AIESE 2024

Piraeus, Greece, August 27-30, 2024

DETAILED CONFERENCE PROGRAM

15th International Conference on AI-empowered Software Engineering – AIESE 2024 (Formerly Joint Conference on Knowledge-based Software Engineering – JCKBSE), 27-30 August 2024, Piraeus, Greece

ORGANIZED BY THE DEPARTMENT OF INFORMATICS, UNIVERSITY OF PIRAEUS, GREECE

AIESE2024 CHAIRS' MESSAGE

Welcome to the 15th International Conference on Artificial Intelligence-empowered Software Engineering – AIESE2024 (formerly, Joint Conference on Knowledge-based Software Engineering - JCKBSE), 27-30 August 2024, Piraeus, Greece.

This booklet summarizes the works and new research results presented at the **15th International Conference on Artificial Intelligence-empowered Software Engineering (AIESE2024)**. The main objective of the AIESE (formerly JCKBSE) series of biennial conferences is to bring together researchers and practitioners to share ideas on the foundations, techniques, tools, and applications of Artificial Intelligence-empowered Software Engineering theory and practice. AIESE2024 is the 15th Conference in the series, following previous JCKBSE conferences held in Pereslavl-Zalesskii (1994), Sozopol (1996), Smolenice (1998), Brno (2000), Maribor (2002), Protvino (2004), Tallinn (2006), Piraeus (2008), Kaunas (2010), Rhodes (2012), Volgograd (2014), Corfu (2018), Larnaca-virtually (2020), and Larnaca-virtually (2022). AIESE2024 lasts for four days and features regular sessions with technical contributions reviewed and selected by an international program committee, as well as of invited talks given by distinguished keynote speakers, tutorials presented by leading scientists and a roundtable discussion. The official language of the conference is English. AIESE2024 is organized by the Department of Informatics of the University of Piraeus, Greece.

This year, pretty much like every year, the majority of submissions originated from Japan, while Greece was second. The submitted papers were rigorously reviewed by at least two independent reviewers. Finally, 19 papers were accepted for presentation at AIESE2024 and inclusion in its Proceedings. The papers accepted for presentation in AIESE2024 address topics such as the following:

- Architectures for AI-empowered shells
- Architecture of AI-empowered systems, including intelligent agents and softbots
- Development processes for AI-empowered applications
- Internet-based interactive applications
- Software tools assisting the development
- Knowledge acquisition
- Empirical /evaluation studies for AI-empowered applications
- Intelligent user interfaces and human-machine interaction
- Development of user models
- Development of multi-modal interfaces
- Software life cycle of intelligent interactive systems
- Knowledge technologies for semantic web
- Ontologies and patterns in UML modeling
- Knowledge technologies for web services
- Knowledge-based requirements engineering, domain analysis and modeling
- Knowledge engineering for process management and project management
- Methodology and tools for knowledge discovery and data mining
- Automating software design and synthesis
- AI-empowered methods and tools for testing, verification and validation, maintenance and evolution
- Decision support methods for software engineering
- Knowledge management for business processes, workflows and enterprise modeling
- Program understanding, programming knowledge, modeling programs and programmers
- AI-empowered methods and tools for software engineering education
- Software engineering methods for Intelligent Tutoring Systems
- AI-empowered methods for software metrics

In addition to technical paper presenters, in AIESE2024 we have the following distinguished researchers as keynote speakers:

1. **Prof.-Dr. Hironori Washizaki, *Waseda University, Japan***
2. **Prof.-Dr. Stephan Krusche, *Technical University of Munich, Germany***
3. **Prof.-Dr. Vassilios Verykios, *Hellenic Open University, Greece***
4. **Prof.-Dr. Maria Virvou, *University of Piraeus, Greece***
5. **Prof.-Dr. Petros P. Groumpos, *University of Patras, Greece***
6. **Prof.-Dr. Miltiadis Alamaniotis, *University of Texas at San Antonio, USA***

Moreover, in AIESE2024 we have the following researchers as tutorial presenters:

1. **Prof. (Assistant)-Dr. Dionisios N. Sotiropoulos, *University of Piraeus, Greece***
2. **Prof. (Assistant)-Dr. Konstantina Ch. Chrysafiadi, *University of Piraeus, Greece***
3. **Dr. Dimitrios P. Panagoulias, *Dermacen S.A. and University of Piraeus, Greece***

First and foremost, we would like to thank **Prof.-Dr. Shuichiro Yamamoto, *International Professional University of Technology in Nagoya, Japan*** and **Prof.-Dr. Lakhmi C. Jain, *University of Piraeus, Greece and KESInternational, UK*** for acting as **Honorary Chairs of AIESE2024**.

We also would like to thank the authors for choosing AIESE2024 as the forum for presenting the results of their research. Additionally, we would like to thank the reviewers for taking the time to rigorously review the submitted papers. For putting together the website of AIESE2024 and for managing the conference administration system and coordinating AIESE2024, we would like to thank **Easy Conferences Ltd., Nicosia, Cyprus**. Finally, we would like to thank the **Springer personnel** for their wonderful job in producing the AIESE2024 proceedings, which are available via https://link.springer.com/.

