***Reliable Probabilistic Prediction of High-Risk
Asymptomatic Carotid Plaques*

Lunch

Room A

SESSION
3Recurrent-Radial Basis
Function ANN
(REC-RBF)Chair **Bernardete Ribeiro****Glauco Martins, Marley Vellasco,
Roberto Schirru, Pedro Vellasco***Closed Loop Identification of Nuclear Steam
Generator Water Level Using ESN Network Tuned
by Genetic Algorithm*

Room B

Mining Humanistic Data
WorkshopWORKSHOP
MHDW
2Chair **Phivos Mylonas****Vasiliki Retsi, Ianthi Aggeliki Leonti, Aigli
Korfiati, Konstantinos Theofilatos, Spiros
Likothanassis and Seferina Mavroudi***Predicting and Classifying Short Non-coding
RNAs Using a Multiclass Evolutionary
Methodology*

Room C

Innovative European
Policies and Applied
Measures for Developing
Smart CitiesWORKSHOP
IPMSC
2Chairs **Ioannis Chochliouros
Ioannis Stephanakis****Georgios Bardis, Nikolaos Sideris,
Nikolaos Vassilas, Georgios Miaoulis***An Intelligent GIS Database Framework
Featuring Building Query Functionality
Using N-grams Encoding and k-means
Classification*



**Ander Arriandiaga, Eva Portillo,
Jose Antonio Sánchez, Itziar Cabanes**

*On-line Surface Roughness Prediction in
Grinding Using Recurrent Neural Networks*

Eric Antonelo and Eduardo Camponogara

*An Echo State Network-based Soft Sensor of
Downhole Pressure for a Gas-lift Oil Well*

David Coufal

RBF Neural Networks and Radial Fuzzy Systems



**Katia Kermanidis, Manolis Maragoudakis,
Spyros Vosinakis**

*House of Ads: a Multiplayer Action Game for
Annotating Ad Video Content*

**Dimos Makris, Ioannis Karydis and Spyros
Sioutas**

The Greek Music Dataset



**Aggeliki Vlachostergiou, Georgios Stratogiannis,
George Caridakis, Georgios Siolas, Phivos Mylonas**
*Smart Home Context Awareness Based on Smart
and Innovative Cities*

**George Lyberopoulos, Eleni Theodoropoulou,
Ioanna Mesogiti, Constantinos Filis,
Ioannis Mamounakis, Prodromos Makris,
Emmanouel Varvarigos**

*VIMSEN: A Distributed Architecture for future Energy
Market Frameworks*

**E. Vlachos, C. Mavrokefalidis, D. Ampeliotis,
K. Berberidis**

Regularized ICI Cancellation in V2V Communications

16:00
↓
16:30

Coffee break

16:00
↓
16:30

Room A

SESSION
4

Industrial and
Engineering ANN
Applications
(INDE)

Chair **Mario Malcangi**

**Bartłomiej Beliczynski, Lech M. Grzesiak,
Bartłomiej Ufnalski**

*Mixed Phenomenological and Neural Approach
to Induction Motor Speed Estimation*

Sam Palmer, Denise Gorse, Ema Muk-Pavic

*Neural Networks and Particle Swarm
Optimization for Function Approximation in Tri-
SWACH Hull Design*

David Lehký and Martina Šomodíková

*Reliability Analysis of Post-tensioned Bridge
Using Artificial Neural Network-based Surrogate
Model*

**Stephen Akuma, Chrisina Jayne,
Rahat Iqbal, Faiyaz Doctor**

*Inferring Users' Interest on Web Documents
through their Implicit Behaviour*

Room B

Mining Humanistic Data
Workshop

WORKSHOP
MHDW
3

Chair **Giannis Tzimas**

**Angeliki Rapti, Dimitrios Tsolis,
Spyros Sioutas, Athanasios Tsakalidis**

A Survey: Mining Linked Cultural Heritage Data

**Sotiris Christodoulou, Giannis Tzimas,
Andreas Gizas, Emmanouil Viennas,
Marios Kendea**

*Mining HTML5 Code: A View to How Humans
Use Emerging Web Standards*

**Athanasia Koumpouri, Iosif Mporas,
Vasilis Megalooikonomou**

*Evaluation of Four Approaches for "Sentiment
Analysis on Movie Reviews": The Kaggle
Competition*

Room C

Innovative European
Policies and Applied
Measures for Developing
Smart Cities

WORKSHOP
IPMSC
3

Chairs **Konstantinos Deltouzos
Evangelos Vlachos**

**Efthymios Oikonomou, Dimitra Panagiotou,
Angelos Rouskas**

*Energy-aware Management of Virtual Machines in
Cloud Data Centers*

**George Asimakopoulos, Sotiris Christodoulou,
Andreas Gizas, Vassilios Triantafyllou, Giannis
Tzimas, Emmanouil Viennas, John Gialelis,
Dimitris Karadimas, Andreas Papalambrou**

