

# 17th International Conference on Artificial Intelligence Applications and Innovations 25-27 June 2021

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aiai2021.eu

## AIAI 2021 IFIP Conference, Working Group 12.5

### KEYNOTE SPEAKERS

**John Macintyre**, University Sunderland UK  
**Hojjat Adeli**, Ohio State University, Columbus, USA  
**Antonis Argyros**, University of Crete, Greece  
**Peter Tino**, University of Birmingham, UK  
**Johan Suykens**, KU Leuven, ESAT-Stadius and  
Leuven.AI Institute, Belgium  
**Nikola Kasabov**, Auckland University of Technology,  
New Zealand  
**Eunika Mercier-Laurent**, Université de Reims  
Champagne-Ardenne, France  
**Jose Principe**, University of Florida, USA

### WORKSHOPS

1st wks on AI & EThics (AIETH 21)  
University of Sunderland UK  
1st wks on Energy Efficiency and AI (EEAI)  
ITI-CERTH Greece  
10th Mining Humanistic Data wks (MHDW)  
Ionian University-University Patras, Greece  
6th wks on 5G Putting Intelligence  
to the Network Edge (5G-PINE) OTE Greece  
1st wks Defence applications of  
AI. EUROPEAN UNION- EDA  
1st wks Artificial Intelligence in Biomedical  
Engineering & Informatics  
(EMB) IEEE Greece Chapter  
1st wks Distributed AI for Resource-Constrained  
Platforms  
(DARE) ITEA3 MIRAI Project

### GENERAL CHAIRS

**Ilias Maglogiannis**, University of Piraeus, Greece  
**John Macintyre**, University of Sunderland, UK

### PROGRAM CHAIRS

**Lazaros Iliadis**, Democritus University of Thrace, Greece  
**Xiao-Yun-Wu**, Jiangnan University, China  
**Petia Koprinkova**, Bulgarian Academy of Sciences

### HONORAY CHAIRS

**Plamen Angelov**, University of Lancaster, UK  
**Vera Kurkova**, Czech Academy of Sciences

### TUTORIALS

**Vangelis Metsis**, Texas State University, USA:  
*SUBJECT: Modern methods and tools for human biosignal analysis*  
**Giacomo Boracchi**, Politecnico di Milano, Italy  
*SUBJECT: Anomaly Detection in Images*



# 17<sup>th</sup> Artificial Intelligence Applications and Innovations

AIAI 2021 IFIP WG 12.5 June 25–27, 2021

IFIP was founded in 1960 under the auspices of UNESCO, following the first World Computer Congress held in Paris the previous year. A federation for societies working in information processing, IFIP's aim is two-fold: to support information processing in the countries of its members and to encourage technology transfer to developing nations.

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# 17<sup>th</sup> AIAI 2021

Artificial Intelligence (AI) continues to advance, following extreme development rhythms in the new era of the 21<sup>st</sup> century. It has already made its way into the lives of common people in various forms. It is estimated that more than 80 billion USD have been invested by car industries for the design and development of autonomous self-driving vehicles. AI technologies like *Google Duplex* are accomplishing real-world conversations and arrangements with humans, using *Deep Neural Networks* (e.g., Google voice search, Wavenet). It is estimated by the IDC (International Data Corporation, a global provider of market intelligence) that investments in AI business globally will reach as high as 110 billion \$ by 2024. AI is a major part of the 4<sup>th</sup> industrial revolution, together with other technologies like *Internet of Things*, *Genetic Engineering*, *Quantum Computing* and its impact in the evolution of our post-modern societies in various domains is huge and growing. On the other hand, there are major areas of ethical concern for our societies, namely: Privacy, Surveillance, Bias-Discrimination, Elimination of entire job categories. Moreover, serious questions arise on the superiority and indispensability of human judgment on important aspects of life. In other words: "Can smart machines outthink our human judgment?"

The 17<sup>th</sup> *Artificial Intelligence Applications and Innovations* (AIAI) conference offered insight into all timely challenges related to technical, legal, and ethical aspects of intelligent systems and their applications. New algorithms and potential prototypes employed in diverse domains were introduced.

AIAI is a mature international scientific conference that has been held all over the world and it is well established in the scientific area of AI. Its history is long and very successful, following and spreading the evolution of intelligent systems.

The first event was organized in Toulouse France in 2004. Since then, it has had a continuous and dynamic presence as a major global, but mainly European scientific event. More specifically, it has been organized in China, Greece, Cyprus, Australia, and France. It has always been technically supported by the International Federation for Information Processing (IFIP) and more specifically by the Working Group 12.5, which is interested in AI applications.

Following a long-standing tradition, this Springer volume belongs to the IFIP AICT Springer Series and it contains the papers that were accepted to be presented orally at the AIAI 2021 conference. An additional volume comprises the papers that were accepted and presented at the workshops and were held as parallel events. The event was held during June 25–27, 2021, in Greece.

The diverse nature of papers presented demonstrates the vitality of AI algorithms and approaches. It certainly proves the very wide range of AI applications as well.

The response of the international scientific community to the AIAI 2021 call for papers was more than satisfactory, with 113 papers initially submitted. All papers were peer reviewed by at least two independent academic referees. Where needed, a third referee was consulted to resolve any potential conflicts. A total of 54 papers (47.79% of the submitted manuscripts) were accepted to be published as full papers (12 pages long) in the proceedings. Owing to the high quality of the submissions, the Program Committee decided that it should accept 7 more papers to be published as short ones (10 pages long).

## WORKSHOPS

Totally, the following seven (7) scientific workshops on timely AI subjects were organized under the framework of the AIAI 2021.

- The **10<sup>th</sup> Mining Humanistic Data Workshop (10<sup>th</sup> MHDW 2021)** was organized by the

University of Patras and Ionian University, Greece.

The *Mining Humanistic Data Workshop* (MHDW) aims to bring together interdisciplinary approaches that focus on the application of innovative as well as existing artificial intelligence, data matching, fusion and mining and knowledge discovery and management techniques to data derived from all areas of Humanistic Sciences.

- The **6<sup>th</sup> Workshop on 5G-Putting Intelligence to the Network Edge (5G-PINE 2021)** was

organized by the research team of the *Hellenic Telecommunications Organization* (OTE) in cooperation with many major partner companies. The 6<sup>th</sup> 5G-PINE Workshop has been established to disseminate knowledge obtained from ongoing EU projects as well as from any other action of EU-funded research, in the wider thematic area of “*5G Innovative Activities – Putting Intelligence to the Network Edge*” and with the aim of focusing on Artificial Intelligence in modern 5G telecommunications infrastructures. This should take place by emphasizing upon associated results, methodologies, trials, concepts and/or findings originating from technical reports/deliverables, from related pilot actions and/or any other relevant 5G-based applications, intending to enhance intelligence to the network edges.

- The **1st Workshop on AI and Ethics (AIETH 2021)**

Coordinator: Professor John Macintyre

We should aim in responsible global AI, however at the same time we must be preparing to act preemptively and ensure that our societies will avoid negative effects of AI and of 4th Industrial Revolution in general. The workshop on AI Ethics was organized by the University of Sunderland, United Kingdom and it will discuss potential major ethical issues that will arise in the near future.

Coordinator: Professor John Macintyre

### **AIETH workshop Speakers:**

**Speaker 1:** Matthias Scheutz, Professor, Bernard M. Gordon Senior Faculty Fellow, Adjunct Professor, Psychology, Tufts School of Arts & Sciences, Director, Human-Robot Interaction Lab

**Title:** The Need for Explicit Ethical Mechanisms in Architectures for Autonomous Systems.

**Abstract:** I will argue that ethical principles need to be deeply integrated into the operation of autonomous systems to ensure that ethical rules and laws will be followed properly and for the system to be able to explain why it decided to do what it did with

recourse to the principles involved in the decision, ideally with provable guarantees. I will argue against approaches like inverse reinforcement learning or other current deep-neural network-based machine-learning approaches for autonomous systems that are not introspectable with respect to what they learned and how they internalized ethical principles, in particular, because it is then unclear of how they arrive at their decisions and what principles they use, aside from lacking provable formal guarantees.

**Bio:** Matthias Scheutz received a PhD degree in philosophy from the University of Vienna and a joint Ph.D. in cognitive science and computer science from Indiana University. He is currently a full professor of computer and cognitive science in the Department of Computer Science at Tufts University, Senior Gordon Faculty Fellow in the School of Engineering, and Director of the Human-Robot Interaction Laboratory and the Human-Robot Masters and PhD programs. He has over 400 peer-reviewed publications in artificial intelligence, artificial life, agent-based computing, natural language understanding, cognitive modeling, robotics, human-robot interaction and foundations of cognitive science. His current research focuses on complex ethical cognitive robots with natural language interaction, problem-solving, and instruction-based learning capabilities.

**Speaker 2:** Cortnie Abercrombie, CEO, Founder AI Truth. Independent Consultant. AI Strategy for Trusted AI.

**Title:** How AI/ML gets done in Companies and how that contributes to AI that can be untrustworthy - this presentation presents the different roles involved in developing internal and external AI capabilities and how the roles, cultures, and norms (such as use of Agile, Move fast and break things, minimal viable product mentality) of the team influence the ethics of the team and causes bad practices.

**Bio:** Cortnie Abercrombie is a top advisor to Fortune 500 companies on responsible artificial intelligence and data innovation strategy, operating models and practices. She is also CEO and founder of AI Truth, a non-profit organization dedicated to responsible creation and use of AI. Prior to that she led a Shark Tank style AI solutions incubator at IBM. She was announced as one of “12 Brilliant Women in Artificial Intelligence & Ethics to Watch”, a “Top 100 Innovator in Data and Analytics” one of “10 Big Data Experts to Know”.

**Speaker 3:** Olivia Gambelin, AI Ethicist and founder of Ethical Intelligence

**Title:** Operationalizing Ethics to Elevate Innovation in AI

**Abstract:** We often hear of ethics being used for risk mitigation methods in AI design and development. Although necessary to the success of AI, risk mitigation only covers half the potential use of ethics when it comes to practically applying high level ethical values to the concrete context of AI systems. If fully utilised, ethics can become a powerful tool used to enable human-centric innovation that both aligns with current regulations and elevates an AI system into a position of competition in the marketplace.

**Bio:** Olivia is an AI Ethicist who works with entrepreneurs to bring ethical analysis into technological development. She believes there is strength in human values that, when applied to artificial intelligence, lead to robust solutions we can trust. Olivia holds a BA in Philosophy and Entrepreneurship from the Honors College of Baylor University and an MSc in Philosophy, concentration in AI Ethics, from the University of Edinburgh. Currently, Olivia works as the Chief Executive Officer of Ethical Intelligence where she leads a remote team of over thirty experts in the Tech Ethics field. She is on the Founding Editorial Board of Springer Nature's AI & Ethics Journal, Save the Children US External Ethics Committee, and is co-chair of IEEE's AI Expert Network Criteria Committee.

**Speaker 4:** Christoph J Ebell, Co-Founder & CEO at Arcades Digital

**Title:** Look who's talking. Who owns AI Ethics?

**Abstract:** The applications of AI will in many cases transcend political borders and cultural boundaries. An emerging international community of AI Ethicists does incredibly important work, both theoretical and practical, to advance ethical AI. At the same time, we are acutely aware that there is no agreed global standard of ethics, not even for seemingly fundamental issues like the death penalty, torture, gender equality, wealth distribution, and many others. Are ethical standards relative and regional? And what does this mean for

AI ethics? A frame-of-reference approach could help to make AI ethics comparable and applicable across cultural and political differences.