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Hironori Washizaki, Waseda University / National Institute of Informatics / SYSTEM INFORMATION / eXmotion

Rihito Yaegashi, Kagawa Univsersity

Takahira Yamaguchi, Kanagawa University

PROGRAM AT A GLANCE

TIME	TUESDAY 27 AUGUST 2024
8:30-9:00	OPENING SESSION
9:00-10:00	KEYNOTE-1
10:00-10:20	*COFFEE BREAK*
10:20-12:00	S-1
12:00-13:00	*LUNCH BREAK*
13:00-14:00	TUTORIAL-1
14:00-15:00	*WELCOME RECEPTION*
TIME	**WEDNESDAY 28 AUGUST 2024**
9:00-10:00	KEYNOTE-2
10:00-10:20	*COFFEE BREAK*
10:20-12:00	S-2
12:00-13:00	*LUNCH BREAK*
13:00-14:00	KEYNOTE-3
14:00-14:20	*COFFEE BREAK*
14:20-15:20	TUTORIAL-2

TIME	THURSDAY 29 AUGUST 2024
9:00-10:00	KEYNOTE-4
10:00-10:20	*COFFEE BREAK*
10:20-12:00	S-3
12:00-13:00	*LUNCH BREAK*
13:00-14:00	KEYNOTE-5
14:00-14:20	*COFFEE BREAK*
14:20-16:00	ROUNDTABLE
19:00-21:00	TOUR AND BANQUET
TIME	FRIDAY 30 AUGUST 2024
9:00-10:00	KEYNOTE-6
10:00-10:20	*COFFEE BREAK*
10:20-12:00	S-4
12:00-13:00	*LUNCH BREAK*
13:00-14:00	TUTORIAL-3
14:00-14:15	CLOSING SESSION

INVITED KEYNOTE SPEAKERS

Tuesday, 27 August 2024, 9:00-10:00

Prof. (Associate)-Dr. Miltiadis Alamaniotis, ***University of Texas at San Antonio, USA***

Title: Preventing a Nuclear September 11th: Solutions, Challenges and Concerns in Utilizing AI-empowered Analysis Software in Sensors

Abstract:

The terrorist attacks of 9/11 led to a redefinition of security architecture and its priorities to prevent such acts. One emerging scenario involves the potential use of nuclear materials for attacks in metropolitan areas, resulting in severe and widespread consequences. Typically, detecting and identifying terrorist activities involve sensors that measure radiation and analyze the data for significant patterns. Recent advancements in Artificial Intelligence across various fields have shown promise in addressing critical challenges in nuclear security. Specifically, AI-empowered software modules embedded in radiation sensors—creating smart sensors—allow for real-time data analysis and decision-making. AI facilitates high-definition, high-speed analysis of diverse data types directly within the sensors, improving the monitoring of nuclear materials' use, storage, and transport. Additionally, the embedded AI software in sensors eliminates the need for human operators to have expertise in nuclear physics and engineering. This talk will explore the AI solutions in data analytics, as well as challenges, and societal and ethical concerns related to using AI-empowered software in sensors to upgrade security measures and prevent a nuclear 9/11 in metropolitan areas.

Short bio:

Dr. Miltos Alamaniotis is Associate professor and the GreenStar Endowed Fellow in Energy in the Department of Electrical and Computer Engineering at the University of Texas at San Antonio (UTSA). Before joining UTSA, he worked as a researcher at Purdue University. He received his BS in Electrical and Computer Engineering from the University of Thessaly, 2005, and MS and PhD in Nuclear Engineering with an emphasis in Applied Artificial Intelligence from Purdue University in 2010 and 2012, respectively. His interdisciplinary research focuses on the development of Artificial Intelligence and machine learning approaches applied to intelligent energy systems, nuclear power systems, and nuclear security to detect hidden radioactive materials. He has published over two hundred (200) research papers in scientific journals, books and proceedings of international conferences. He serves as Associate Editor in the International journal on Artificial Intelligence Tools, Internet of Things (Elsevier), and as Program Chair in IEEE International Tools with Artificial Intelligence 2018 and 2020. He had worked as an external researcher at Argonne National Laboratory

(Illinois, USA) from 2010 to 2012, as visiting researcher in the Energy and Power Systems group at Oak Ridge National Laboratory (Tennessee, USA) in May 2016, and at the Nevada National Security Laboratory (USA). He is the recipient of the Distinguished Alumnus Award of the Department of Electrical and Computer Engineering. University of Thessaly in July 2017, and the Presidential Award for Distinguished Research Achievements at UTSA in 2022. In 2023, the National Academy of Engineering included him in the “top-notch 100 Early Career Engineers in USA” for the 2023 Frontiers-of-Engineering Symposium.

Wednesday, 28 August 2024, 9:00-10:00

Prof.-Dr. Maria Virvou, ***University of Piraeus, Greece***

Title: Balancing Autonomy and Ethics in AI-empowered Software Engineering by Addressing User-Centered Requirements Tension

Abstract:

In Artificial Intelligence and AI-Empowered Software Engineering, the clash between AI autonomy and ethical imperatives creates a significant tension in requirements. This keynote investigates this tension, exploring how user-centred approaches can effectively manage it. By focusing on the delicate balance between user needs, ethical integrity, and AI autonomy, we examine real-world scenarios, such as AI-empowered virtual assistants handling sensitive user data, where conflicts arise between personalising user experiences and safeguarding privacy, as well as ensuring user assistance while maintaining human oversight.

Through theoretical frameworks and practical examples, we investigate the complexities of navigating this requirements tension, impacting both the design and functionality of AI-empowered software. The discussion addresses ethical implications of algorithmic decision-making and user experience considerations of autonomous systems. We present strategies for achieving a balanced approach, including transparent decision-making processes, human-AI synergy, and clear ethical guidelines for AI development and user experience design.

