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SEPTEMBER 08-10, 2023

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About IESAIRT2023

We are pleased to invite all researchers, young scholars, delegates, experts and students from all over the world to attend the International Experts Summit on Artificial Intelligence and Robotic Technology (IESAIRT2023) will be held in Tokyo, Japan, during September 07-09, 2023.

IESAIRT2023 provides a platform of international standards where you can discuss and share knowledge on Artificial Intelligence and Robotic Technology to bring a unique forum for exchanging the information regarding the latest developments, finding solutions and enriching the knowledge. In addition to Presentations, Workshops, and Discussions, the conference also offers a unique venue for renewing professional relationships, and providing plenty of networking opportunities during the summit.

We're looking forward to Meghaz meetings with researchers from different countries around the globe for sharing innovative and great results in Artificial Intelligence and Robotic Technology.

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Abstracts Plenary

Sparse Possibilistic C-Means Clustering with Lasso

Miin-Shen Yang[a], and Josephine B.M. Benjamin[b]

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bDepartment of Mathematics, University of Santo Tomas, Manila, Philippines

Abstract
Krishnapuram and Keller first proposed possibilistic c-means (PCM) clustering in 1993. Afterward, PCM was widely studied with various extensions. The PCM algorithm and its extensions always treat feature components under equal importance, but, in real applications, different features may better have different weights. Recently, Yang and Benjamin in 2021 proposed a feature-weighted PCM clustering with feature reduction. Although Yang and Benjamin (2021) can reduce feature dimensions, it still encounters the curse of dimensionality for high dimensional data. One possible way to address this problem is to conduct a sparse clustering technique. In this paper, we further study the PCM clustering by incorporating the idea of sparsity with different feature weights. We propose two approaches that use the PCM clustering with the least absolute shrinkage and selection operator (Lasso). The first one is the sparse PCM subject to a Lasso constraint of feature weights, called S-PCM1. The second is the sparse PCM by adding a Lasso penalty term of feature weights in the objective function, called S-PCM2. We show that S-PCM1 and S-PCM2 are theoretically the same, and both can induce sparsity in features, but they use different procedures in algorithms. Synthetic and real data sets are used to compare S-PCM1 and S-PCM2 with some existing sparsity clustering algorithms. Experimental results and comparisons demonstrate the effectiveness and usefulness of the proposed S-PCM1 and S-PCM2 clustering algorithms.

Keywords
Clustering; Possibilistic C-Means (PCM), Feature Weights, Sparsity, Lasso, Spare PCM (S-PCM)

Biography
Miin-Shen Yang received the B.S. degree in mathematics from Chung Yuan Christian University, Taoyuan, Taiwan, in 1977, the M.S. degree in applied mathematics from National Chiao-Tung University, Hsinchu, Taiwan, in 1980, and the Ph.D. degree in statistics from the University of South Carolina, Columbia, USA, in 1989. In 1989, he joined the faculty of the Department of Mathematics, Chung Yuan Christian University (CYCU), as an Associate Professor, where he has been a Professor, since 1994. From 1997 to 1998, he was a Visiting Professor with the Department of Industrial Engineering, University of Washington, Seattle, USA. Since 2012, he has been a Distinguished Professor, and now a life Distinguished Professor of the Department of Applied Mathematics, CYCU. He was the Chairman of the Department of Applied Mathematics, the Director of Chaplain's Office, and the Dean of the College of Science, CYCU. His research interests include applications of statistics, fuzzy clustering, soft computing, pattern recognition, and machine learning. He was an Associate Editor of the IEEE Transactions on Fuzzy Systems from 2005 to 2011, and is an Editorial Board Member of Computer Science and Engineering section in the journal Electronics (MDPI). According to Stanford University and Scopus, he is among the World's top 2% scientists as career-long impact and also single year impact of 2020 in Artificial Intelligence & Image Processing.