**Bio:** Christoph Ebell is an entrepreneur, tech consultant, digital transformation strategist. His specialties are international consortia, AI Ethics, Crypto and FinTech. His background is in physics and humanities. Chris worked for the Swiss government's innovation agency; he was posted as a science diplomat in Washington, D.C. He served as the Executive Director of the Human Brain Project, a multidisciplinary EU (1+ billion EUR) project. He founded a consulting firm for technology projects and is Secretary General of the European Association for Modular High-Performance Computing. In 2020, Chris founded a startup tokenizing physical and digital assets, with a focus on Fine Art.

- **The 1<sup>st</sup> Workshop on Defense Applications of AI – (DAAI 2021) Organized by EU-EDA**



This workshop was organized by the European Defense Agency (EDA) a European Union (EU) Organization. Defense and Security systems are becoming more and more complicated and at the same time equipped with a plethora of sensing devices which collect an enormous amount of information both from their operating environment as well as from their own functioning. Considering the accelerating technology advancements of AI, it is likely that it will have a profound impact on practically every segment of daily life, from the labor market to doing business and providing services. The security and defense sectors will not remain idle or unaffected by this technological

evolution. On the contrary, AI is expected to transform the nature of future defence and security domains, because by definition defense and security forces are highly dependent on (accurate) data and (reliable) information. The first Defense Applications of Artificial Intelligence (DAAI) Workshop aims at presenting recent evolutions in artificial intelligence applicable to defense and security applications.

**INVITED TALKS for the DAAI 2021 Workshop**

**Keynote 1 Lecture in the EU - DAAI workshop .....**

Dr. Evangelos Ouzounis of the *European Union Agency for Cybersecurity* gave a *Keynote* Lecture in the framework of the DAAI workshop. Title: “Artificial Intelligence Cybersecurity Challenges”.

**Bio:** Dr. Evangelos OUZOUNIS is a senior expert at ENISA, the European Network Information Security Agency. He is responsible for the security policy section of the Technical Department of the Agency. The section contributes to the multi thematic program one, Resilience of public e-Communication Networks and develops position papers on emerging technical issues like mobile eIDs, social networking, virtual worlds and privacy issues of mobile eID cards. Dr. Ouzounis’ personal contribution is on policy and regulatory issues related to the resilience of public e-Communication Networks. Recently, he published the analysis and stock taking of 25EEA countries’ national policy and regulatory environments. His work will continue with development of good practice guides incident reporting management, information sharing, and exercises. Prior to his position at ENISA, Dr. Ouzounis worked several years as a project officer at the European Commission, DG Information Society and Media (DG INFSO). He significantly contributed to the development of DG INFSO’s strategy and policy related to secure application provision (e.g. eGovernment, eBusiness and eHealth), eIDs, and secure software development. Dr. Ouzounis was co-founder of Electronic Commerce Centre of Competence (ECCO) at Fraunhofer Institute for Open Communication Systems (FhG-FOKUS, Berlin, Germany). He led and managed more than 20 pan European and International R&D projects in the areas of virtual organizations, secure distributed middleware, intelligent agents and web services. He was a lecturer at Technical University of Berlin, wrote 2 books and more than 20 peer reviewed academic papers and chaired several international conferences. Dr. Ouzounis holds a Ph.D from the Technical University of Berlin and a master from the Technical University of Patras in computer engineering and informatics.

**Keynote 2 Lecture in the EU - DAAI workshop .....**

Dr. Sergio Albani title: "Application of AI for GEOINT services in the Space and Security domain": The scope of the presentation will be to present the state of the art of GEOINT services for the security and defense applications and to demonstrate the benefit and impact of AI algorithms to these services.

**Bio:** Sergio Albani is the Head of Research, Technology Development and Innovation (RTDI) Unit at the European Union Satellite Centre. He is in charge of implementing new operational solutions in the Space and Security domain looking at the whole EO and collateral data lifecycle; this is performed by exploiting new data acquisition systems, secure satellite communications, emerging technologies and innovative EO based

solutions. He is responsible for several H2020 projects as well as ESA Point of Contact and GEO Principal Alternate. Mr. Albani holds a Master's degree in Physics (Astrophysics and Space Physics branch) and a 2nd Level Specializing Master's Degree in Journalism and Scientific & Institutional Communication.

- **The 1<sup>st</sup> Workshop on Energy Efficiency and Artificial Intelligence (EEAI 2021)**

**ORGANIZED by (ITI) Information Technology Institute  
(CERTH-Center for Research and Technology, Greece)**



Sustainable energy is hands down one of the biggest challenges of our times. As the EU sets its focus to reach its 2030 and 2050 goals, the role of private energy consumers becomes prevalent. The EU and member states are increasingly highlighting the need to complement supply-related measures (e.g., smart/efficient buildings, appliances and meters) with consumption-affecting initiatives (e.g., consumer empowerment, information and education, energy taxes and incentives). This workshop has been organized by the Information Technologies Institute, *Centre for Research and Technology Hellas- CERTH*.

- **The 1<sup>st</sup> Workshop on Distributed AI for Resource-Constrained Platforms (DARE 2021)**

This workshop is organized within the scope of the ITEA3 MIRAI project <https://itea3.org/project/mirai.html>. The standard approach explored by IoT applications of leveraging cloud computing to address constraints at the level of end and edge nodes is no longer viable, especially for applications with hard real-time requirements and increasing AI usage. Managing the complexity and heterogeneity of IoT systems is a big challenge for the future of edge computing as data is collected and analysed on a large network of different devices which may change at run-time. Only with an open and technology-agnostic approach this challenge can be addressed for a broad set of applications.

- **The 1<sup>st</sup> Workshop on Artificial Intelligence in Biomedical Engineering and Informatics**

Artificial intelligence (AI) is gradually changing the routine of medical practice and the level of acceptance, by the medical personnel is constantly increasing. Recent progress in digital medical data acquisition through advanced bio-signal and medical imaging devices, machine learning and high-performance cloud computing infrastructures, push health related AI applications into areas that were previously thought to be only the province of human experts. Such applications employ a variety of methodologies including fuzzy logic, evolutionary calculations, neural networks, or deep learning. Advance image processing, and artificial intelligence methods can support medical diagnostics, follow-up monitoring, preventive medicine, assessment of therapy and many other domains. These areas have been in recent years the subject of many research papers and research grants. Consequently, this workshop is devoted to the subject of artificial intelligence, in its broadest sense, in biomedical engineering and health informatics.



## KEYNOTE LECTURES:

Eight keynote speakers were invited to give lectures on timely aspects of AI. The following talks were given:

1. **Professor John Macintyre:** Pro Vice Chancellor at the University of Sunderland, UK gave a Keynote Lecture on a very hot topic related to AI and Ethics.  
**Title:** “Is “Big Tech” Becoming the “Big Tobacco” of Artificial Intelligence?”



### **Abstract:**

Recent developments in research, development, implementation and use of AI include worrying trends which ask big questions about the future direction of the whole field. As part of this, the role of “Big Tech” – the huge corporate entities who now dominate the development of AI technologies and products – is crucial, both in terms of the technology they develop, and the researchers they employ. Their dominance places them at the apex of the R&D and product development activity in AI, which in turn means they have a great responsibility to ensure that this activity leads to fair, transparent, accountable, and ethical AI systems and products. They also have a great responsibility to support and nurture their staff. This talk will examine recent developments in AI and the role of Big Tech, and ask whether they are stepping up to these responsibilities.

### **Biography:**

Professor John MacIntyre is Pro Vice Chancellor at the University of Sunderland. He did his doctorate in Applied Artificial Intelligence in the early 1990s, and went on to establish the Centre for Adaptive Systems which became recognised by the UK Government as a Centre of Excellence in Applied AI. He has published more than 170 papers and given numerous keynote presentations at events around the world. He is the Editor-in-Chief of Neural Computing & Applications, a role he has held since 1996. NC&A publishes peer-reviewed original research on applied AI, receiving over 4,000 submissions in 2020. John is also Co Editor-in-Chief of a new journal, AI and Ethics, which he established with Professor Larry Medsker of George Washington University this year. The first original research and thought leadership pieces were published online in AI and Ethics in October 2020, and the journal is now making a significant contribution to the public debate on the future direction of AI.

2. **Prof. Hojjat Adeli:** Ohio State University, Columbus, USA, Fellow of the Institute of Electrical and Electronics Engineers (IEEE) (IEEE), Honorary Professor, Southeast University, Nanjing, China, Member, Polish and Lithuanian Academy of Sciences, Elected corresponding member of the Spanish Royal Academy of Engineering.

**Title:** “Machine Learning: A Key Ubiquitous Technology in the 21st Century”



**Abstract:**

Machine learning (ML) is a key and increasingly pervasive technology in the 21st century. It is going to impact the way people live and work in a significant way. In general, machine learning algorithms simulate the way brain learns and solves an estimation/recognition problem. They usually require a learning phase to discover the patterns among the available data, similar to the humans. An expanded definition of ML is advanced as algorithms that can learn from examples and data and solve seemingly intractable learning and unteachable problems, referred to as ingenious artificial intelligence (AI). Recent and innovative applications of ML in various fields and projects currently being pursued by leading high-tech and industrial companies such as Boeing, Google, IBM, Uber, Baidu, Facebook, and Tesla are reviewed. Then, machine learning algorithms developed by the author and his associates are briefly described. Finally, examples are presented in different areas from health monitoring of smart highrise building structures to automated EEG-based diagnosis of various neurological and psychiatric disorders such as epilepsy, the Alzheimer’s disease, Parkinson’s disease, and autism spectrum disorder.

**Short Bio:**

Hojjat Adeli received his Ph.D. from Stanford University in 1976 at the age of 26. He is currently an Academy Professor at The Ohio State University where he held the Abba G. Lichtenstein Professorship for ten years. He is the Editor-in-Chief of the international journals Computer-Aided Civil and Infrastructure Engineering which he founded in 1986 and Integrated Computer-Aided Engineering which he founded in 1993. He has also served as the Editor-in-Chief of the International Journal of Neural Systems since 2005. He has been an Honorary Editor, Advisory Editor, or member of the Editorial Board of 144 research journals. He has authored over 600 research and scientific publications in various fields of computer science, engineering, applied mathematics, and medicine, including 16 ground-breaking high-technology books. He is the recipient of over sixtyfive

awards and honors including five Honorary Doctorates, and Honorary Professorship at several Asian and European Universities. He is a member of Academia Europaea, a corresponding member of the Spanish Royal Academy of Engineering, a foreign member of Lithuanian Academy of Sciences and Polish Academy of Science, a Distinguished Member of American Society of Civil Engineers (ASCE), and a Fellow of AAAS, IEEE, AIMBE, and American Neurological Association. He was profiled as an Engineering Legend in the journal Leadership and Management in Engineering, ASCE, April 2010, by a noted biographer of legendary engineer Infrastructure.

**3. Prof. Antonis Argyros:** Professor and Chair, Computer Science Department, University of Crete, Greece.

Researcher, Foundation for Research and Technology – Hellas (FORTH)

**Title:** Human-Centered Computer Vision: Core Components and Applications



**Abstract:**

Computer vision is an area of artificial intelligence aimed at developing technical systems capable of perceiving the environment through image and video processing and analysis. In this talk, we mainly focus on human-centered computer vision, that is, computer vision for capturing aspects of human presence such as the geometry and motion of the human body, as well as for recognizing human actions, behavior, intentions and emotional states. Such technologies may constitute a fundamental building block for the development of a variety of applications in almost all aspects of human life (health, security, work, education, transportation, entertainment). In this special area, we give specific examples of our research activity and highlight the significant boost achieved due to the exploitation of state-of-the-art machine learning techniques and deep neural networks. We also give examples of applications developed based on these technologies in the field of robotics and ambient intelligence environments.