This keynote aims to provide a comprehensive analysis of the relationships between autonomy, ethics, and user needs in AI-empowered software engineering. Emphasising a user-centred approach, we outline a path towards responsible, inclusive, and ethically sound AI-driven software practices.

Short bio:

Professor- Dr. Maria Virvou is the Dean of the School of Information and Communication Technologies at the University of Piraeus, Greece, Director and Founding Member of the Postgraduate M.Sc.Program in Computer Science, and Director of the Research Laboratory “Software Engineering”. She is the Co-Founder and Co-Editor-in-Chief of the Springer book series “Learning and Analytics in Intelligent Systems” and “Artificial Intelligence-Enhanced Software and Systems Engineering”. She obtained a Ph.D. in Computer Science and Artificial Intelligence from the University of Sussex in the United Kingdom (U.K.), funded by the Greek State Scholarships Foundation specialising in “Artificial Intelligence”. She obtained a Master of Science (M.Sc.) in Computer Science from University College

London (UCL), University of London, United Kingdom (U.K.), and her first degree from the Department of Mathematics at the National and Kapodistrian University of Athens, Greece.

In her academic career, Prof.-Dr. Virvou has authored and co-authored over 400 publications in journals, books, and international conferences. She has edited over 40 conference proceedings and books and has served as the Editor-in-Chief of the open access journal SpringerPlus. Her work has earned her numerous awards and recognitions in the field of Computer Science. Prof.- Dr. Virvou's research interests include Software Engineering and Artificial Intelligence, Human-Centred AI, Human-AI Interaction, Educational Software and Games, Personalised Software, User Modelling, User Experience, and Affective Software. Her contributions to these fields have been extensive and widely recognised. She holds top positions in global rankings of scientific performance. Notably, she ranks first worldwide in Scopus for "User Modeling" out of 150,900 publications and first for "Educational Software" according to both Scopus and Microsoft Academic Search. Furthermore, she is ranked among the top scientists in User Interface, Multimedia, and Human-Computer Interaction according to Microsoft Academic Search.

She is also ranked among the top 2% of Artificial Intelligence researchers with the highest worldwide impact according to the international ranking of Stanford University.

Wednesday, 28 August 2024, 13:00-14:00

Prof.-Dr. Vassilios Verykios, *Hellenic Open University, Greece*

Title: Custodians of Privacy: Protecting Data and Information in the Digital Age

Abstract:

This keynote explores the critical balance between maintaining individual privacy and maximizing data utility. It distinguishes between input privacy techniques, such as k-anonymity, l-diversity, and differential privacy, which protect the privacy of individual data entries, and output privacy techniques like frequent itemset hiding and inverse frequent itemset mining, which ensure that the results of data analysis do not disclose sensitive information. Real-world examples and innovative approaches demonstrate how to protect sensitive information while ensuring the data remains useful for analysis, emphasizing the importance of ethical and responsible data handling.

Short bio:

Vassilios Verykios is a Professor at the School of Science and Technology at the Hellenic Open University, specializing in "Data Management." He is included in the top 2% of scientists in the world, based on the Elsevier Publishing Company, and he is listed among the top Greek scientists in the field of Computer Science, according to Research.com.

He graduated in 1992 from the Department of Computer Engineering and Informatics at the University of Patras, and he received his Master's Degree (1997) and Ph.D. (1999) in Computer Science, from Purdue University, Indiana, USA. From 1999 to 2002, he was an Assistant Professor in the Department of Information Systems at Drexel University, Philadelphia, Pennsylvania, USA, and from 2005 to 2010, he was an Assistant Professor in the Department of Electrical and Computer Engineering at the University of Thessaly. From 2010 to 2016, he was an Associate Professor at the School of Science and Technology at the Hellenic Open University, where he is a faculty member to this day, as a full Professor. Read Less

At the Hellenic Open University, he serves as the Director and Coordinator in many different Postgraduate Programs. In one of these programs, DAMA-"Data Science and Machine Learning, he was also involved in the Founding Committee of the program.

He has an extensive administrative experience and, currently, he is the Founder and Director of the Research Laboratory of Big Data Analytics and Anonymization at the HOU and a Member of the Board of Directors of the Computer Technology Institute and Publications "Diophantus".

He has participated in many research projects at:

• the Hellenic Open University,

• the Institute of Educational Policy,

• the Athena Research and Innovation Information Technologies,

• the Computer Technology Institute,

• the Australian Research Council's Discovery Projects,

• etc.

He has published over 250 papers in reputable scientific journals and proceedings of international conferences and workshops, with approximately 11,700 citations according to Google Scholar.

Finally, he has served on the Program Committees of many international conferences for several years, including SIGMOD, VLDB, EDBT, KDD, ICDM, ECML/PKDD, CIKM, IISA, AIAI, etc., and as a reviewer and editor for high-impact journals such as IEEE TKDE, VLDB Journal, KAIS, IDT, and TKDD.

His scientific interests include Big Data Analytics and Anonymization, Data Management, Data Privacy and Security, Big Data, Knowledge Discovery from Data, and Software Systems.

Thursday, 29 August 2024, 9:00-10:00

Prof.-Dr. Hironori Washizaki, *Waseda University, Japan*

Title: Machine Learning Software Engineering based on Multi-view Modeling with Patterns and MLOps

Abstract:

Prof.-Dr. Hironori Washizaki has led the evolution project of the IEEE Computer Society's Guide to the Software Engineering Body of Knowledge (SWEBOK Guide). This talk first provides an overview of the SWEBOK Guide and its latest updates, including a new topic, AI and Software Engineering (SE). Then, as a part of AIeSE2024, the talk presents machine learning (ML) software engineering, with a particular focus on a multi-view modeling framework for ML systems with ML design patterns and ML pipeline integration to address the probabilistic nature of ML and its experimentative development approach. The framework provides an integrated platform between the modeling environment with ML patterns and ML training, performance monitoring, repair pipelines, and security risk management.