Biomimetic Human Simulation with Neuro-Musculoskeletal and Neuro-Visuomotor Control

Demetri Terzopoulos

University of California, USA

Abstract
Realistic computer simulation of the human body — not just the bones, joints, and muscles, but also the sensory organs and, of course, the brain — is a grand challenge in robotic science and the quest for artificial intelligence/life. In this context, I will present our advances in biomimetic human simulation and sensorimotor control. Our framework features an unprecedentedly detailed biomechanical human musculoskeletal model actuated by more than 800 muscles, with functional eyes whose retinas have numerous nonuniformly-distributed photoreceptors. This bio-inspired perceptual apparatus feeds the sensorimotor center of our virtual human's brain, which currently incorporates two dozen (deep) neural networks, organized as a neurovisual sensory subsystem that drives a neuromuscular motor subsystem. Synthesizing its own motor and visual training data, our autonomous virtual human learns efficient and robust active visuomotor control of its eyes, head, torso, and limbs to perform a variety of nontrivial sensorimotor tasks never previously achieved in realistic biomechanical human simulations or anthropomimetic robotics.

Keywords
AI; Virtual Humanoid Robotics; Body and Brain Modeling; Deep Learning

Biography
Demetri Terzopoulos is a Chancellor's Professor of Computer Science at the University of California, Los Angeles, where he holds the rank of Distinguished Professor and directs the UCLA Computer Graphics & Vision Laboratory. He is also Co-Founder and Chief Scientist of VoxelCloud, Inc., a multinational healthcare AI company. He received his PhD degree ('84) in Artificial Intelligence from the Massachusetts Institute of Technology (MIT). He is or was a Guggenheim Fellow, a Fellow of the ACM, a Life Fellow of the IEEE, a Distinguished Fellow of the IETI, a Fellow of the Royal Society of London and the Royal Society of Canada, a Member of the European Academy of Sciences and the New York Academy of Sciences, and a Life Member of Sigma Xi. His many awards include an Academy Award for Technical Achievement from the Academy of Motion Picture Arts and Sciences for his pioneering work on physics-based computer animation, as well as the IEEE's Computer Pioneer Award, Helmholtz Prize, and inaugural Computer Vision Distinguished Researcher Award. His published work includes more than 400 research papers and several volumes, primarily in computer graphics, computer vision, medical imaging, computer-aided design, and artificial intelligence/life. He has given more than 500 invited talks worldwide about his research, including well over 100 distinguished lectures and keynote/plenary addresses.

The Third Millennium Computing & Its Social Impact

Eduard Babulak
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Abstract

Given the current dynamic developments in the field of Semiconductors, Very Large-scale Integration, New Materials, AI, Smart Medicine, and Humanoid Robotics, with the ubiquitous access to high-speed Internet 24/7, the Ultra-smart Cyberspace is becoming reality. The Smart Computational Systems are collecting, processing and analyzing a real-time medical data utilizing the Electronic Health Record (EHR) to fast treatment, prevention and healing of the wave of new viruses and diseases and ultimately safe human lives.

The areas of research in the field of Microelectronics, Computing and AI & Humanoid Robotics create a new platform for future e-Health utilizing new biomechanical humanoid devices. In light of currently ongoing developments of Covid-19 crisis, having effective real-time application of Ultra-smart Cyberspace, with applied AI & Robotics and Big Data will support critical live saving surgeries in Next generation tele-Medicine.

Due to Covid-19, the humanity lives in the most dramatic times, yet despite of its most negative impact it does also inspire dynamic innovation, research and developments in the world of health, business, government, industry, plus., while promoting seamless creation of multidisciplinary teams of experts in the nation and worldwide.

The author discuss the current and future dynamic trends in research, innovation and developments of Electronics, Semiconductor & VLSI, New Materials, AI, Smart Health, and cutting-edge Humanoid Robotics that would provide support to save lives and to make best real-time decisions worldwide.