**Short Bio:**

Antonis Argyros is a Professor of Computer Science at the Computer Science Department (CSD), University of Crete (UoC) and a researcher at the Institute of Computer Science (ICS), Foundation for Research and Technology-Hellas (FORTH) in Heraklion, Crete, Greece. His current research interests fall in the areas of

computer vision and pattern recognition, 3D reconstruction, image motion and tracking, with emphasis on human body pose and shape analysis and recognition of human activities and gestures. He is also interested in applications of computer vision in the fields of robotics and smart environments. In these areas, he has published more than 180 papers in scientific journals and refereed conference proceedings and has delivered several invited and keynote talks in international events, universities and research centers. Antonis Argyros has served as a general co-chair of ECCV'10, as a Program Co-chair of IEEE FG'20, ICVS'19, as a co-founder and co-organizer of the HANDS'15, '17, '18, '19 series of workshops, and as an Area Chair/Area Editor/Associate Editor of several editions for top vision, robotics and signal processing conferences (ICCV, ECCV, BMVC, ICPR, ICRA, IROS, EUSIPCO). He serves as a member of the Advisory Board of the IET Image Processing journal and as an Area Editor for the Computer Vision and Image Understanding Journal (CVIU). He has served as a member of the Editorial Board of the IEEE Robotics and Automation Letters journal, as a reviewer in more than 35 journals and as a TPC member of more than 70 conferences in computer vision, computer graphics, robotics and related disciplines. Since 1999, Antonis Argyros he has been involved in more than 30 European and national RTD projects on computer vision, pattern recognition, image analysis and robotics.

4. **Prof. Peter Tino:** School of Computer Science, University of Birmingham, UK  
**Title:** Unveiling Recurrent Neural Networks - What Do They Actually Learn and How?



**Abstract:**

When learning from "dynamic" data where the order in which the data is presented does matter, the key issue is how such temporal structures get represented within the learning machine. In the case of artificial neural networks, an often-adopted strategy is to introduce feedback-connections with time delays. This enables the neurons to form their activation patterns based on the past, as well as the current neural activations. Neural networks of this kind became known as Recurrent Neural Networks (RNN). Many diverse architectures fall under this umbrella, with a wide variety of application domains. We will briefly review past attempts to understand the way RNNs learn to represent the past in order to perform the tasks they are trained on.

To that end, we will adopt the general view of RNNs as parameterized state space models and input driven non-autonomous dynamical systems. We will then

present some new results connecting RNNs to a widely known class of models in machine learning - kernel machines. In particular, we will show that RNNs can be viewed as "temporal feature spaces". This framework will enable us to understand how high-dimensional RNNs constructed with very few degrees of freedom in their parameterization can still achieve competitive performances. Such observations can be viewed as "dynamical analogs" to classical "static" kernel machines that often achieve excellent performance using rich feature spaces constructed with very few degrees of freedom (e.g. single scale parameter in Gaussian kernels).

**Short Bio:**

Peter Tino holds a Chair position in Complex and Adaptive Systems at the School of Computer Science, University of Birmingham, UK. His interests span machine learning, neural computation, probabilistic modelling and dynamical systems. Peter is fascinated by the possibilities of cross-disciplinary blending of machine learning, mathematical modelling and domain knowledge in a variety of scientific disciplines ranging from astrophysics to bio-medical sciences.

He has served on editorial boards of a variety of journals including IEEE Transactions on Neural Networks and Learning Systems, IEEE Transactions on Cybernetics, Scientific Reports, and Neural Computation and (co-)chaired Task Force on Mining Complex Astronomical Data and Neural Networks Technical Committee (TC of IEEE Computational Intelligence Society). Peter led an EPSRC-funded consortium of six UK universities on developing new mathematics for personalised healthcare. He was a recipient of the Fulbright Fellowship to work at NEC Research Institute, Princeton, USA, on dynamics of recurrent neural networks, UK–Hong-Kong Fellowship for Excellence, three Outstanding Paper of the Year Awards from the IEEE Transactions on Neural Networks and the IEEE Transactions on Evolutionary Computation, and the Best Paper Award at ICANN 2002.

5. **Prof. Dr.ir. Johan Suykens:** KU Leuven, ESAT-Stadius and Leuven AI Institute, Belgium

**Title:** Deep learning and Kernel Machines



**Abstract:**

Over the last decades, with neural networks and deep learning, several powerful architectures have been proposed, including e.g., convolutional neural networks

(CNN), stacked autoencoders, deep Boltzmann machines (DBM), deep generative models and generative adversarial networks (GAN). On the other hand, with support vector machines (SVM) and kernel machines, solid foundations in learning theory and optimization have been achieved. Within this talk, we outline a unifying picture and show several new synergies, for which model representations and duality principles play an important role. A recent example is restricted kernel machines (RKM), which connects least squares support vector machines (LS-SVM) to restricted Boltzmann machines (RBM). New developments on this will be shown for deep learning, generative models, multi-view and tensor-based models, latent space exploration, robustness and explainability.

**Short Bio:**

Johan A.K. Suykens was born in Willebroek Belgium, May 18 1966. He received his MSc degree in Electro-Mechanical Engineering and the PhD degree in Applied Sciences from the Katholieke Universiteit Leuven, in 1989 and 1995, respectively. In 1996 he has been a Visiting Postdoctoral Researcher at the University of California, Berkeley. He has been a Postdoctoral Researcher with the Fund for Scientific Research FWO Flanders and is currently a full Professor with KU Leuven. He is author of the books “Artificial Neural Networks for Modelling and Control of Non-linear Systems” (Kluwer Academic Publishers) and “Least Squares Support Vector Machines” (World Scientific), co-author of the book “Cellular Neural Networks, Multi-Scroll Chaos and Synchronization” (World Scientific) and editor of the books “Nonlinear Modeling: Advanced Black-Box Techniques” (Kluwer Academic Publishers), “Advances in Learning Theory: Methods, Models and Applications” (IOS Press) and “Regularization, Optimization, Kernels, and Support Vector Machines” (Chapman & Hall/CRC). In 1998 he organized an International Workshop on Nonlinear Modelling with Time-series Prediction Competition. He has served as associate editor for the IEEE Transactions on Circuits and Systems (1997-1999 and 2004-2007), the IEEE Transactions on Neural Networks (1998-2009), the IEEE Transactions on Neural Networks and Learning Systems (from 2017) and the IEEE Transactions on Artificial Intelligence (from April 2020). He received an IEEE Signal Processing Society 1999 Best Paper Award, a 2019 Entropy Best Paper Award and several Best Paper Awards at International Conferences. He is a recipient of the International Neural Networks Society INNS 2000 Young Investigator Award for significant contributions in the field of neural networks. He has served as a Director and Organizer of the NATO Advanced Study Institute on Learning Theory and Practice (Leuven 2002), as a program co-chair for the International Joint Conference on Neural Networks 2004 and the International Symposium on Nonlinear Theory and its Applications 2005, as an organizer of the International Symposium on Synchronization in Complex Networks 2007, a co-organizer of the NIPS 2010 workshop on Tensors, Kernels and Machine Learning, and chair of ROKS 2013. He has been awarded an ERC Advanced Grant 2011 and 2017, and has been elevated IEEE Fellow 2015 for developing least squares support vector machines. He is currently serving as program director of Master AI at KU Leuven.

6. **Eunika Mercier-Laurent**, Université de Reims Champagne-Ardenne, CReSTIC/MODECO

**Title:** How can Artificial Intelligence efficiently support Sustainable Development?



**Abstract:**

This talk considers the multiple role AI may play in sustainability. Actually, sustainable development is among the greatest challenges for humanity. Sustainability and development are apparently opposite. The current efforts to face the Planet Crisis by separate actions generate less impact than expected. Artificial Intelligence approaches and capacity of available technologies are underexplored. Eco-innovation actions focus mainly on smart transportation, smart use of energy and water and waste recycling but do not consider the necessary evolution of behaviors and focus. The trendy Digital transformation follows mostly traditional approaches. The concepts such as Smart, Intelligent, Innovative, Green or Wise City invented to promote existing technology transform the IT market. Most of offers consist in data processing with statistical/optimization methods. But AI can do better – the AI approaches and techniques combined with adequate thinking may help innovating the way of facing Planet Crisis.

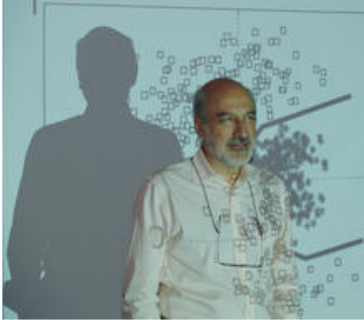
**Short Bio:**

Eunika Mercier-Laurent is electronic engineer, PhD in computer science, expert in artificial intelligence, associate researcher with University of Reims Champagne Ardennes and Professor at EPITA International Masters and SKEMA. She has over 15 years of involvement with IFIP including the Chair position of Technical Committee 12 on Artificial Intelligence since 2019 and Chair of WG 12.6 (AI for Knowledge Management). She was elected representative of TC12 in France in 2018. Her teaching and MOOC includes Knowledge Management & Innovation powered by AI, Ethical Development of AI Systems, Innovation Ecosystems and Innovation Week Challenges. After working as researcher in INRIA, computers designer and manager of innovative AI applications with Groupe Bull, she founded Global Innovation Strategies devoted to all aspects of Knowledge Innovation. Among her research topics are: Knowledge and Eco-innovation Management Systems, methods and techniques for innovation, knowledge modelling and processing, complex problem solving, AI for sustainability, eco-design and impacts of artificial intelligence. She is President of Innovation3D, International Association for Global Innovation, expert for EU programs, member of Managing Body of the EU K4I (<https://www.knowledge4innovation.eu>) and author of over hundred scientific publications and books. Among the last “The

Innovation Biosphere, Planet and Brains in Digital Era” and Intelligence in energy (co-authored with G. Kayakutlu).

7. **Jose C. Principe**, University of Florida

**Title:** Backpropagation Free Deep Learning



**Abstract:**

This talk presents recent results that show the feasibility of training deep networks classifiers without backpropagation. We will prove that it is possible to substitute error propagation in general conditions and practically achieve the same performance as conventional algorithms. This methodology allows modularization of the algorithmic pipeline and improves explainability. We will then address some of the benefits of this technology for applications.

**Short Bio:**

Jose C. Principe (M’83-SM’90-F’00) is a Distinguished Professor of Electrical and Computer Engineering and Biomedical Engineering at the University of Florida where he teaches advanced signal processing, machine learning and artificial neural networks (ANNs) modeling. He is Eckis Endowed Professor and the Founder and Director of the University of Florida Computational NeuroEngineering Laboratory (CNEL) [www.cnel.ufl.edu](http://www.cnel.ufl.edu). The CNEL Lab has been studying signal and pattern recognition principles based on information theoretic criteria (entropy and mutual information).