Short bio:

Prof.-Dr. Hironori Washizaki is a Professor and the Associate Dean of the Research Promotion Division at Waseda University in Tokyo and a Visiting Professor at the National Institute of Informatics. He also works as an Outside Director of eXmotion. He currently serves as IEEE Computer Society President-Elect and has been elected IEEE Computer Society 2025 President. He has led software engineering research and ICT professional and educational activities, including developing the IEEE-CS's Guide to the Software Engineering Body of Knowledge (SWEBOK Guide). He has led many academia-industry joint research and large-funded projects in software design, reuse, traceability, quality assurance, and machine learning engineering. Recent achievements include IoT design patterns and machine learning design patterns. He leads a professional IoT/AI/DX education project called SmartSE (http://www.washi.cs.waseda.ac.jp/).

Thursday, 29 August 2024, 13:00-14:00

Prof.-Dr. Stephan Krusche, ***Technical University of Munich, Germany***

Title: Artemis: Interactive Learning with Generative AI

Abstract:

In large university courses, students face challenges in mastering programming skills, which underlines the need for effective pedagogical support. The Artemis learning platform has been providing interactive learning through automated, individual feedback since 2016. It also offers fully personalized support with detailed explanations based on generative AI. The general availability of large language models enabled the creation of IRIS, a virtual assistant designed to offer context-sensitive support. Deployed as part of Artemis, IRIS is accessible to thousands of students. This presentation highlights the challenges of developing AI assistance in education and motivates ongoing research focused on analyzing student behavior and evaluating the impact on their learning experience.

Short bio:

Stephan Krusche inspires students in computer science. He conducts research at the intersection of educational technologies, software engineering, and human computer interaction, and explores robotics and machine learning. Stephan developed the open-source learning and research platform Artemis, which is used in many courses at different universities to enhance the learning experience. With the help of automation and artificial intelligence, it reduces the workload for lecturers and creates free space for personal interactions.

In his dissertation, Stephan developed the process model Rugby, which improves quality in software development and teaching. He established the teaching methodology Interactive Learning, which is applied at several European universities. He is involved in the EdTech Center and organizes international summer schools, interactive lectures with 2,000 students and large project-based courses with industry partners.

Friday, 30 August 2024, 9:00-10:00

Prof. (Emeritus)-Dr. Petros Groumpos, ***University of Patras, Greece***

Title: Artificial Intelligence or Cybernetics? Why Not Cybernetic Artificial Intelligence (CAI)

Abstract:

In a world where technology is constantly evolving, it can be difficult to keep up with the latest trends. In particular, there are two terms that are often used interchangeably but have very different meanings: artificial intelligence (AI) and Cybernetics. Though they share some similarities, AI and Cybernetics are quite different. In this plenary paper, this challenging difference is considered and carefully analyzed.

AI is the result of applying computer science techniques to artificially create something that performs tasks that only humans can perform, like reasoning, natural communication, and problem-solving. There are two types of AI: general AI (AGI) and narrow AI (ANI). AGI is where machines have human-like intelligence, while ANI is where machines are good at one specific task. The history of AI started with a dream to build intelligent machines, dating back to the ancient Greeks. A Dartmouth summer conference in 1956 brought the field of AI into existence. In this conference three names were given for the field of "thinking machines" 1) cybernetics 2) automata theory and 3) complex information processes. All three were scientifically developed, analyzed, and defined long before AI as we know it today was officially started in 1956 at Dartmouth College. Of the three names, the one that had been well-known and investigated, at that time, is cybernetics. Artificial Intelligence (AI) is one of the most important and misunderstood sciences of today. Much of this misunderstanding is caused by a failure to recognize its immediate predecessor – Cybernetics. Both AI and Cybernetics are based on binary logic and rely on the same principle for the results they produce. The 1956 Dartmouth Workshop was organized by Marvin Minsky, John McCarthy, and two senior scientists: Claude Shannon and Nathan Rochester of IBM. McCarthy persuaded the attendees to accept "Artificial Intelligence" as the name of the new field. The 1956 Dartmouth conference was the moment that AI gained its name, its mission, its first success, and its major players, and is widely considered the birth of AI. The term "Artificial Intelligence" was chosen by McCarthy to avoid associations with Cybernetics and connections with the influential cyberneticist Norbert Wiener, the father of Cybernetics.

Cybernetics is the interdisciplinary study of the structure of regulatory systems. Cybernetics is concerned with various kinds of feedback, compliance, and control mechanisms in living organisms, machines, and organizations. Broadly speaking, cybernetics studies how information processing and control systems work. Cyberneticists investigate topics such as how goals are represented and achieved, how systems process information and make decisions, how they learn and adapt, and how

they cope with uncertainty. Cybernetics looks for the causes creating new knowledge and activities and do not depend mainly on correlation and statistics. The field of cybernetics till 10-15 years ago has had a profound impact on a wide range of disciplines, including engineering, biology, health, environment, psychology, economics, and sociology.