Keywords
Microelectronics; Semiconductors; VLSI; New Materials; Smart Cyberspace; Humanoid Robotics; Smart Heath; AI

Biography
Professor Dr. Eduard Babulak is accomplished international scholar, researcher, consultant, educator, professional engineer and polyglot, with more than thirty years of experience. He served as successfully published and his research was cited by scholars all over the world. He serves as Chair of the IEEE Vancouver Ethics, Professional and Conference Committee. He was Invited Speaker at the University of Cambridge, MIT, Purdue Speaker Photo University, Yokohama National University and University of Electro Communications in Tokyo, Japan, Shanghai Jiao Tong University, Sungkyunkwan University in Korea, Penn State in USA, Czech Technical University in Prague, University at West Indies, Graz University of Technology, Austria, and other prestigious academic institutions worldwide. His academic and engineering work was recognized internationally by the Engineering Council in UK, the European Federation of Engineers and credited by the Ontario Society of Professional Engineers and APEG in British Columbia in Canada. He was awarded higher postdoctoral degree DOCENT – Doctor of Science (D.Sc.) in the Czech Republic, Ph.D., M.Sc., and High National Certificate (HNC) diplomas in the United Kingdom, as well as, the M.Sc., and B.Sc. diplomas in Electrical Engineering Slovakia. He serves as the Editor-in-Chief, Associate Editor-in-Chief, Co- Editor, and Guest-Editor. He speaks 16 languages and his biography was cited in the Cambridge Blue Book, Cambridge Index of Biographies, Stanford Who's Who, and number of issues of Who's Who in the World and America.

E-CARGO and Role-Based Collaboration

Haibin Zhu, PhD,
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Abstract
Role-Based Collaboration (RBC) is a computational methodology that uses roles as the primary underlying mechanism to facilitate collaboration activities. It consists of a set of concepts, principles, models, processes, and algorithms. RBC and its Environments - Classes, Agents, Roles, Groups, and Objects (E-CARGO) model have been developed to a powerful tool for investigating collaboration and complex systems. Related research has brought and will bring in exciting improvements to the development, evaluation, and management of systems including collaboration, services, clouds, productions, and administration systems. RBC and E-CARGO grow gradually into a strong fundamental methodology and model for exploring solutions to problems of complex systems including Collective Intelligence, Sensor Networking, Scheduling, Smart Cities, Internet of Things, Cyber-Physical Systems, and Social Simulation Systems. E-CARGO assists scientists and engineering to formalize abstract problems, which originally are taken as complex problems, and finally points out solutions to such problems including programming. The E-CARGO model possesses all the preferred properties of a computational model. It has been verified by formalizing and solving significant problems in collaboration and complex systems, e.g., Group Role Assignment (GRA). With the help of E-CARGO, the methodology of RBC can be applied to solve various real-world problems. E-CARGO itself can be extended to formalize abstract problems as innovative investigations in research. On the other hand, the details of each E-CARGO component are still open for renovations for specific fields to make the model easily applied. For example, in programming, we need to specify the primitive elements for each component of E-CARGO. When these primitive elements are well-specified, a new type of modelling/programming language can be developed and applied to solve general problems with software design and implementations. In this talk, the speaker examines the requirement of research on collaboration systems and technologies, discusses RBC and its model E-CARGO; reviews the related research achievements on RBC and E-CARGO in the past years; illustrates those problems that have not yet been solved satisfactorily; presents the fundamental methods to conduct research related to RBC and E-CRAGO and discover related problems; and analyzes their connections with other cutting-edge fields. This talk aims at informing that E-CARGO is a well-developed model and has been investigated and applied in many ways. The speaker welcomes queries, reviews, studies, applications, and criticisms. As case studies of E-CARGO, GRA and its related problem models are inspired by delving into the details of the E-CARGO components and the RBC process. GRA can help solve related collaboration problems with the help of programming and optimization platforms. All the related Java codes can be downloaded by GitHub: https://github.com/haibinnipissing/E-CARGO-Codes. The speaker welcomes interested researchers and practitioners to use these codes in their research and practice and contact the speaker if there are any questions about them.

Keywords
Collaboration; Methodology; Model; E-CARGO; Role-Based Collaboration; Object; Agent; Role

Audience
Decision-makers, researchers, practitioners, graduate and senior students of computer science, computer engineering, information systems, systems engineering, industrial engineering, management, and computational economics and social science.