Dr. Principe is an IEEE, IABME, AIMBE Fellow. He was awarded the IEEE Neural Network Pioneer Award, the IEEE Shannon Nyquist Technical Achievement Award from the Signal Processing Society, the EMBS Career Achievement Award, and the Teacher Scholar of the Year from the U. of Florida. He was the past Chair of the Technical Committee on Neural Networks of the IEEE Signal Processing Society, Past-President of the International Neural Network Society, and Past-Editor in Chief of the IEEE Transactions on Biomedical Engineering. Dr. Principe has more than 800 publications. He directed 102 Ph.D. dissertations and 65 Master theses. He wrote in 2000 an interactive electronic book entitled “Neural and Adaptive Systems” published by John Wiley and Sons and more recently co-authored several books on “Brain Machine Interface Engineering” Morgan and Claypool, “Information Theoretic Learning”, Springer, and “Kernel Adaptive Filtering”, Wiley.



8. **Prof. Nikola Kasabov** Fellow IEEE, Fellow RSNZ, Fellow INNS College of Fellows  
Professor of Knowledge Engineering and Founding Director KEDRI  
Auckland University of Technology, Auckland, New Zealand,  
George Moore Chair/Professor, University of Ulster, UK,  
Honorary Professor Teesside University UK and the University of Auckland, NZ  
**Title:** Backpropagation Free Deep Learning



**Abstract:**

This talk presents recent results that show the feasibility of training deep networks classifiers without backpropagation. We will prove that it is possible to substitute error propagation in general conditions and practically achieve the same performance as conventional algorithms. This methodology allows modularization of the algorithmic pipeline and improves explainability. We will then address some of the benefits of this technology for applications.

**Short Bio:**

Professor Nikola Kasabov is Fellow of IEEE, Fellow of the Royal Society of New Zealand, Fellow of the INNS College of Fellows, DVF of the Royal Academy of Engineering UK. He is the Founding Director of KEDRI and Professor at the School of Engineering, Computing and Mathematical Sciences at Auckland University of Technology. Kasabov is a Past President of the Asia Pacific Neural Network Society (APNNS) and the International Neural Network Society (INNS). He is member of several technical committees of IEEE Computational Intelligence Society and Distinguished Lecturer of IEEE (2012-2014). He is Editor of Springer Handbook of Bio-Neuroinformatics, Springer Series of Bio-and Neurosystems and Editor-in-Chief of the Springer journal Evolving Systems. He is Associate Editor of several international journals. Kasabov holds MSc and PhD from 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 650 publications. He has extensive academic experience at various academic and research organizations in Europe and Asia, including: George Moore Chair in Data Analytics at the University of Ulster; Professor at the University of Otago, NZ; Advisory Professor at Shanghai Jiao Tong University; Visiting Professor at ETH/University of Zurich and Robert Gordon University UK, Honorary Professor at the University of Auckland and Teesside University. Prof. Kasabov has received a number of awards, among them: Doctor Honoris Causa from Obuda University, Budapest; INNS Ada Lovelace Meritorious Service Award; NN Best Paper Award for 2016; APNNA 'Outstanding Achievements Award'; INNS Gabor Award for 'Outstanding contributions to engineering applications of neural

networks'; EU Marie Curie Fellowship; Bayer Science Innovation Award; APNNA Excellent Service Award; RSNZ Science and Technology Medal; 2015 AUT Medal; Honorable Member of the Bulgarian, the Greek and the Scottish Societies for Computer Science. More information of Prof. Kasabov can be found on the web site: <https://academics.aut.ac.nz/nkasabov>

## TUTORIALS:

**Tutorial 1** .....

**Prof. Vangelis Metsis**



Texas State University, USA

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**Title:** Modern methods and tools for human biosignal analysis

**Abstract:** The term biosignal refers to any signal that can be measured from living organisms. Biosignals have been used in medicine, sports science, and psychology for diagnoses, and there have been impressive advancements in these areas. Recently, the fields of human-computer interaction and affective computing have found an interest in using biosignals as a means of understanding the human state and intention. This interest has been reinforced by the fact that acquiring information with sensors and interfacing electrically with the human body has become much easier in the past few years. Moving from large analog technologies to digital ones has led to the miniaturization of sensing devices. Wireless transmission technologies (e.g., Bluetooth low energy), which can be easily integrated with the acquisition hardware, have removed the need for bulky wiring. This tutorial will present an overview of modern applications of human biosignals and will provide practical examples of machine learning-based methods and tools for biosignal analysis. Traditional machine learning algorithms for feature extraction and classification will be compared with recent developments in deep learning and its applications to biosignal and time-series data processing in general.

**Short Bio:**

Dr. Vangelis Metsis. is an Assistant Professor at the Department of Computer Science at Texas State University. He joined the department in August 2014. Dr.

Metsis received his Bachelor of Science degree in Computer Science in 2005, from the Department of Informatics of Athens University of Economics and Business in Greece, and his Doctoral degree in 2011 from the Department of Computer Science and Engineering of The University of Texas at Arlington. During 2006-2007, Dr. Metsis worked as a Research Associate at the Department of Informatics and Telecommunications of the National Center for Scientific Research (NCSR) “Demokritos” in Greece, contributing to the project MedIEQ, funded by the European Commission. After receiving his Ph.D. diploma, and until joining TxState, he was employed, as a Research Assistant Professor by UTA, and he continued to be affiliated with Heracleia Human-Centered Computing Laboratory, where he was involved in several federally-funded research projects, as a Co-PI or Senior Researcher. He also taught a number of graduate and undergraduate classes at the CSE department. Dr. Metsis research interests span the areas of Machine Learning, Data Mining and Computer Vision with focus in applications of Smart Health and Wellbeing, Assisted Living and Bioinformatics.

**Tutorial 2** .....  
**Prof. Giacomo Boracchi**



Politecnico di Milano, Italy

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**Title:** Anomaly Detection in Images

Anomaly detection problems are ubiquitous in engineering: the prompt detection of anomalies is often a primary concern, since these might provide precious information for understanding the dynamics of a monitored process and for activating suitable countermeasures. In fact, anomalies are typically the most informative regions in an image (e.g., defects in images used for quality control). Not surprisingly, anomaly detection problems have been widely investigated in the image processing and pattern recognition communities and are key in application scenarios ranging from quality inspection to health monitoring. The tutorial presents a rigorous formulation of the anomaly-detection problem that fits with many imaging scenarios and applications. The tutorial describes, by means of illustrative examples, the most important anomaly-detection approaches in the literature, and their connection with the machine-learning perspective of semi-supervised and unsupervised learning/monitoring. Special emphasis will be given to anomaly-detection methods based on learned models, which are often adopted to handle images and signals. In particular, these will be

divided into traditional models (including dictionaries yielding sparse representations) and deep learning models. The tutorial is accompanied by various examples from our research projects where we applied anomaly-detection algorithms to solve real world problems: visual quality inspection for monitoring chip and nanofiber production.

**Short Bio:**

Giacomo Boracchi is an Associate Professor of Computer Engineering at Dipartimento di Elettronica, Informazione e Bioingegneria of the Politecnico di Milano, where he also received the Ph.D. in information technology (2008), after graduating in Mathematics (Università Statale di Milano, 2004). His research interests concern image processing and machine learning, and in particular image restoration and analysis, change/anomaly detection, domain adaptation. Since 2015 he is leading industrial research projects concerning algorithms for X-ray inspection systems for airport security, automatic quality inspection systems for monitoring silicon wafer production (the system developed with STMicroelectronics is currently analyzing wafer production over different sites), and outlier detection in web-sessions. He is currently associate editor for IEEE Transactions on Image Processing and server as AE for IEEE Computational Intelligence Magazine and in a few special issues. In 2015 he received an IBM Faculty Award, in 2016 the IEEE Transactions on Neural Networks and Learning Systems Outstanding Paper Award and in 2017 the Nokia Visiting Professor Scholarship. He has held tutorials in major IEEE conferences: ICIAP 2020, ICASSP 2018 and IJCNN 2017, 2018.

<b>TOPICS:</b>
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The accepted papers of the 17th AIAI 2021 conference are related to the following thematic topics:

- |                                    |                                   |
|------------------------------------|-----------------------------------|
| Activity Recognition               | Data Mining                       |
| Adaptive Learning                  | Deep Learning ANN                 |
| Adversarial Neural Networks        | Dialogue Act-Recognition          |
| AI for Media                       | Embedded Machine Learning         |
| AI for Music Composition           | Fake News Detection & AI          |
| Anomaly Detection & AI             | Feature selection                 |
| Anxiety Recognition & AI           | Financial Applications of AI      |
| Autoencoders                       | Fuzzy modeling                    |
| Autonomous Driving                 | Genetic algorithms & optimization |
| Biomedical - Bioinformatics & AI   | Hybrid intelligent models         |
| Classification-Pattern Recognition | Interoperability & AI             |
| Clustering                         | Image Analysis-Face Recognition   |
| Computer vision                    | Machine Learning                  |
| Convolutional and Recurrent ANN    | Meta Auto-ML                      |
| Cybersecurity & AI                 | Multi Agent Systems               |
| Cyber Supply-Chain & AI            | Natural Language                  |

Recommendation Systems  
Robotics  
Social media intelligent modeling  
SOM

Swarm Intelligence  
Text mining/machine translation  
Time Series  
Emotion recognition

The authors of submitted papers came from 21 different countries from all over the globe, namely: Australia, Austria, Belgium, Czech Republic, Egypt, France, Germany, Greece, Lebanon, Netherlands, India, Italy, P.R. China, Poland, Portugal, Romania, Sweden, Taiwan, Turkey, UK, USA.

June 2021

Ilias Maglogiannis  
Lazaros Iliadis  
John MacIntyre

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**Detailed Program of the joint  
22<sup>nd</sup> EANN 2021 - 17<sup>th</sup> AIAI 2021 Conference**

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**Friday 25/6/2021**

**10:00 – 18:00 Registration**

**10:30 - 10:45 Welcome Session**

**10:45 - 11:45**

**Session 1, Plenary 1:** “Brain-Inspired Data Analytics for Incremental and Transfer Learning of Cognitive Spatio-Temporal Data and for Knowledge Transfer”

Chair: Prof. Lazaros Iliadis

**Keynote Speaker: Nikola Kasabov**

Fellow IEEE, Fellow RSNZ, Fellow INNS College of Fellows, Professor of Knowledge Engineering and Founding Director KEDRI Auckland University of Technology, Auckland, New Zealand George Moore Chair/Professor, University of Ulster, UK, Honorary Professor Teesside University UK and the University of Auckland, NZ

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**11:45 - 13:00**

**Session 2, EANN: DL-CON I** (DEEP LEARNING - CONVOLUTIONAL I)

Chair: Prof. George Magoulas

fNIRS-Based BCI Using Deep Neural Network with an Application to Deduce the Driving Mode based on the Driver's Mental State

*Kazuhiko Takahashi, Reo Yokono, Chang Chu, Gauvain Huve, Masafumi Hashimoto*

Deep Learning Modeling of Groundwater Pollution Sources

*Yiannis N. Kontos, Theodosios Kassandra, Konstantinos Katsifarakis, Kostas Karatzas*

Image Pre-processing and Segmentation for Real-Time Subsea Corrosion Inspection

*Craig Pirie, Carlos Moreno-Garcia*

Exploring the Limits of Vanilla CNN Architectures for Fine-grained Vision-based Vehicle Classification

*Andreas Caduff, Klaus Zahn, J. Hofstetter, M. Rechsteiner, P. Bucher*

An Artificial Intelligence System for Endotracheal Intubation Confirmation

*Dror Lederman*

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**11:45 - 13:00**

**Session 3, AIAI: DL-CON II** (DEEP LEARNING - CONVOLUTIONAL II)

Chair: Prof. Elias Pimenidis

A Comparative Study of Deep Learning Techniques for Financial Indices Prediction

*Argyrios Ketsetsis, Konstantinos Giannoutakis, Georgios Spanos, Nikolaos Samaras, Dimitrios Hristu-Varsakelis, Dimitrios Thomas, Dimitrios Tzovaras*  
Robustness testing of AI systems: A case study for traffic sign recognition  
*Christian Berghoff, Pavol Bielik, Matthias Neu, Petar Tsankov, Arndt von Twickel*

Deep Dense and Convolutional Autoencoders for Machine Acoustic Anomaly Detection  
*Gabriel Coelho, Pedro Pereira, Luis Matos, Alexandrine Ribeiro, Eduardo Nunes, André Ferreira, Paulo Cortez, Andre Pilastrri*

Just-in-time Biomass Yield Estimation with Multi-Modal Data and Variable Patch Training Size  
*Patricia O'Byrne, Patrick Jackman, Damon Berry, Thomas Lee, Michael French, Robert J. Ross*

Automatic Classification of XCT Images in Manufacturing  
*Bertram Sabrowsky-Hirsch, Roxana-Maria Holom, Christian Gusenbauer, Michael Reiter, Florian Reiterer, Ricardo Fernández Gutiérrez, Josef Scharingesr*

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**11:45 - 13:00**

**Session 4, Workshop: DARE** (Distributed AI for Resource-Constrained Platforms)

Chair: Dr. Anna Hristoskova & Dr. Nicolás González-Deleito

Distributed data compression for edge devices.