In recent decades, Cybernetics has often been overshadowed by Artificial Intelligence, even though Artificial Intelligence was influenced by Cybernetics in many ways. Recently, Cybernetics has been returning to the public conscience and is once more being used in multiple fields. It must be emphasized that Cybernetics is an interdisciplinary science that focuses on how a system processes information, responds to it and changes, develops control actions, or restructure the whole system for better functioning. It is a general theory of information processing, feedback control, and decision making. Today's interpretation of the term "Cybernetics" as it was pioneered by Norbert Wiener in 1948 as "the scientific study of control and communication in the animal and the machine" is more relevant to our today's problems and challenges than ever before. Cybernetics, for many years, has been the science of human-machine interaction that studies and uses the principles of systems control, feedback, identification, and communication. Recently, Cybernetics has also been redefined. It has shifted its attention more to the study of regulatory systems that are mechanical, electrical, medical, biological, physical, or cognitive in nature. It studies mainly the concepts of control and communication in living organisms, machines and organizations including self-organization. The question is: Does AI accept the same principles of Cybernetics, and how does it proceed to solve the challenging problems of society? I am afraid to say that although AI is close to Cybernetics, it still fails to provide realistic and viable solutions to the world's problems. Recently, scientists and mathematicians have begun to think in innovative ways to make machines smarter and approach human intelligence. AI and Cybernetics are perfect examples of this human-machine merger. Binary logic is the main principle in both fields. Both terms are often used interchangeably, but this can cause confusion when studying them. They are slightly different; AI is based on the view that machines can act and behave like humans, while Cybernetics is based on a cognitive view of the world. Further studies on this scientific aspect between AI and Cybernetics will clarify several scientific differences between them. A more appropriate term for modeling and controlling dynamical complex systems should be Cybernetic Artificial Intelligence (CAI). Such a new scientific field would successfully combine human intelligence (Cybernetics) with "machines" (AI) in a relatively meaningful and healthy merger.

In this plenary paper, a mathematical formulation and an algorithm in implementing the new proposed scientific field of CAI will be provided. Some real-life examples of CAI will be given and future research directions for CAI will also be provided.

Short bio:

Prof. Peter P. Groumpos is an emeritus professor since 2017 at the department of Electrical and Computer Engineering of the University of Patras. He was born in Greece in1950 at the small town of Xylocastron, Corinthia. At the age of 18 years old, he went to USA with the primary goal to do his university studies. He did his undergraduate and graduate studies at the Department of Electrical and Computer Engineering at the SUNYAB. He received his Ph.D. in 1978. He joined as an Assistant Professor, Cleveland State University, Ohio in 1980 and he was promoted to Associate professor in 1985. In 1990, he returned to his motherland Greece, been elected as a full Professor at the Department of Electrical and Computer Engineering of the University of Patras. In 1992 he established the Laboratory for Automation and Robotics to which has been its director till he retired in 2017. A Fulbright Scholar award by the State Department of USA 1986-87. Chairman of the Dept. of Electrical and Computer Engineering, University of Patras (1999-2003). Academic Honorary Member of the Russian Academic Council of Mechatronics and Robotics 2002-2011 and Honorary Invited Professor of the University of Science and Technology of the Eastern China of Shanghai 2013-2017. President

& CEO, Patras Science Park, Patras, Greece (2004–2010). The Greek National representative to high positions: a) at European Management Committees (ESPRIT, ICT, IMS, INCO). Included in b) Who's Who in Frontiers of Science and Technology and Men of Achievement, c) General Chairman of IFAC Conferences, LSS '98 and MIM 2000, and of the IEEE Conferences, ISIC 2000 and MED 1994, 2000 and 2016 d) Chairman of the TC 9.5 of Large-Scale Systems of IFAC (1996-2001), e) Co-Chairman of the Creativity in Intelligent Technologies and Data Science Conferences, CIT&DS 2017, 2018, 2019 and 2021, Volgograd, Russia.

He has taught in the 40 years of his professional life undergraduate and graduate courses in the thematic areas of automatic control, stochastic processes, intelligent control, Fuzzy systems, Robotics, modeling Complex Dynamic Systems and Bioinformatics. His research interests cover the broad thematic areas of modeling and control of large Complex Dynamic Systems, Intelligent control, Artificial Intelligence (AI), fuzzy systems, Fuzzy Cognitive Maps, Hybrid Energy Systems (HES), Intelligent Manufacturing systems, Renewables, Decision Support Systems (DSS), Knowledge Management, Creative software Computing, Simulation Methods, Technology Transfer, and Innovation Systems.

He has conducted funded research using advanced new intelligent and fuzzy techniques in many applications especially in Health, Business and Economics, Energy, Environment, Manufacturing, Agriculture and Transportation. He has been the principal investigator and/or participated as a partner in many R&D projects been funded by the EC, the Greek Government and/or the private sector. He has published four (4) books, edited seven (9) books, 17 invited chapters in books, over 350 papers in journals and/or in international conferences, and over 50 Technical Reports. He has an h-index of 42 and more than 7800 citations. For four consecutive years, 2019, 2020, 2021 and 2022, he has been ranked internationally among the world's top scientists in Artificial Intelligence, ranking him in the top 2% of the most influential scientists, according to the published lists and the Stanford University study "Updated science-wide author databases of standardized citation indicators".

Prof. Groumpos has been a reviewer for several International Journals and for many International Conferences. Has organized more than 20 invited special sessions on Conferences and has been Keynote Plenary Invited Speaker in more than 30 International conferences.