Biography
Dr. Haibin Zhu is a Full Professor and the Coordinator of the Computer Science Program, the Founding Director of the Collaborative Systems Laboratory, a member of Arts and Science Executive Committee, Nipissing University, Canada. He is an affiliate professor of Concordia Univ. and an adjunct professor of Laurentian Univ., Canada. He received a BSc degree in computer engineering from the Institute of Engineering and Technology, China (1983), and MSc (1988) and PhD (1997) degrees in computer science from the National Univ. of Defense Tech. (NUDT), China. He was the chair of the Department of Computer Science and Mathematics, Nipissing University, Canada (2019-2021), a visiting professor and special lecturer in the College of Computing Sciences, New Jersey Institute of Technology, USA (1999-2002) and a lecturer, an associate professor and a full professor at NUDT (1988-2000). He has accomplished (published or in press) over 230+ research works including 40+ IEEE Transactions articles, six books, five book chapters, four journal issues, and four conference proceedings. He is a fellow of I2CICC (International Institute of Cognitive Informatics and Cognitive Computing), a senior member of IEEE, a senior member of ACM, a full member of Sigma Xi, and a life member of CAST-USA (Chinese Association of Science and Technology, USA).

He is serving as a member-at-large of the Board of Governors (2022-), Vice President, Systems Science and Engineering (SSE) (2023-) and a co-chair (2006-) of the technical committee of Distributed Intelligent Systems of IEEE Systems, Man and Cybernetics (SMC) Society (SMCS), Editor-in-Chief of IEEE SMC Magazine (2022), Associate Editor (AE) of IEEE Transactions on SMC: Systems (2019-), IEEE Transactions on Computational Social Systems(2019-), Frontiers of Computer Science (2021-), and IEEE Canada Review (2019-). He was AE of IEEE SMC Magazine (2018-2021), Associate Vice President (AVP), SSE (2021), IEEE SMCS, a Conference (Co-)Chair and Program (Co-)Chair for many international conferences, and a PC member for 130+ academic conferences.

He is the founding researcher of Role-Based Collaboration and the creator of the E-CARGO model. His research monograph E-CARGO and Role-Based Collaboration can be found https://www.amazon.com/CARGO-Role-Based-Collaboration-Modeling-Problems/dp/1119693063. The accompanying codes can be downloaded from GitHub: https://github.com/haibinnipissing/E-CARGO-Codes. He has offered 20 keynote and plenary speeches for international conferences and 80 invited talks internationally. His research has been being sponsored by NSERC, IBM, DNDC, DRDC, and OPIC.

He is the recipient of the best paper award in international collaboration from the 25th Int'l conf. on Computer-Supported Cooperative Work in Design, Hangzhou, China, 2022, the meritorious service award from IEEE SMC Society (2018), the chancellor's award for excellence in research (2011) and two research achievement awards from Nipissing University (2006, 2012), the IBM Eclipse Innovation Grant Awards (2004, 2005), the Best Paper Award from the 11th ISPE Int'l Conf. on Concurrent Engineering (ISPE/CE2004), the Educator's Fellowship of OOPSLA'03, a 2nd class National Award for Education Achievement (1997), and three 1st Class Ministerial Research Achievement Awards from China (1997, 1994, and 1991).

His research interests include Collaboration Systems, Human-Machine Systems, Computational Social Systems, Collective Intelligence, Multi-Agent Systems, Software Engineering, and Distributed Intelligent Systems.

Learning and Modelling in Image Analysis

Prof. Huiyu Zhou

University of Leicester, UK

Abstract
There are many quesions to answer in image interpretation and understanding. Uncertainty in image analysis needs strong and powerful modelling tools to describe the objects in the images. Artificial intelligence (AI) plays a very important role in the design of a robust tool for image representation. Using some examples from his own work on uncertainty analysis, Prof. Zhou will explore how AI can stimulate new concepts or development of dealing with complicated problems and lead us to novel adventures through these applications.