*Kevin Van Vaerenbergh, Tom Tourwe*

PFilter: Privacy-aware and secure data filtering at the edge for distributed edge analytics

*Annanda Rath, Anna Hristoskova, Sarah Klein*

An Initial Analysis of the Shortcomings of Conventional AI and the Benefits of Distributed AI

Approaches in Industrial Use Cases

*Anna Hristoskova, Nicolás González-Deleito, Sarah Klein, Joana Sousa, Nuno Martins, João Tagaio, João Serra, Carlos Silva, João Ferreira, Pedro M. Santos, Ricardo Morla, Luis Almeida, Bariş Bulut, Sencer Sultanoğlu*

Towards a Distributed Learning Architecture for Securing ISP Home Customers

*Pedro Santos, Joana C Sousa, Ricardo Morla, Nuno Martins, João Tagaio, João Serra, Carlos Silva, Mário Sousa, Pedro Souto, Luís Lino Ferreira, João Ferreira, Luis Almeida*

A first sensitivity study of multi-object multi-camera tracking performance

*Miguel Ramos, Carlos Pereira, Luis Almeida*

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**11:45 - 13:45**

**Session 5, Workshop: nloVe** (Designing a Novel Adaptive Cybersecurity Solution for Internet-of-Vehicle) / **Discussion Forum / Open Session**

Chair: Dr. Konstantinos Votis

11:45-12:00 - Presentation of the nloVe project

12:00-12:20 - Aspects of stakeholders' requirements

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12:30-13:45 - Round table discussion with stakeholders' representatives, researchers from projects in the same domain, and external experts in the field of cybersecurity, automotive industry, and AI

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**11:45 - 13:45**

**Session 6, Workshop: DAAI** (Defense Applications of AI) / **Discussion Forum / Open Session**

**Co-Organized together with European Defense Agency**

Chair: Dr. Panagiotis Kikiras

11:45-12:00 - Dr. Panagiotis Kikiras, European Defence Agency

Introduction & Welcome message by the Organizers

12:00-12:45 - Dr. Evangelos Ouzounis, European Defence Agency

Artificial Intelligence Cybersecurity Challenges - How Cyber Security and Privacy Affects the Smooth Deployment of AI – ENISA's Approach

13:00-13:45 - Sergio Albani, European Union Satellite Centre

Application of AI for GEOINT services in the Space and Security domain

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**13:15 - 14:30**

**Session 7, Workshop: AIETH 2021** **The 1st Workshop on AI and Ethics**

Chair: Prof. John Macintyre

**Pro Vice Chancellor at the University of Sunderland, United Kingdom**

13:15-13:30 - Professor Matthias Scheutz, Bernard M. Gordon Senior Faculty Fellow, Adjunct Professor, Psychology, Tufts School of Arts & Sciences, Director, Human-Robot Interaction Lab

13:30-13:45 - Olivia Gambelin, AI Ethicist and founder of Ethical Intelligence

13:45-14:00 - Cortnie Abercrombie, CEO, Founder AI Truth. Independent Consultant. AI Strategy for Trusted AI

14:00-14:15 - Christoph J Ebell, Co-Founder & CEO at Arcades Digital (Free discussion-exchange of Arguments with conference participants during the event)

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**13:15 - 14:30**

**Session 8, AIAI: REC\_SENT\_IMP** (Recommendation Systems-Sentiment Analysis-AI Impacts)

Chair: Prof. Peter Hajek

Recommending Database Architectures for Social Queries: A Twitter Case Study

*Michael Marountas, Georgios Drakopoulos, Phivos Mylonas, Spyros Sioutas*

The AI4Media project: Use of Next-generation Artificial Intelligence Technologies for Media Sector Applications

*Filareti Tsalakanidou, Symeon Papadopoulos, Vasileios Mezaris, Ioannis Kompatsiaris, Birgit Gray, Danae Tsabouraki, Maritini Kalogerini, Fulvio Negro, Maurizio Montagnuolo, Jesse de Vos, Philo van Kemenade, Daniele Gravina, Rémi Mignot, Alexey Ozerov, Francois Schnitzler, Artur Garcia-Saez, Georgios N. Yannakakis, Antonios Liapis, Georgi Kostadinov*

Science4Fashion: An Autonomous Recommendation System for Fashion Designers

*Iordanis Koutsopoulos, Maria Halkidi*

A two-step optimised BERT-based NLP algorithm for extracting sentiment from financial news

*Rapheal Olaniyan, Daniel Stamate, Ida Pu*

*Optimization of Multi-Stakeholder Recommender Systems for Diversity and Coverage*

*Iordanis Koutsopoulos, Maria Halkidi*

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**13:15 - 14:30**

**Session 9, Workshop: DARE** (Distributed AI for Resource-Constrained Platforms) /  
**Discussion Forum / Open Session**

Chair: Dr. Anna Hristoskova & Dr. Barış Bulut

13:15-13:20 - Introduction & Welcome message by the Organizers

13:20-13:35 - Emiliano Casalicchio, BTH – BLEKINGE TEKNISKA HÖGSKOLA, Sweden  
An Energy-aware Multi-Criteria Federated Learning Model for Edge

Computing

13:40-13:55 - Müjdat Soytürk, Marmara University, Turkey

Edge Computing and V2X: the new ecosystem on the Cloud and the network architecture

14:00-14:15 - Thomas De Moor, Sentigrate, Belgium

Intelligence trade-off: edge vs cloud

14:15-14:30 - Emre Kaplan, AVL, Turkey

Personalized Gear Shifting Architecture for Next Generation Automatic Transmission

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**15:30 - 16:30**

**Session 11, EANN: BIOMED** (BIOMEDICAL)

Chair: Prof. Ilias Maglogiannis

Deep Learning of Brain Asymmetry Images and Transfer Learning for Early Diagnosis of Dementia

*Nitsa Herzog, George Magoulas*

Liver cancer trait detection and classification through Machine Learning on smart mobile devices

*Olympia Giannou, Anastasios Giannou, Dimitra Zazara, Dörte Kleinschmidt, Tobias Mummert, Björn Ole Stüben, Michael Gerhard Kaul, Gerhard Adam, Samuel Huber, Georgios Pavlidis*

Deep learning topology-preserving EEG-based images for autism detection in infants

*Cosmin Stamate, George Magoulas, Michael Thomas*

Using WOA with Feed Forward Neural Network in Prediction of Subcutaneous Glucose Concentration for Type-I Diabetic Patients

*Fayrouz Allam*

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**15:30 - 16:45**

**Session 12, AIAI: AUTOML-AUTOAG** (AUTONOMOUS MACHINE LEARNING-AUTONOMOUS AGENTS)

Chair: Dr. Georgios Drakopoulos

Object Migration Automata for Non-Equal Partitioning Problems with Known Partition Sizes

*Rebekka Olsson Omslandseter, Lei Jiao, John Oommen*

An Automated Machine Learning Approach for Predicting Chemical Laboratory Material Consumption

*António João Silva, Paulo Cortez*

An Ontology-Based Concept for Meta AutoML

*Bernhard Humm, Alexander Zender*

Enhanced Security Framework for Enabling Facial Recognition in Autonomous Shuttles Public Transportation during COVID-19

*Dimitrios Tsiktsiris, Antonios Lalas, Minas Dasygenis, Konstantinos Votis, Dimitrios Tzovaras*

Evaluating Task-General Resilience Mechanisms in a Multi-Robot Team Task

*James Staley, Matthias Scheutz*

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**15:30 - 16:45**

**Session 13, Workshop: 5G-PINE I** (5G – Putting Intelligence to the Network Edge I)

**INDUSTRY/AI 5G TECHNOLOGY** Organization by the Hellenic Telecommunications

Organization Research Group

Chair: Dr. Ioannis Chochliouros

V2X Communications for the Support of GLOSA and Intelligent Intersection Applications

*Ioannis Chochliouros, Anastasia Spiliopoulou, Pavlos Lazaridis, Zaharias Zaharis, Michail-Alexandros Kourtis, Slawomir Kuklinski, Lechoslaw Tomaszewski, Dimitrios Arvanitosis, Alexandros Kostopoulos*

Machine Learning-Based, Networking and Computing Infrastructure Resource Management

*Alexandros Kostopoulos, Ioannis Chochliouros, Miquel Payaro, Christos Verikoukis, Sabrina De Capitani di Vimercati*

5G Communications as “Enabler” for Smart Power Grids: The Case of the Smart5Grid Project

*Daniele Porcu, Ioannis P. Chochliouros, Sonia Castro, Giampaolo Fiorentino, Rui Costa, Dimitrios Nodaros, Vaios Koumaras, Fabrizio Brasca, Nicola di Pietro, George Papaioannou, Irina Ciornei, Antonios Sarigiannidis, Nikolay Palov, Teodor Bobochikov, Charilaos Zarakovitis, Anastasia S. Spiliopoulou*

5G-VICTORI: Future Railway Communications Requirements Driving 5G Deployments in Railways

*Ioanna Mesogiti, Eleni Theodoropoulou, Fotini Setaki, George Lyberopoulos, Anna Tzanakaki, Markos Anastassopoulos, Christina Politi, Panagiotis Papaioannou, Christos Tranoris, Spyros Denazis, Paris Flegkas, Nikos Makris, Nebojsa Maletic, Darko Cvetkovski, Jesus Gutierrez Teran, Panteleimon Konstantinos Chartsias, Konstantinos Stamatis, Maria-Evgenia Xezonaki, Dimitrios Kritharidis, Alexandros Dalkalitsis, Manfred Taferner, Martin Piovarci*

TYPHON: Hybrid Data Lakes for Real-time Big Data Analytics – An Evaluation Framework in the Telecom Industry

*Antonis Misargopoulos, George Papavassiliou, Christos Antonios Gizelis, Filippos Nikolopoulos-Gkamatsis*

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**15:30 - 17:45**

**Session 6, Workshop: DAAI** (Defense Applications of AI) / **Discussion Forum / Open Session**

**Co-Organized together with European Defense Agency**

Chair: Dr. Panagiotis Kikiras

**Project presentation session, EDA invited projects**

- ABIDE and CLAUDIA, EDA research on innovative techniques to support the decision-making process, Jose Luis Delgado Gamella
  - Artificial Intelligence for Energy and Environmental performance in Defence – Perspectives from EDA's ARTENET project, Prof. Christos Markopoulos
  - Artificial Intelligence for Automatic Detection Recognition, Identification and Tracking, Marcos Quintana Everis
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**16:45 - 17:30**

**Session 15, EANN: ML-REC-SENT** (MACHINE LEARNING - RECOMMENDATION SYSTEMS - SENTIMENT ANALYSIS)

Chair: Assoc. Prof. Phivos Mylonas

Real-time Multimodal Emotion Classification System in E-learning Context

*Arijit Nandi, Fatos Xhafa, Laia Subirats, Santi Fort*

A Multi-Modal Audience Analysis System for Predicting Popularity of Online Videos

*Alexandros Vrochidis, Nikolaos Dimitriou, Stelios Krinidis, Savvas Panagiotidis, Stathis Parcharidis, Dimitrios Tzovaras*

Do Weibo platform experts perform better on predicting stock market?