*Towards a Dynamic Waste Collection Management
System Using Real-time and Forecasted Data*

**Nikolaos Sideris, Georgios Bardis,
Christos Yiakoumettis, Nikolaos Vassilas,
Georgios Miaoulis**

*An Integrated Framework for Semantic Modelling and
Decision Support in 3D Urban Virtual Environments*

Makis Stamatelatos, Dirk Osstyn, Simon Delaere
The Creative Ring Conceptual Architecture

16:30
↓
18:00

16:30
↓
18:00

19:30

Welcome Reception

19:30

08:30
↓
09:00

Registration

Room A

KEYNOTE
2

Engineering Biologically and Psychologically
Grounded Living Machines: The Distributed Adaptive
Control Theory of Mind, Brain and Behaviour
Paul Verschure

Chair **Nikola Kassabov**

Room A

SESSION
5

Fuzzy - Neuro Fuzzy
(FAZ-NEU)

Chair **Pekka Kumpulainen****Petr Hajek, Vladimir Olej**

*Intuitionistic Fuzzy Neural Network: The Case of
Credit Scoring using Text Information*

Athanasios Tsadiras
and **George Zitopoulos**

*Decision Making on Container based Logistics
Using Fuzzy Cognitive Maps*

George E. Tsekouras, Anastasios Rigos,
Antonios Chatzipavlis, Adonis Velegrakis

*A Neural-Fuzzy Network Based on Hermite
Polynomials to Predict the Coastal Erosion*

Mario Malcangi and Philip Grew

*Evolving Fuzzy-neural Method for Multimodal
Speech Recognition*

10:00
↓
11:30

Room B

TUTORIAL
1

Learning under Concept
Drift: Methodologies
and Applications
Giacomo Boracchi

Chair **Paul Verschure**11:30
↓
12:00

Coffee break

Room A

Support Vector
Machines
(SVM)

SESSION
6Chair **Athanasios Tsadiras**

Isidoros Perikos, Epameinondas
Ziakopoulos, Ioannis Hatzilygeroudis

*Recognize Emotions from Facial Expressions
Using a SVM and Neural Network Schema*

Pekka Kumpulainen, Timo Korpela,
Yrjö Majanne, Anna Häyrynen

*Modelling of NOx Emissions in Natural Gas
Fired Hot Water Boilers*

Nektaria Potha and Manolis Maragoudakis

Time Series Forecasting in Cyberbullying Data

Olari Surinta, Mahir Karaaba,
Tusar Mishar, Lambert Schomaker,
Marco Wiering

*Recognizing Handwritten Characters with Local
Descriptors and Bags of Visual Words*

Room B

Strength
and Limitations
of Shallow Networks
Vera Kurkova

TUTORIAL
2Chair **Barbara Hammer**12:00
↓
13:30

Lunch

13:30
↓
14:30

Room A

Classification Pattern
Recognition
(CLA)
2

SESSION
7Chair **Chrisina Jayne**

Marcelino Lázaro, Francisco Herrera,
Aníbal R. Figueiras-Vidal

*Classification of Binary Imbalanced Data Using a
Bayesian Ensemble of Bayesian Neural Networks*

Markus Kächele, Patrick Thiam,
Mohammadreza Amirian, Philipp Werner,
Steffen Walter, Friedhelm Schwenker,
Guenther Palm

*Multimodal Data Fusion for Person-independent,
Continuous Estimation of Pain Intensity*

Room B

Bioinformatics -
Intelligent Medical
Modeling
(BIO-MED)

SESSION
8Chair **Ilias Maglogiannis**

Fotis Psomopoulos, Olga Vrousou,
Pericles Mitkas

*A Grid-enabled Modular Framework for Efficient
Sequence Analysis Workflows*

Sarni Suhaila Rahim, Vasile Palade,
James Shuttleworth, Chrisina Jayne,
Raja Norliza Raja Omar

*Automatic Detection of Microaneurysms for
Diabetic Retinopathy Screening Using Fuzzy
Image Processing*

14:30
↓
16:00

SAT**26**

EANN (day2)



Beatriz Pérez Sánchez, Oscar Fontenla Romero, Noelia Sánchez Maroño

One-class Classification for Microarray Datasets with Feature Selection

Doug Hunt and Dave Parry

Using Echo State Networks to Classify Unscripted, Real-World Punctual Activity



Marcos Levano

Application of Elastic Nets Using Phase Transition for Detection of Gene Expression Patterns with Different Carbon Sources

Dror Lederman

Endotracheal Tube Position Confirmation System Using Neural Networks

16:00



16:30

Coffee break

Room**A**

SESSION

9

Life-Earth Sciences
Intelligent Modeling
(LIFE-EA)

16:30



18:00

Chair **Manolis Maragoudakis**

Sergey Dolenko, Alexander Eftorov, Sergey Burikov, Tatiana Dolenko, Igor Persiantsev, Kirill Laptinskiy