Keywords
Artificial Intelligence; Image Understanding; Medical Application; Object Detection and Tracking

Biography
Prof. Huiyu Zhou received a Bachelor of Engineering degree in Radio Technology from Huazhong University of Science and Technology of China, and a Master of Science degree in Biomedical Engineering from University of Dundee of United Kingdom, respectively. He was awarded a Doctor of Philosophy degree in Computer Vision from Heriot-Watt University, Edinburgh, United Kingdom. Dr. Zhou currently is a full Professor at School of Computing and Mathematical Sciences, University of Leicester, United Kingdom. He has published over 450 peer-reviewed papers in the field. He was the recipient of “CVIU 2012 Most Cited Paper Award”, “MIUA 2020 Best Paper Award”, “ICPRAM 2016 Best Paper Award” and was nominated for “ICPRAM 2017 Best Student Paper Award” and “MBEC 2006 Nightingale Prize”. His research work has been or is being supported by UK EPSRC, ESRC, AHRC, MRC, EU, Royal Society, Leverhulme Trust, Invest NI, Puffin Trust, Alzheimer’s Research UK, Invest NI and industry.

Abstracts Keynote

Physical Robot-Environment Interaction: Intrinsically Safe Actuation

Emre Sariyildiz

University of Wollongong, Australia

Abstract
It is a well-known fact that traditional robotic systems fall-short when dealing with several problems we face today, e.g., meeting the requirements of fast changing and diversified demands of customers in the 4th revolution of industry and providing assistance to help elderly adults to independently fulfil daily activities in super mature societies. Compared to traditional robots that can precisely perform predefined repetitive tasks, today's robots should be resilient and perform interactive tasks in unknown and dynamic environments, accomplishing by humans every day. To this end, several robotic systems and control techniques have been developed in the last decades. This keynote talk will address this fundamental problem in the next generation robotics. Current- state-of-the art solutions for establishing next generation robotic systems, which are capable of working in human environments effectively, will be discussed in detail.

Keywords
Explicit and Implicit Force Control; Compliant and Soft Robotics; Assistive Robotics; Medical and Rehabilitation Robotics; Human-Robot Collaboration; Physical Robot- Environment Interaction; And Intelligent Robotics

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Biography
Emre Sariyildiz received Ph.D. degrees in Integrated Design Engineering from Keio University, Tokyo, Japan, in September 2014 and in Control and Automation Engineering from Istanbul Technical University, Istanbul, Turkey, in February 2016. He was a postdoctoral research fellow in the department of Biomedical Engineering and Singapore Institute for Neurotechnology (SINAPSE) at National University of Singapore, Singapore, before joining the University of Wollongong (UOW), NSW, Australia in April 2017. He is currently a Senior Lecturer in the School of Mechanical, Materials, Mechatronic and Biomedical Engineering at UOW. His main research interests are control theory, robotics, mechatronics and motion control.

Transparency in Artificial Intelligence: Challenges and Implications

V. Franzoni[1;2]
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[2] *Department of Computer Science; Hong Kong Baptist University; Hong Kong; China.*

Abstract
Artificial Intelligence (AI) systems have become increasingly integrated into various aspects of society; e.g.; journalism; entertainment; education; health management; and marketing; automating tasks and enabling new creative possibilities. The rapid development of AI applications has raised significant ethical concerns [1;2]. This abstract explores the methods; challenges; and implications associated with supplementing AI systems in the promotion of ethical and trustworthy AI. A comprehensive literature review is carried out to investigate current approaches and tools for AI transparency and identify gaps and areas for future research. The findings of this study are preliminary input to propose a maturity model that assesses the ethical capabilities of the AI system and provides best practices for further improvements. Among the issues raised by the recent hype of generative AI; there is a need for a transparent approach [3]; considering explainable AI to support data for verifying sources; to avoid breach of copyright; and to guarantee the security and privacy of information protected by law.

Keywords
Transparency; Black Box; Deep Learning Ethics; Explainable AI; Algorithmic Auditing; Ethics by Data

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Biography
V.F. is a tenure-track professor at the University of Perugia and a Lecturer at Hong Kong Baptist University; Hong Kong. Over the course of her 15-year research career; she has become a renowned expert in the fields of complex networks; affective computing; AI ethics; and semantic similarity. She is an IEEE senior member and has been invited to speak at ACM and IEEE international conferences as a keynote speaker. She is author of more than 70 academic papers.