*Ziyuan Ma, Conor Ryan, Jim Buckley, Muslim Chochlov*

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**16:45 - 17:45**

**Session 16, Workshop: 5G-PINE II** (5G – Putting Intelligence to the Network Edge II) **INDUSTRY/AI 5G TECHNOLOGY** Organization by the Hellenic Telecommunications

Organization Research Group

Chair: Dr. Ioannis Chochliouros

Top Challenges in 5G Densification

*Eleni Theodoropoulou, Ioanna Mesogiti, Foteini Setaki, Konstantinos Filis, George Lyberopoulos, Agapi Mesodiakaki, Marios Gatzianas, Christos Vagionas, George Kalfas, Mauro Agus, Annachiara Pagano*

Advanced first responders' services by using FASTER project Architectural Solution

*Christina Lessi, Ioannis Chochliouros, Panagiotis Trakadas, Panagiotis Karkazis*

5G-VICTORI: Optimizing Media Streaming in Mobile Environments using mmWave, NBMP and 5G Edge Computing

*Louay Bassbouss, Mehdi Ben Fadhel, Anita Chen, Stefan Pham, Stephan Steglich, Eric Troudt, Marc Emmelmann, Jesús Gutiérrez, Nebojsa Maletic, Eckhard Grass, Stefan Schinkel, Annette Wilson, Sven Glaser, Christian Schlehuber*

High mobility 5G services for vertical industries - network operator's view

*Lechosław Tomaszewski, Ioannis Chochliouros, Robert Kołakowski, Sławomir Kukliński, Michail-Alexandros Kourtis*

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**16:45 - 17:45**

**Session 17, Workshop: AI-BIO** (Artificial Intelligence in Biomedical Engineering and Informatics)

Chair: Prof. Ilias Maglogiannis

A Machine Learning Approach for Recognition of Elders' Activities using Passive Sensors

*Anastasios Panagiotis Psathas, Antonios Papaleonidas, Lazaros Iliadis*

An inception-based architecture for haemodialysis time series classification

*Giorgio Leonardi, Stefania Montani, Manuel Striani*

Analyzing Collective Knowledge towards Public Health Policy Making

*Spyridon Kleftakis, Konstantinos Mavrogiorgos, Nikolaos Zafeiropoulos, Argyro Mavrogiorgou, Athanasios Kiourtis, Ilias Maglogiannis, Dimosthenis Kyriazis*

Evaluating mental patients utilizing video analysis of facial expressions

*M Tziomaka, Athanasios Kallipolitis, P Tsanakas, Ilias Maglogiannis*

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**17:45 -18:45**

**Session 18, Plenary 2:** "Backpropagation Free Deep Learning"

Chair: Prof. Plamen Angelov

**Keynote Speaker: Jose Principe**

Professor of Electrical and Computer Engineering and Biomedical Engineering, University of Florida. Eckis Endowed Professor and Founder-Director of the University of Florida Computational NeuroEngineering Laboratory.



**Saturday 26/6/2021**

**10:00 - 17:30 Registration**

**10:30-11:45**

**Session 19, EANN: DEE-BLKCH-SEG** (DEEP LEARNING-BLOCKCHAIN-SMART ENERGY GRIDS)

Chair: Dr. Konstantinos Demertzis

A Hybrid Deep Learning Ensemble for Cyber Intrusion Detection

*Anastasios Panagiotis Psathas, Lazaros Iliadis, Antonios Papaleonidas*

Addressing Computer Vision Challenges using an Active Learning Framework

*Christina Tzogka, Ioannis Refanidis*

Search Problems in Contemporary Power Grids

*Theofanis Aravanis, Andreas Petratos, Georgia Doukliq, Efpraxia Plati*

Incentivizing Participation to Distributed Neural Network Training

*Spyridon Nikolaidis, Ioannis Refanidis*

Blockchained Adaptive Federated Auto MetaLearning BigData and DevOps  
CyberSecurity Architecture in Industry 4.0

*Konstantinos Demertzis, Lazaros Iliadis, Elias Pimenidis, Nikolaos Tziritas,  
Maria Koziri, Panagiotis Kikiras*

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**10:30 - 11:45**

**Session 20, AIAI: ML-HYB** (MACHINE LEARNING/ HYBRID SYSTEMS)

Chair: Assoc. Prof. Christos Tjortjis

Using Machine Learning Methods to Predict Subscriber Churn of a Web-based Drug  
Information Platform

*Athanasios Tsadiras, Georgios Theodoridis*

Predicting CO2 Emissions for Buildings Using Regression and Classification

*Alexia Avramidou, Christos Tjortjis*

Intelligent Techniques and Hybrid Systems Experiments Using the Acumen Modeling  
and Simulation Environment

*Sotirios Tzamaras, Stavros Adam, Walid Taha*

Classification of Point Clouds with Neural Networks and Continuum-Type Memories

*Stefan Reitmann, Elena Kudryashova, Bernhard Jung, Volker Reitmann*

An automated tool to support an intelligence learner management system using  
Learning Analytics and Machine Learning

*Shareeful Islam, Hasan Mahmud, Haralambos Mouratidis*

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**10:30 - 11:45**

**Session 21, AIAI: AD-DTM** (ADAPTIVE-DATA MINING)

Chair: Dr. Ioannis Livieris

Dynamic Plume Tracking Utilizing Symbiotic Heterogeneous Remote Sensing  
Platforms

*Iakovos Michailidis, Athanasios Kapoutsis, Elias Kosmatopoulos, Yannis Boutalis*

Self-organizing maps for optimized robotic trajectory planning applied to surface coating

*Maria Tzinava, Konstantinos Delibasis, Spyros Kamnis*

Regression Predictive Model to analyze Big Data Analytics in Supply Chain Management

*Elena Puica*

If Only I Would Have Done That...': A Controlled Adaptive Network Model for Learning by Counterfactual Thinking

*Raj Bhalwankar, Jan Treur*

A Multi-View Clustering Approach for Analysis of Streaming Data

*Vishnu Manasa Devagiri, Veselka Boeva, Shahrooz Abghari*

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**10:30 - 11:15**

**Session 22, Workshop: DAAI** (Defense Applications of AI) / **Discussion Forum / Open Session**

**Co-Organized together with European Defense Agency**

Chair: Dr. Giorgos Dimitriou

EDA Action plan presentation

Panagiotis Kikiras, European Defence Agency

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**11:15 - 12:00**

**Session 23, Workshop: DAAI** (Defense Applications of AI) / **Discussion Forum / Open Session**

**Co-Organized together with European Defense Agency**

Chair: Dr. Giorgos Dimitriou

Research on AI-based capabilities for the European Border and Coast Guard

Darek Saunders, Head of the Border Security Observatory - FRONTEX

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**12:00 - 13:30**

**Session 24, TUTORIAL 2 - ANDIM**

"Anomaly Detection in Images"

Chair: Prof. Ilias Maglogiannis

Tutor: **Prof. Giacomo Boracchi**

Politecnico di Milano, Italy

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**12:00-13:00**

**Session 25, EANN: DEE\_CON** (DEEP-CONVOLUTIONAL)

Chair: Prof. Ioannis Refanidis

Repeatable functionalities in complex layers of formal neurons

*Leon Bobrowski, Tomasz Łukaszuk*

Data Fusion for Deep Learning on Transport Mode Detection: A Case Study

Hugues Moreau, Andrea Vassilev, Liming Chen

Toward an augmented and explainable machine learning approach for classification of defective nanomaterial patches

*Cosimo Ieracitano, Nadia Mammone, Annunziata Paviglianiti, Francesco Carlo Morabito*

Using Artificial Neural Network to Provide Realistic Lifting Capacity in the Mobile Crane Simulation

*Simon Roysson, Taufik Akbar Sitompul, Rikard Lindell*

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**12:00 - 13:15**

**Session 26, AIAI: NAT\_LA** (NATURAL LANGUAGE)

Chair: Prof. Elias Pimenidis

A comparative assessment of state-of-the-art methods for multilingual unsupervised keyphrase extraction

*Nikolaos Giarelis, Nikos Kanakaris, Nikos Karacapilidis*

Machine Learning Meets Natural Language Processing - The story so far

*Nikolaos-Ioannis Galanis, Panagiotis Vafiadis, Kostas-Gkouram Mirzaev, George Papakostas*

Robust Pose Estimation Based on Maximum Correntropy Criterion

*Qian Zhang, Badong Chen*

CEA-TM: A Customer Experience Analysis framework based on Contextual-aware Topic Modeling approach

*Ariona Shashaj, Davide Stirparo, Mohammad Kazemi*

SemAI: A Novel Approach for Achieving Enhanced Semantic Interoperability in Public Policies

*George Manias, Athanasios Kiourtis, Argyro Mavrogiorgou, Dimosthenis Kyriazis*

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**12:00 - 13:15**

**Session 27, AIAI: ML-IoT** (MACHINE LEARNING - INTERNET OF THINGS)

Chair: Asst. Prof. Athanasios Tsadiras

Verification of Size Invariance in DNN Activations using Concept Embeddings

*Gesina Schwalbe*

A Comparative Study of Embedded Feature Selection Methods on Microarray data

*Hind Hamla, Khadoudja Ghanem*

BEMS in the Era of Internet of Energy: A Review

*Asimina Dimara, Christos-Nikolaos Anagnostopoulos, Konstantinos Kotis, Stelios Krinidis, Dimitrios Tzovaras*

Cyber Supply Chain Threat Analysis and Prediction using Machine Learning and Ontology

*Shareeful Islam, Abel Yeboah-Ofori, Umar Ismail, Haralambos Mouratidis, Spyridon Papastergiou*

"SAVE" – an Integrated Approach of Personal and Home Safety for Active Assisted Living

*Sorin-Aurel Moraru, Adrian Alexandru Mosoi, Dominic Mircea Kristaly, Florin Sandu, Dan Floroian, Delia Elisabeta Ungureanu, Liviu Marian Perniu*

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**12:00 - 13:15**

**Session 28, Workshop: MHDW\_I** (Mining Humanistic Data Workshop I)

Chair: Assoc. Prof. Katia Lida Kermanidis

Movie Recommendation System based on Character Graph Embeddings

*Agisilaos Kounelis, Pantelis Vikatos, Christos Makris*

Privacy-Preserving Text Labelling Through Crowdsourcing

*Giannis Haralabopoulos, Mercedes Torres Torres, Ioannis Anagnostopoulos, Derek Mcauley*