TUTORIALS

Tuesday, 27 August 2024, 13:00-14:00

Prof. (Assistant)-Dr. Konstantina Ch. Chrysafiadi, ***University of Piraeus, Greece***

Title: Incorporating Fuzzy Logic in Intelligent Software Systems

Abstract:

Artificial Intelligence-empowered software systems are continually evolving, with fuzzy logic frequently serving as a fundamental enabling technology. This tutorial aims at providing a comprehensive understanding of how fuzzy logic can enhance the capabilities of intelligent systems, enabling them to handle uncertainty, imprecision, and approximate reasoning more effectively. We will explore the foundational concepts of fuzzy logic, including fuzzy sets, membership functions, linguistic variables and fuzzy inference systems. Also, we will discuss other Artificial Intelligence techniques which are often combined with fuzzy logic. Emphasis will be placed on the advantages of fuzzy logic in improving system adaptability, robustness, and human-like reasoning. Furthermore, through practical applications and case studies, attendees will have the opportunity to delve into the implementation of fuzzy logic into various software systems, enhancing their intelligence and performance.

Short bio:

Dr. Konstantina Chrysafiadi is currently an Assistant Professor in the Department of Informatics of the University of Piraeus, Greece. Previously, she worked as Laboratory Teaching Staff in the same Department for 6 years. She received her postdoctoral and Ph.D. in Computer Science from the Department of Informatics of the University of Piraeus, a M.Sc. degree in Information Systems from the Athens University of Economics and Business, and an B.Sc. in Computer Science from the Department of Informatics of the University of Piraeus. She teaches courses in both undergraduate and graduate degree programs of study. She has also supervised the graduation theses of many undergraduate and graduate students. She is the author/co-author of two monographs published by Springer, several chapters in books, as well as a significant number of articles published in international peer-reviewed journals and papers presented at international conferences. She received the “Best Paper Award” at the 11th International Conference on Information, Intelligence, Systems and Applications (IISA 2020). Her research interests include Artificial Intelligence, Fuzzy Logic–based systems, Knowledge-based systems, Adaptive Systems, User Modeling and Distance Learning.

Wednesday, 28 August 2024, 14:20-15:20

Prof. (Assistant)-Dr. Dionisios N. Sotiropoulos, ***University of Piraeus, Greece***

Title: Navigating the Nexus: Leveraging Deep Learning for Social Network Analysis

Abstract:

In this tutorial, we explore the sophisticated realm where deep learning meets social network analysis, highlighting how state-of-the-art algorithms such as Long Short-Term Memory networks (LSTMs), Transformers, BERT, Graph Neural Networks, and Convolutional Neural Networks are transforming our understanding of complex online social structures. As digital platforms burgeon with vast amounts of textual and relational data, developing robust analytical tools to parse and understand this information is increasingly vital. This session will delve into the application of these advanced deep learning models to dissect both the structural frameworks and the rich text content of online social networks, shedding light on user behavior, community dynamics, and emerging trends. Through practical demonstrations and case studies, participants will gain firsthand experience in applying these technologies to real-world challenges, thereby enhancing their analytical capabilities and opening up new avenues for research and discovery in digital social interactions.

Short bio:

Dr. Dionisios N. Sotiropoulos is currently an Assistant Professor (tenured) in the Department of Informatics of the University of Piraeus, Greece. He received his PhD. in Computer Science from the Department of Informatics at the University of Piraeus, Greece in 2011 as well as a B.Sc. in Informatics in 2003. He has worked as a post-doctoral researcher in the Department of Management Science and Technology at Athens University of Economics and Business, as a member of the SocioMine group. He has also been a visiting researcher at Norwich Business School, University of East Anglia. His primary research interests are in the areas of machine learning, data mining, evolutionary computing and signal processing, and applications in user modeling, information retrieval and intelligent software systems. His interest in Digital Social Media focuses on the development of bio-inspired machine learning algorithms for data mining purposes within the context of digital social networks.

Friday, 30 August 2024, 13:00-14:00

Dr. Dimitrios P. Panagoulias, ***Dermacen S.A. and University of Piraeus, Greece***

Title: Evaluating Multimodal Large Language Models: Benchmarks, Methods, and Analytical Approaches

Abstract:

Large language models (LLMs) constitute a breakthrough in state-of-the-art Artificial Intelligence technology, which is rapidly evolving and being utilized in various domains. Applications augmented by LLMs can generate and edit images, create text based on specific prompts or assigned tasks, and extract and discuss features of images. However, given the vast amount of training data used to engineer and fine-tune these models, the output can often be misleading and baseless, a process known as *hallucination*. In this tutorial, the architecture of these models will be analyzed comprehensively. Evaluation paradigms and analytical tools for measuring the performance and domain-specific capacity of LLMs will be presented via a series of use cases, utilizing and showcasing tools for Image-Metadata-Analysis, Named-Entity-Recognition, Knowledge-Graphs, and Multi-Genre Natural Language Inference.

Short bio:

Dimitrios P. Panagoulias holds a B.SC. in Business Administration from the Athens University of Economics and Business, Greece, and a M.B.A., a M.Sc. in Computer Science and a Ph.D. in Artificial Intelligence-empowered Biomedical Applications, from the University of Piraeus, Greece. He has authored or co-authored numerous publications in international journals, book chapters, and conference proceedings. Since 2011, he has been at the helm of Dermacen S.A., a secondary healthcare provider in Greece specializing in dermatology, venereology, and plastic surgery. In 2018, he established Disk Inside I.T. Development and Consulting Ltd in the U.K., a company focusing on developing CRM and ERP software and LLM agents, mainly for the medical sector, and providing consultation related to digital transformation and branding. His research focuses on machine learning and pattern recognition, the development of AI-infused systems and APIs using iterative or agile development methodologies, and functional and object-oriented programming with .NET, Python, and JavaScript.