Neural Network Approaches to Solution of the Inverse Problem of Identification and Determination of the Ionic Composition of Multi-component Water Solutions

Lazaros Iliadis

and **Konstantinos Demertzis**

*Intelligent Bio-Inspired Detection of Food Borne Pathogen by DNA Barcodes: The case of Invasive Fish Species *Lagocephalus Sceleratus**

Irina Myagkova, Sergey Dolenko, Vladimir Shiroky, Natalia Sentemova, Igor Persiantsev

Horizon of Neural Network Prediction of Relativistic Electrons Flux in the Outer Radiation Belt of the Earth

Tibor Kmet and Maria Kmetova

A 24-h Forecast of Solar Irradiance Using Echo State Neural Networks

21:00

Gala Party

EANN (day3)

SUN**27**

Registration

08:30



09:00

Room**A**

Autonomous Model Selection
for Prototype Based Architectures

Barbara Hammer

KEYNOTE

3

09:00



10:00

Chair **Vera Kurkova**

Room**A**

Learning
(LEA)

SESSION

10

10:00



11:30

Chair **Giacomo Boracchi**

Yiannis Kokkinos
and **Konstantinos Margaritis**

Multithreaded Local Learning Regularization Neural Networks for Regression Tasks

Primož Potočnik and Edvard Govekar

Practical Considerations in Training Extreme Learning Machines

Sotiris Konstantinidis, Pythagoras Karampiperis, Miguel-Angel Sicilia

Enhancing the Levenberg-Marquardt Method in Neural Network Training Using the Direct Computation of the Error Cost Function Hessian

Shruti Kulkarni and Bipin Rajendran

Scalable Digital CMOS Architecture for Spike Based Supervised Learning

Coffee break

11:30



12:00

12:00
↓
13:30

Room A

SESSION
11Robotics-Image Video
Processing
(ROB-IVP)Chair **Yiannis Kokkinos****Philipp Kainz, Harald Burgsteiner, Martin Asslaber, Helmut Ahammer**
*Robust Bone Marrow Cell Discrimination by Rotation-Invariant Training of Multi-Class Echo State Networks***Adriano Gaibotti, Claudio Marchisio, Alexandro Sentinelli, Giacomo Boracchi Boracchi**
*Tampering Detection in Low-Power Smart Cameras***Anu Aggarwal**
*Azimuthal Sound Localisation with Electronic Lateral Superior Olive***Farah Bouakrif**
Trajectory Tracking Control for Perturbed Robot Manipulators Using Iterative Learning Method

Lunch

13:30
↓
14:30

Room A

SESSION
12Clustering
(CLU)Chair **Petr Hajek****Szabolcs Novaczki and Borislava Gajic**
*Fixed-Resolution Growing Neural Gas for Clustering the Mobile Networks Data***Ali Aghaeirad and Bernardete Ribeiro**
*Credit Prediction Using Transfer Learning to Neural Networks via Self-Organizing Maps***Xanthoula Eirini Pantazi, Dimitrios Moshou, Antonios Morellos**
*Prediction of Soil Nitrogen from Spectral Features Using Supervised Self Organizing Maps***Hamid Parvin, Sadrollah Sadeghi, Ali Heidarzadegan, Yaser Nemati**
*Enhanced KNNC Using Clustering of Training Samples***Robin Babujee Jerome and Kimmo Hätonen**
A Metric for Determining the Significance of Failures and its Use in Anomaly Detection

Walking Tour Medieval Rodos

17:30

Friday 25/9 19:30 **Welcome Reception**Saturday 26/9 21:00 **Gala Party**Sunday 27/9 17:30 **Walking tour to the medieval town of Rhodes and visit to the Palace of the Grand Magistros**

LOCAL INFO

Conference Venue

Hotel Amilia Mare Rodos

Main Street, Kallithea, 851 00 Rhodes

<http://www.aldemar-resorts.gr/EN/Family%20resorts/Amilia%20Mare/>

Emergency numbers

Police 100 • Fire brigade 199 • Ambulance 166

Telephone directory enquiries

Local 11888

Taxi Companies

Radiotaxi (in Rhodes Town) +30 22410 69800

Radiotaxi (out of Rhodes Town) +30 22410 69600

Diagoras +30 22410 66555

Rhodes Airport

Phone Centre +30 22410 88700, 88701

Municipality of Rhodes Department of Tourism

3, Averof, 851 00 Rhodes

Tel: +30 22410 35240, 35945

Greek National Tourism Organisation (EOT)

1, Ethnarhou Makariou Street and Papagou Street, 851 00 Rhodes

Phone center +30 22410 44333

Information: 171 (applicable inside Greece)

Tourist Police

1, Ethnarhou Makariou Street and Papagou Street, 851 00 Rhodes

Phone center +30 22410 27423 • Information: 171 (call inside Greece)