Forecasting Air Flight Delays and Enabling Smart Airport Services in Apache Spark

*Gerasimos Vonitsanos, Theodor Panagiotakopoulos, Andreas Kanavos, Athanasios Tsakalidis*

Visitor behavior analysis for an ancient Greek technology exhibition

*Dimitrios Kosmopoulos, Kali Tzortzi*

Recognition of epidemic cases in social web texts

*Apostolos Antonakakis, Eleftherios Alexiou, Nemanja Jevtic, Georgios Sideras, Eftichia Farmaki, Sofronia Foutsitzi, Katia Lida Kermanidis*

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**12:00 - 13:30**

**Session 29, Workshop: DARE** (Distributed AI for Resource-Constrained Platforms) /  
**Discussion Forum / Open Session**

Chair: Dr. Giorgos Dimitriou

AI in Security and Defence, Moderated Round table

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**13:30 - 14:30**

**Session 30, Plenary 3:** “Is “Big Tech” Becoming the “Big Tobacco” of Artificial Intelligence?”

Chair: Prof. Lazaros Iliadis

**Keynote Speaker: John Macintyre**

Pro Vice Chancellor at the University of Sunderland, United Kingdom

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**15:30 - 16:30**

**Session 31, Plenary 4:** “Human-Centered Computer Vision: Core Components and Applications”

Chair: Prof. Ilias Maglogiannis

**Keynote Speaker: Antonis Argyros**

Professor and Chair, Computer Science Department, University of Crete, Greece

Researcher, Foundation for Research and Technology – Hellas (FORTH)

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**16:30 - 17:45**

**Session 32, EANN: DEE-CLA-FZ** (DEEP LEARNING-CLASSIFICATION-FUZZY)

Chair: Assoc. Prof. Dimitrios Kosmopoulos

**EANN # 41, 38, 14, 19, 17**

Face Detection with YOLO on Edge

*Adamu Ali-Gombe, Eyad Elyan, Carlos Francisco Moreno-García, Johan Zwiigelaar*

Fuzzy Approach to Identity Resolution

*Asif Nawaz, Hassan Kazemian*

Anomaly Detection by Robust Feature Reconstruction

*Ron Triepels Theofanis Aravanis, Andreas Petratos, Georgia Douklia, Efpraxia Plati*

Squeeze-and-Threshold based quantization for Low-Precision Neural Networks

*Binyi Wu, Bernd Waschneck, Christian Mayr*

Efficient Realistic Data Generation Framework leveraging Deep Learning-based Human Digitization

*Charalampos Symeonidis, Paraskevi Nousi, Pavlos Tosidis, Konstantinos Tsampazis, Nikolaos Passalis, Anastasios Tefas, Nikos Nikolaidis*

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**16:30 - 17:45**

**Session 33, AIAI: DL-BLC** (DEEP LEARNING - BLOCKCHAIN)

Chair: Assoc. Prof. Vangelis Metsis

Improved Biomedical Entity Recognition via longer context modelling

*Nikolaos Stylianou, Panagiotis Kosmoliaptsis, Ioannis Vlahavas*

ebioMelDB: Multi-modal database for melanoma and its application on estimating patient prognosis

*Aigli Korfiati, Giorgos Livanos, Christos Konstantinou, Sophia Georgiou, George Sakellariopoulos*

Federated Blockchain Supply Chain Management: A CyberSecurity and Privacy Framework

*Konstantinos Demertzis, Lazaros Iliadis, Elias Pimenidis, Nikolaos Tziritas, Maria Koziri, Panagiotis Kikiras, Michael Tonkin*

Learning Sentiment-aware Trading Strategies for Bitcoin leveraging Deep Learning-based Financial News Analysis

*Nikolaos Passalis, Solon Seficha, Avraam Tsantekidis, Anastasios Tefas*

Analysis and Prediction for House Sales Price Using a Hybrid Machine Learning Approach

*S. M. Soliman Hossain, Jyoti Rawat, Doina Logofatu*

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**16:30 - 17:45**

**Session 34, Workshop: EEAI** (Energy Efficiency and Artificial Intelligence)

Chair: Dr. Stelios Krinidis, Dr. Dimitrios Tzovaras, Prof. Jasminko Novak

Semantic modeling of trustworthy IoT entities in energy-efficient cultural spaces

*Konstantina Zachila, Konstantinos Kotis, Asimina Dimara, Stamatia Ladikou, Christos-Nikolaos Anagnostopoulos*

Short Term Net Imbalance Volume Forecasting through Machine and Deep Learning:  
A UK case study

*Elpiniki Makri, John Koskinas, Apostolos Tsolakis, Dimosthenis Ioannidis,  
Dimitrios Tzovaras*

Explainable needn't be (much) less accurate: evaluating an explainable AI dashboard  
for energy forecasting

*Ana Grimaldo, Jasminko Novak*

Improving Energy Efficiency in Tertiary Buildings through user-driven  
Recommendations delivered on optimal Micro-moments

*Apostolos C. Tsolakis, George Tsakirakis, Vasileios G. Vasilopoulos,  
Konstantinos Peppas, Charisios Zafeiris, Iordanis Makaratzis, Ana Grimaldo,  
Stelios Krinidis, Jasminko Novak, George Bravos, Dimitrios Tzovaras*

A Recommendation Specific Human Activity Recognition Dataset with Mobile  
Device's Sensor Data

*Alexandros Vrochidis, Vasileios G. Vasilopoulos, Konstantinos Peppas, Valia  
Dimaridou, Iordanis Makaratzis, Apostolos C. Tsolakis, Stelios Krinidis,  
Dimitrios Tzovaras*

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**16:30 - 17:30**

**Session 35, Workshop: DAAI** (Defense Applications of AI)

Chair: Prof. Lazaros Iliadis

On the potential of SDN enabled network deployment in tactical environments

*Georgios Lazaridis, Kostas Papachristou, Anastasios Drosou, Dimosthenis  
Ioannidis, Periklis Chatzimisios, Dimitrios Tzovaras*

A Lipschitz - Shapley Explainable Defense Methodology Against Adversarial Attacks

*Konstantinos Demertzis, Panagiotis Kikiras, Lazaros Iliadis*

A Multimodal AI-leveraged Counter-UAV Framework for Diverse Environments

*Eleni Diamantidou, Antonios Lalas, Konstantinos Votis, Dimitrios Tzovaras*

Cyber-attack detection and trust management toolkit for defence-related microgrids

*Charalampos - Rafail Medentzidis, Thanasis Kotsiopoulos, Vasileios Vellikis,  
Dimosthenis Ioannidis, Dimitrios Tzovaras, Panagiotis Sarigiannidis*

**Sunday 27/6/2021**

**10:00 - 18:00 Registration**

**10:30 - 11:30**

**Session 36, Plenary 5:** "How can Artificial Intelligence efficiently support Sustainable Development?"

Chair: Prof. Ilias Maglogiannis

**Keynote Speaker:** Eunika Mercier-Laurent

Université de Reims Champagne-Ardenne, CReSTIC/MODECO

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**11:30 - 12:45**

**Session 37, EANN: DEE – ADV-FUZZY** (DEEP LEARNING – ADVERSARIAL-FUZZ)

Chair: Prof. Hassan Kazemian

Deep Learning for Water Quality Classification in Water Distribution Networks

*Essa Q. Shahra, Wenyan Wu, Shadi Basurra, Stamatia Rizou*

Face Spoof Detection: An Experimental Framework

*Faseela Abdullakutty, Eyad Elyan, Pamela Johnston*

Automatic Facial Expression Neutralisation Using Generative Adversarial Network

*Wiem Grina, Ali Douik*

Early prediction of COVID-19 onset by fuzzy-neuro inference

*Mario Malcangi*

Creating Ensembles of Generative Adversarial Network Discriminators for One-class Classification

*Mihai Ermaliuc, Daniel Stamate, George Magoulas, Ida Pu*

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**11:30 - 12:45**

**Session 38, AIAI: ML-BIC** (MACHINE (DEEP) LEARNING-BRAIN INSPIRED COMPUTING)

Chair: Prof. Will Serrano

System-wide anomaly detection of industrial control systems via deep learning and correlation analysis

*Gordon Haylett, Zahra Jadidi, Kien Nguyen Thanh*

PQ-HDC: Projection-based Quantization Scheme for Flexible and Efficient Hyperdimensional Computing

*Chi-Tse Huang, Cheng-Yang Chang, YUCHUAN CHUANG, An-Yeu Wu*

Scalable NPairLoss-based Deep-ECG for ECG Verification

*Yu-Shan Tai, Yi-Ta Chen, An-Yeu Wu*

Hyperdimensional Computing with Learnable Projection for User Adaptation Framework

*Yu-Ren Hsiao, YUCHUAN CHUANG, Cheng-Yang Chang, An-Yeu (Andy) Wu*

An Approach Utilizing Linguistic Features for Fake News Detection

*Dimitrios Panagiotis Kasseropoulos, Christos Tjortjis*

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**11:30 - 12:30**

**Session 39, AIAI: DL-CON III** (DEEP LEARNING CONVOLUTIONAL\_III)

Chair: Assoc. Prof. Christos Makris

An autoencoder convolutional neural network framework for Sarcopenia detection based on multi-frame ultrasound image slices

*Emmanuel Pintelas, Ioannis Livieris, Nikolaos Barotsis, George Panayiotakis, Panagiotis Pintelas*

A Computational Model for the Second-Order Adaptive Causal Relationships between Anxiety, Stress and Physical Exercise

*Lars Rass, Jan Treur*

Improving the flexibility of production scheduling in flat steel production through standard and AI-based approaches: challenges and perspectives

*Vincenzo Iannino, Valentina Colla, Alessandro Maddaloni, Jens Brandenburger, Ahmad Rajabi, Andreas Wolff, Joaquin Ordieres, Miguel Gutierrez, Erwin Sirovnik, Dirk Mueller, Christoph Schirm*

Efficient Approaches for Density-Based Spatial Clustering of Applications with Noise (short)

*Pretom Kumar Saha, Doina Logofatu*

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**11:30 - 12:30**

**Session 40, Workshop: MHDW\_II** (Mining Humanistic Data Workshop II)

Chair: Asst. Prof. Andreas Kanavos

Self-supervised approach for Urban Tree Recognition on Aerial Images

*Lakshmi Babu Saheer, Mohamed Shahawy*

Community Detection Algorithms for Cultural and Natural Heritage Data in Social Networks

*Andreas Kanavos, Maria Trigka, Elias Dritsas, Gerasimos Vonitsanos,*

*Phivos Mylonas*

Active Bagging Ensemble Selection

*Vangjel Kazllarof, Sotiris Kotsiantis*

Applying Machine Learning to Predict Whether Learners will Start a MOOC after Initial Registration

*Theodor Panagiotakopoulos, Sotiris Kotsiantis, Spiros Borotis, Fotis Lazarinis, Achilles Kameas*

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**13:00 - 14:00**

**Session 41, Plenary 6: "Deep learning and Kernel Machines"**

Chair: Prof. Eunika Mercier-Laurent

**Keynote Speaker: Prof. Dr.ir. Johan Suykens**

KU Leuven, ESAT-Stadius and Leuven AI Institute

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**14:00 - 15:15**

**Session 42, EANN: DEE-FUZZ** (DEEP LEARNING-FUZZY)

Chair: Assoc. Prof. Christos Makris



Deep Neural Networks for Indoor Geomagnetic Field Fingerprinting with Regression Approach