ROUNDTABLE

Thursday, 29 August 2024, 14:20-16:00

Chairs: George A. Tsihrintzis and Maria Virvou, ***University of Piraeus, Greece***

Title: Artificial Intelligence-empowered Autonomous Software – Moral Dilemmas, Ethics, Regulations, Opportunities, Challenges, and Requirements

Abstract:

Artificial Intelligence has been a field of very active and intense research worldwide. The whole field of Artificial Intelligence has recently been revisited to provide critical functionality and significant enhancements in many disciplines, including reasoning, decision making, recommendation, personalization, deep learning, machine learning data mining big data, smartphones, Internet of Things, social robots and in a vast range of application areas in all sorts of human activities and professions. As such, Artificial Intelligence (AI) has accelerated innovation across various fields, profoundly impacting daily lives.

AI-empowered Autonomous Software Engineering incorporates paradigms such as Expert Systems, Machine Learning (including Deep Learning), Artificial Immune Systems, Swarm Intelligence, Fuzzy Logic, and Genetic Algorithms. These advancements promise transformative impacts on science, technology, and society, yet they also present intricate ethical and regulatory challenges.

This interdisciplinary panel consisting of expert researchers representing societal and scientific stakeholders is aimed to highlight and discuss the ethical dilemmas inherent in AI-powered autonomy from different societal and scientific points of view. It addresses biases in decision-making, accountability, and societal implications across diverse domains, fostering dialogue among AI empowered software engineering researchers, experts from application domains, and legal scholars.

The panel evaluates existing regulatory frameworks, identifying gaps in AI governance and emerging trends, emphasizing the need for rapid consensus on critical ethical and moral issues. Technical requirements are examined to ensure transparency, fairness, and human oversight in AI systems, aiming to guide future developments responsibly.

By synthesizing perspectives across disciplines, this panel offers insights into navigating the evolving landscape of AI ethics and regulations. It underscores the collaborative efforts required to shape policies and practices for AI-empowered autonomous software, recognizing its profound and rapid impact on society.

The challenges posed by AI ethics are merged with the technical requirements for ensuring transparency, fairness, and human oversight in autonomous systems. By synthesizing current research and policy perspectives, this panel seeks to contribute to a holistic view of the emerging needs of AI ethics and regulations in several domains, offering insights for future development and governance of AI-empowered autonomous software.

Participants (in alphabetical order):

- **Prof.-Dr. Miltos Alamaniotis**, Department of Electrical and Computer Engineering, University of Texas-San Antonio, USA

- **Prof.-Dr. Fotini Asderaki**, Department of International and European Studies, University of Piraeus, Greece

- **Prof.-Dr. Peter P. Groumpos**, Department of Electrical and Computer Engineering, University of Patras, Greece

- **Prof.-Dr. Stephan Krusche**, School of Computation, Information, and Technology, Technical University of Munich, Germany

- **Prof.-Dr. Aggelos Pantouvakis**, Department of Maritime Studies, University of Piraeus, Greece

- **Prof.-Dr. Vassilios Verykios**, School of Science and Technology, Hellenic Open University, Greece

- **Prof.-Dr. Hinorori Washizaki**, Faculty of Science and Engineering, Waseda University, Japan

- **Ph.D. Research Fellow Konstantinos Deligiannis-Virvos**, Norwegian Centre for the Law of the Sea, Law Faculty, UiT - The Arctic University of Norway, Norway

- **Ph.D. Research Fellow Julie Slyngstad**, Law Faculty, UiT - The Arctic University of Norway, Norway

DETAILED TECHNICAL PAPER PRESENTATION SCHEDULE

TUESDAY, AUGUST 27

8:30 - 9:00	**Opening Session:** M. Virvou, G.A. Tsihrintzis and T. Yoshinori
9:00 - 10:00 Session Chair: Evangelos Sakkopoulos	**Keynote – 1: Miltiadis Alamaniotis, Preventing a Nuclear September 11th: Solutions, Challenges and Concerns in Utilizing AI-empowered Analysis Software in Sensors**
10:00-10:20	**Coffee Break**
10:20 - 12:00 Session Chair: Efthimios Alepis	**S-1: INTELLIGENCE AND SOFTWARE GAMES** ❖ ***10:20-10:40*** **Toward the Formation of Common Understanding of Arts and Mental Health: Questionnaire-based Analysis of Perception on Arts, Sports, and Therapy** *Michi Komura, Akihiro Hayashi, Midori Ishihara, Hajime Kaneko* ❖ ***10:40-11:00*** **Comparison of Decision-making Technologies and Basic Concepts of Natural Decision Intelligence** *Tomoko Kaneko* ❖ ***11:00-11:20*** **Remote Play System For Adaptive Sports Players with Severe Physical Disabilities** *Fumihiro Kumeno* ❖ ***11:20-11:40*** **Tutorial System Displaying on Other Device Following Video Game Progress** *Hajime Iwata, Yuta Sukegawa, Junko Shirogane, Yoshiaki Fukazawa* ❖ ***11:40-12:00*** **User Experience in Serious Games: Adaptivity in the Plot and Environment of the Game** *Konstantina Chrysafiadi, Spyros Papadimitriou, Margaritis Kamitsios, Maria Virvou*
12:00 – 13:00	**Lunch Break**
13:00 - 14:00 Presenter: Konstantina Chrysafiadi	**Tutorial-1: Incorporating Fuzzy Logic in Intelligent Software Systems**