Abstracts Invited

Connected Autonomous Vehicles: Vehicle and Behaviour Design for a New City

Xu Zhang* and Hui Li

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Abstract

This presentation discusses the CAVs (Connected Autonomous Vehicles), the mobility robots, their design and their impacts in five sections:

1. The emergency of CAVs and the social, environmental and ecological contexts

CAVs emerged amid many challenges, the seemingly unstoppable global warming, depleting natural and mineral resources, degrading ecological system and increasing social tensions and divide, domestically and globally. We are also behind the technology development curve: driven by the technology rather than leading its development. This section gives a brief review of this state of affairs and relates it to the past automobile development and the coming CAVs.

2. A historic view of the symbiotic relationships between transport technology, urban form and lifestyle

This section discusses the symbiotic relationships between urban form, the social organization and lifestyle and the enabling transport technology and points to the prospect of a new urban landscape if the CAVs are going to be the expected disruptive technology. It is argued that the technology development should be design-led with the views to a new form of city which can bring about improved human conditions.

3. What makes CAV the disruptive technology?

This section deliberates on two prominent design features of CAV which could bring the disruptive change. The first, manifested in a new macroscopic fundamental diagram (MFD) governing the road traffic, is the ability of each CAV to connect with others to form platoons or flexible road trains. The other is the behaviour design which is perhaps an overlooked aspect of CAV development. The fact that the behaviour of the CAVs is open for design brings a new horizon for urban and environmental design which, in turn, would come back to define the technology.

4. Envisaging a new city

With fuller appreciation of the CAV potentials this section envisions some aspects of a new city when road safety is assured and when, coupled with geofensing technology, environmental design can be freed from need to contain the dangers caused by running vehicles and cities freed from building the necessary infrastructure so required.

5. Concluding remarks

The presentation concludes with a call for a concerted effort in designing the CAV technology to build a new mobility system guided by aspirations for new life, new communities and new cities which are made possible by the new technology.

Biography

Xu Zhang is a (part-time) professor at the School of Civil Engineering and Architecture of the Henan University of Technology, China, and an independent transport planning consultant based in London, UK. Xu is also a visiting professor at the School of Traffic and Transportation at Beijing Jiaotong University. He sits on the editorial panel for the international journal Proceedings of the Institution of Civil Engineers – Municipal Engineer and is an editor for the International Journal of Transportation.

Trained in transport, computing and electronics sciences Xu holds a PhD in transport studies from University College London, an MSc in computer science and a BSc in electrical and electronic engineering, the latter two from the University of Science and Technology of China (USTC). He has held senior roles in a number of transport planning consultancies and academic institutions, acting, in consultancies, as associate director in transport planning at Halcrow Group Ltd, associate at Colin Buchanan and Partners and chief expert at the intelligent transport systems (ITS) firm Anhui Keli Information Industry Co. Ltd. Academically, he served as British Royal Society guest research fellow at the Artificial Intelligence Department of the University of Edinburgh, external MSc course lecturer at the University of Surrey and lecturer at the Information Technology Research Centre of the USTC.

Over the past 30 years, Xu has undertaken consulting, research and teaching assignments in urban traffic control (UTC) systems, transport planning and design, transport modelling and analysis, traffic management and controls and geographic information systems (GIS) worldwide in countries of different cultures and development paths gaining understanding of diverse local problems as well as aspirations and practices of local communities and experts. He has recently get together over 30 leading academic researchers and practitioners worldwide and jointly written a book, Cities for driverless vehicles: Planning the future built environment with shared mobility, published by the ICE Publishing in October 2021, which was selected as one of the Best Books of 2021 by the publisher.

Optimizing Agricultural Practices with Artificial Intelligence Algorithm to Predict Crop Fertilizer and Water Needs

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2ARB AGRO Technology Sdn. Bhd; Q Sentral; KL Sentral; 50470 Kuala Lumpur; Malaysia.