*Mahdi Abid, Grégoire Lefebvre*

Drilling Operations Classification Utilizing Data Fusion and Machine Learning Techniques

*Marzieh Zare, Jussi-Pekka Lehtinen, Hesam Jafarian, Ari Visa, Liisa Aha*

Impact of Classifiers to Drift Detection Method: A comparison

*Angelos Angelopoulos, Anastasios Giannopoulos, Nikolaos Kapsalis, Sotirios Spantideas, Lambros Sarakis, Stamatios Voliotis, Panagiotis Trakadas*

Recommender systems algorithm selection using machine learning

*Nikolaos Polatidis, Stelios Kapetanakis, Elias Pimenidis*

A Novel CNN-LSTM Hybrid Architecture for the Recognition of Human Activities

*Sofia Stylianou-Nikolaidou, Ioannis Vernikos, Eirini Mathe, Evaggelos Spyrou, Phivos Mylonas*

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**14:00 - 15:15**

**Session 43, AIAI: DEE-FZ** (DEEP LEARNING-Fuzzy)

Chair: Prof. Kostas Delibasis

Intuitionistic Fuzzy Neural Network for Time Series Forecasting - The Case of Metal Prices

*Petr Hajek, Vladimir Olej, Wojciech Froelich, Josef Novotny*

Artificial Intelligence in Music Composition

*Mincer Alaeddine, Anthony Tannoury*

An Effective Loss Function for Generating 3D Models from Single 2D Image without Rendering

*Nikola Zubić, Pietro Liò*

Neural Network Compression Through Shunt Connections and Knowledge Distillation for Semantic Segmentation Problems

*Bernhard Haas, Alexander Wendt, Axel Jantsch, Matthias Wess*

Event-Detection Deep Neural Network for OTDR Trace Analysis\*\*

*Davide Rutigliano, Giacomo Boracchi, Pietro Invernizzi, Enrico Sozio, Cesare Alippi, Stefano Binetti*

*\*\*EANN 2021 Paper*

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**14:00 - 15:00**

**Session 44, AIAI: DTM-ML** (DATA MINING-MACHINE LEARNING)

Chair: Asst. Prof. Sotiris Kotsiantis

BIBLIOICLUSTER: A bicluster algorithm for Bibliometrics

*Gloria Gheno*

Topic identification via human interpretation of word clouds: The case of Instagram hashtags

*Stamatios Giannoulakis, Nicolas Tsapatsoulis*

The Generative Adversarial Random Neural Network

*Will Serrano*

Validation and Verification for Data Marketplaces

**16:15 - 17:15**

**Session 45, Plenary 7:** “Unveiling Recurrent Neural Networks – What Do They Actually Learn and How?”

Chair: Prof. Johan Suykens

**Keynote Speaker: Prof. Peter Tino**

School of Computer Science, University of Birmingham, UK

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**17:15 - 18:45**

**Session 46, TUTORIAL 3: MM\_HUB**

“Modern methods and tools for human biosignal analysis”

Chair: Prof. Ilias Maglogiannis

Tutor: **Prof. Vangelis Metsis**

Texas State University, USA

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**17:15 - 18:15**

**Session 47, Workshop: 5G-PINE III** (5G – Putting Intelligence to the Network Edge III)

**INDUSTRY/AI 5G TECHNOLOGY** Organization by the Hellenic Telecommunications

Organization Research Group

Chair: Dr. Ioannis Chochliouros

A Novel Architectural Approach for the Provision of Scalable and Automated Network Slice Management, in 5G and Beyond

Ioannis Chochliouros, Slawomir Kuklinski, Lechoslaw Tomaszewski, Christos Verikoukis, Anastasia Spiliopoulou, Alexandros Kostopoulos, Robert Kołakowski

The Challenge of Security Breaches in the Era of 5G Networking

*Maria Belesioti, Jorge Carapinha, Rodoula Makri, Ioannis Chochliouros*

Power Control in 5G Heterogeneous Cells considering User Demands using Deep Reinforcement Learning

*Anastasios Giannopoulos, Sotirios Spantideas, Christos Tsinos, Panagiotis Trakadas*

A prototype 5G/IoT implementation for transforming a legacy facility to a Smart Factory

*Panagiotis Papaioannou, Nikolaos Tzanis, Christos Tranoris, Spyros Denazis, Alexios Birbas*

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**17:45 - 18:45**

**Session 48, EANN: ML-SENT** (MACHINE LEARNING-SENTIMENT ANALYSIS)

Chair: Prof. Elias Pimenidis

Improving the Diagnosis of Breast Cancer by Combining Visual and Semantic Feature Descriptors

*George Apostolopoulos, Athanasios Koutras, Dionysios Anyfantis, Ioanna Christoyianni, Evangelos Dermatas*

Contaminated Soil Detection: A proposal using Machine Learning with Hyperspectral imaging

*Fernando Henrique Oliveira Duarte, Gustavo Pessin, Rosa Elvira Correa Pabón, Jefferson Souza*

Predicting Stock Price Movement using Financial News Sentiment

*Jiaying Gong, Bradley Paye, Gregory Kadlec, Hoda Eldardiry*

Inverse Kinematics via a Network Ensemble and Learning Method

*Joshua Ramayrat, Teng-Sheng Moh*

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**17:45 - 18:45**

**Session 49, AIAI: ML-DL (MACHINE-DEEP LEARNING)**

Chair: Prof. Doina Logofatou

Cross-lingual Approaches for Task-specific Dialogue Act Recognition

*Jiří Martínek, Christophe Cerisara, Pavel Kral, Ladislav Lenc*

Collaborative Edge-Cloud Computing for Personalized Fall

*Anne Ngu, Shaun Coyne, Priyanka Srinivas, Vangelis Metsis*

A Survey of Methods for Detection and Correction of Noisy Labels in Time Series Data

*Gentry Atkinson, Vangelis Metsis*

Deep Learning and AI for Optimization in 5G Technology

*Mahnaz Olfati, Kiran Parma*

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**17:15 - 18:30**

**Session 50, Workshop: EEAI (Energy Efficiency and Artificial Intelligence) /**

**Discussion Forum / Open Session**

Chair: Dr. Stelios Krinidis, Dr. Apostolos Tsolakis & Prof. Jasminko Novak

17:15-17:25 - Dr. Stelios Krinidis, Presentation of the SIT4Energy project

17:25-17:50 - Prof. Jasminko Novak, Intelligent Energy Management Tools for Prosumer Scenarios

17:50-18:10 - Dr. Siranush Akarmazyan, Improved customer experience via intelligent mobile applications

18:10-18:30 - Round table discussion

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**19:00 - 19:15 Closing Session**

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## Webex Events Platform Access Links

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### Plenaries, Keynotes, Tutorials, and Invited Workshops

Sessions: 1, 7, 10, 18, 24, 30, 31, 36, 41, 45 & 46 (all Open Access)

[22<sup>nd</sup> EANN / 17<sup>th</sup> AIAI 2021, Open Plenaries & Tutorials Room](#)

### 22<sup>nd</sup> EANN 2021 Technical Sessions

Sessions: 2, 11, 15, 19, 25, 32, 37, 42 & 48

[22<sup>nd</sup> EANN / 17<sup>th</sup> AIAI 2021, Room A](#)

### 17<sup>th</sup> AIAI 2021 Technical Sessions

Sessions: 3, 8, 12, 20, 26, 33, 38, 43 & 49

[22<sup>nd</sup> EANN / 17<sup>th</sup> AIAI 2021, Room B](#)

Sessions: 21, 27, 39 & 44

[22<sup>nd</sup> EANN / 17<sup>th</sup> AIAI 2021, Room C](#)

### Technical Workshops

#### 5G-PINE 2021, [22<sup>nd</sup> EANN / 17<sup>th</sup> AIAI 2021, Workshops Room A](#)

6th Workshop on “5G – Putting Intelligence to the Network Edge”

Sessions: 13, 16 & 47

#### AI – BIO 2021, [22<sup>nd</sup> EANN / 17<sup>th</sup> AIAI 2021, Workshops Room B](#)

Artificial Intelligence in Biomedical Engineering and Informatics

Session: 17

#### DAAI 2021, [22<sup>nd</sup> EANN / 17<sup>th</sup> AIAI 2021, Workshops Room B](#)

Defense Applications of AI

Session: 35

#### DARE 2021, [22<sup>nd</sup> EANN / 17<sup>th</sup> AIAI 2021, Workshops Room A](#)

Distributed AI for Resource-Constrained Platforms

Session: 4

#### EEAI 2021, [22<sup>nd</sup> EANN / 17<sup>th</sup> AIAI 2021, Workshops Room A](#)

Energy Efficiency and Artificial Intelligence

Session: 34

#### MHDW 2021, [22<sup>nd</sup> EANN / 17<sup>th</sup> AIAI 2021, Workshops Room A](#)

10th Mining Humanistic Data Workshop

Sessions: 28 & 40

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**Webex Events Platform Access Links  
for Open Access Special Session & Discussion Forums**

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**The 1st Workshop on Defense Applications of AI**

**Co-Organized together with the European Defense Agency**

**DAAI 2021 Special Sessions & Discussion Forums**

[22<sup>nd</sup> EANN / 17<sup>th</sup> AIAI 2021, Open Rooms / DAAI Special Session - Discussion Forum](#)

**Distributed AI for Resource-Constrained Platforms**

**DARE 2021 Special Sessions & Discussion Forums**

[22<sup>nd</sup> EANN / 17<sup>th</sup> AIAI 2021, Open Rooms / DARE Discussion Forum](#)

**Energy Efficiency and Artificial Intelligence**

**EEAI 2021 Special Sessions & Discussion Forums**

[22<sup>nd</sup> EANN / 17<sup>th</sup> AIAI 2021, Open Rooms / EEA Discussion Forum](#)

**Designing a Novel Adaptive Cybersecurity Solution for Internet-of-Vehicle**

**nIoVw 2021 Special Sessions & Discussion Forums**

[22<sup>nd</sup> EANN / 17<sup>th</sup> AIAI 2021, Open Rooms / NIoVe Discussion Forum](#)

## Conference Events Access

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Access to Plenaries, Keynotes, Thematic Workshops, Special Sessions, Discussion Forums & Invited Workshop Speeches **will be unrestricted and open to everyone.**

Those Sessions are: **1, 5, 6, 7, 9, 10, 14, 18, 22, 23, 24, 29, 30, 31, 36, 41, 45, 46 & 50**

Access to EANN 2021 and AIAI 2021 Technical sessions will be given to **ALL co-authors of ALL accepted papers.** The registration procedure, for each author, has already been made by the staff of EANN and AIAI and access has been already granted to all author's emails.

In order to connect to one of those sessions **please be sure that you are using the email address** that is known to EANN / AIAI 2021 conference organizers. Any other email will be rejected.

Those Sessions are: **2, 3, 4, 8, 11, 12, 13, 15, 16, 17, 19, 20, 21, 25, 26, 27, 28, 32, 33, 34, 35, 37, 38, 39, 40, 42, 43, 44, 47, 48 & 49**

Passwords for teleconference rooms are embedded at room links but in case that you will need it, password for all rooms is **EA2021**

During conference days our [EANN – AIAI 2021 Registration Demo & Support Room](#) will be available from 10:00 a.m. till 18:00 p.m. while at the same time all participants can reach our team through the live chat system that has been already installed at both [www.aiai2021.eu](http://www.aiai2021.eu) & [www.eann2021.eu](http://www.eann2021.eu)

More info can be found under the “**Live Event**” section of the above web sites.