WEDNESDAY, AUGUST 28

9:00 - 10:00	**Keynote – 2: Maria Virvou, Balancing Autonomy and Ethics in AI-Empowered Software Engineering by Addressing User-Centered Requirements Tension**
Session Chair: Tanabe Yoshinori	
10:00 - 10:20	**Coffee Break**
10:20 – 12:00	**S-2: SOFTWARE DEVELOPMENT METHODOLOGIES**
Session Chair: Takako Nakatani	❖ ***10:20-10:40*** **Architecture Design for Enterprise Real-time Systems** *Shuichiro Yamamoto* ❖ ***10:40-11:00*** **Proposal of a Method for Improving the Consistency between SRS and StRS based on Backward Traces** *Momoe Kobayashi, Takako Nakatani* ❖ ***11:00-11:20*** **Project Practice-Based Anti-Patterns for Machine Learning Projects** *Hironori Takeuchi, Haruhiko Kaiya, Hiroyuki Nakagawa, Shinpei Ogata* ❖ ***11:20-11:40*** **A Support Method to Develop Interactive Applications of Novel Devices by Using Network Analysis Approach** *Hidenao Abe* ❖ ***11:40-12:00*** **A Simple Negative Benchmark Generation for Safety Checking** *Tsutomu Kumazawa, Munehiro Takimoto, Yasushi Kodama, Yasushi Kambayashi*
12:00 – 13:00	**Lunch Break**
13:00 - 14:00	**Keynote – 3: Vassilios Verykios, Custodians of Privacy: Protecting Data and Information in the Digital Age**
Session Chair: Efthimios Alepis	
14:00 – 14:20	**Coffee Break**
14:20 - 15:20	**Tutorial-2: Navigating the Nexus: Leveraging Deep Learning for Social Network Analysis**
Presenter: Dionisios Sotiropoulos	

THURSDAY, AUGUST 29

9:00 - 10:00	**Keynote – 4: Hironori Washizaki, Machine Learning Software Engineering based on Multi-view Modeling with Patterns and MLOps**
Session Chair: George A. Tsihrintzis	
10:00 - 10:20	**Coffee Break**
10:20 – 12:00	**S-3: AI-EMPOWERED APPPLICATIONS**
Session Chair: Konstantina Chrysafiadi	❖ ***10:20-10:40*** **Role of University in Dual-Use AI Technology - DARPA Model and Alike -** *Haruki Ueno* ❖ ***10:40-11:00*** **Semi-Decentralized File Storage with User-Hosted Nodes** *Vasileios Argyropoulos, Efthimios Alepis, Maria Virvou* ❖ ***11:00-11:20*** **A Proposed Architecture for an Intelligent Cooking Fire Prevention System Incorporating IoT and Fuzzy Logic** *Konstantina Chrysafiadi, Evangelia-Aikaterini Tsichrintzi* ❖ ***11:20-11:40*** **Enhancing Soft Skills Alongside Hard Skills for Programming and Software Engineering through an Intelligent Educational Adventure Game** *Spyros Papadimitriou, Maria Virvou*
12:00 – 13:00	**Lunch Break**
13:00 - 14:00	**Keynote – 5: Stephan Krusche, Artemis: Interactive Learning with Generative AI**
Session Chair: Maria Virvou	
14:00 – 14:20	**Coffee Break**
14:20 - 16:00	**ROUNDTABLE: Artificial Intelligence-empowered Autonomous Software - Moral Dilemmas, Ethics, Regulations, Opportunities, Challenges, and Requirements**
Chairs: Maria Virvou and George A. Tsihrinzis	
19:00 – 22:00	**Tour and Gala Dinner**

FRIDAY, AUGUST 30

9:00 - 10:00	**Keynote – 6: Petros Groumpos, Artificial Intelligence or Cybernetics? Why Not Cybernetic Artificial Intelligence (CAI)**
Session Chair: Shuichiro Yamamoto	
10:00-10:20	**Coffee Break**
10:20 - 12:00	**S-4: LLMs AND AI-EMPOWERED METHODS**
Session Chair: Maria Virvou	❖ ***10:20-10:40*** **AI-empowered Approaches to Border Sanitization in Frequent Itemset Mining** *Vassilios S. Verykios, Elias Stavropoulos, Evgenia Paxinou, Georgios Feretzakis* ❖ ***10:40-11:00*** **Evaluating Stakeholder Decision-Making Trust and Efficiency in AI-Empowered Energy Software: A VIRTSI Model Approach within an Agile Process** *George Tsihrintzis, Elissaios Sarmas, Vangelis Marinakis, Dimitrios Panagoulias, Evangelia-Aikaterini Tsichrintzi, Maria Virvou, Haris Doukas* ❖ ***11:00-11:20*** **Using ChatGPT in Requirements Engineering Processes: Preliminary Report** *Motoshi Saeki* ❖ ***11:20-11:40*** **Graph Theory-Based Value Estimation of Artificial Intelligence Interventions: the Case of the Patient Journey** *Dimitrios Panagoulias, Maria Virvou, George Tsihrintzis* ❖ ***11:40-12:00*** **The potential of LLM-generated reports in DevSecOps** *Nikolaos Lykousas*
12:00 – 13:00	**Lunch Break**
13:00 - 14:00	**Tutorial-3: Evaluating Multimodal Large Language Models: Benchmarks, Methods, and Analytical Approaches**
Presenter: Dimitrios P. Panagoulias	
14:00 - 14:15	**Closing session**
Chairs: Maria Virvou, George A. Tsihrintzis and Tanabe Yoshinori	

Thank you for your participation in AIESE2024!

We hope to see you again in one of the future conferences in the AIESE (formerly JCKBSE) Series

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