Abstract
Climate change increases uncertain and extraordinary weather that affects farming. Farmers regularly face crop damage due to climate change. This change affects the quantity and quality of plants. Climate change disrupts the growing season of plants; turns farmlands into deserts; and causes seawater floods; which affect fertile deltas. Adaptation to climate change and lower emissions can achieve food security goals and agricultural development. Climate monitoring through sustainable land and water management can also increase productivity and enhance crops and the quality of plants. Optimization of sustainable agricultural processes is an important issue. The Climate-Smart Agriculture (CSA) technology could be the key to improved and increased productivity while decreasing the natural footprint. The CSA is defined as agriculture that sustainably increases productivity; increases resilience; reduces/eliminates greenhouse gas emissions; and improves the achievements of national development and food security goals. Sustainable agricultural production and income growth; climate change adaptation and development; and a reduction or elimination of greenhouse gas emissions are the key objectives of CSA. The CSA has many aspects that help to optimize sustainable agricultural processes. Researchers and policymakers can be driven by climate change; the global population increase; the food security needs; and the decrease of human labor in agribusiness. Furthermore; smart agriculture with IoT improves geospatial data and real-time events; and it is the driving strength towards the agriculture sector supportability. Smart agriculture can be managed and controlled using various tools; including IoT; wireless communications; WSN; Deep Learning (DL); image processing; robotics; ML; Convolutional Neural Networks (CNNs); and Artificial Intelligence Neural Networks (AINNs). The AI can help farmers arrive at efficient land utilization with sustainable resources. This happens by analyzing water utilization; soil conditions; temperature; energy usage; and climate conditions collected from cultivated farms. The analyzed data using Machine Learning (ML) algorithm can be used to predict yield and detect diseases to get better decisions and management. Because of their advantages in traditional systems; AI and ML have been widely adopted in the agricultural sector. In addition; several applications depend on the analysis and visualization of gathered data with the help of ML. These applications are integrated with IoT to make the system more intelligent and get the best decisions. The model in this project is for an intelligent irrigation system that uses ML algorithms to predict crop water needs. IoT in smart agriculture and automation based on ML will soon replace traditional farming methods.

Keywords
Climate-Smart Agriculture; Machine Learning; IoT; Climate Change

Acknowledgement
This work is supported by the University Kebangsaan Malaysia under GP-K020558. Opinions expressed in this paper are iAI Research Group; Institute of Visual Informatics supported by ARB Agri Sdn. Bhd.

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Biography

Rabiah Abdul Kadir is a Senior Research Fellow at Institute of Visual Informatics; Universiti Kebangsaan Malaysia. She received her PhD (2007) in Computer Science from University Kebangsaan Malaysia. Her areas of research are in intelligent computing; computational linguistics; and data analytics. Currently; she is actives on big data analytics; chatbot development concentrating on semantic knowledge relation and reasoning and extraction; medical data analytics; and sentiment analysis. She has experience teaching courses on topics including Big Data to Community; Natural Language Processing; Artificial Intelligent; Advanced Data Structure; Machine learning and Neural Network; and Computer Programming. She headed more than 20 research projects funded by national and international organizations in her area of competence. She has published more than 200 papers of academic journal; book of chapter and proceeding on her areas. She also actives in several international conferences organized by local and international association or universities.

Feedback Controllability as a Normative Theory of Neural Population Dynamics

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Abstract
The structure and variability within diverse behaviors can be accounted for by theories of optimal control. However, to date, the implications of this normative description of behavior for the dynamics of the underlying neural circuits have not been explored. We put for- ward the theory that functionally relevant brain dynamics should be feedback controllable, and test this theory in electrophysiological recordings. We develop linear dimensionality reduction methods that identify subspaces that are most feedforward controllable (FFC) vs feedback controllable (FBC), assuming implicit linear dynamics. In neural data, we show that FBC subspaces and FFC subspaces diverge from each other, and recruit fundamentally different populations of neurons. In contrast to FFC subspaces, single neuron participation in FBC subspaces cannot be predicted from marginal statistics, indicating that FBC is an emergent, population level property. We further show that FBC subspaces robustly outperform FFC subspaces in behavioral decoding in diverse brain areas. In M1 recordings, this decoding performance difference is largest during high acceleration reaching periods. Additionally in M1, FBC neurons exhibited greater heterogeneity in single neuron firing rates and FBC subspaces contained more stereotyped rotational dynamics than their FFC counterparts. Finally, we show, through analytic results and numerical simulations that the divergence between FBC and FFC subspaces is modulated by the degree of non-normality in neural dynamics. Taken together, our results demonstrate feedback controllability is a novel, normative characterization of neural dynamics, and provides insights into how specific features of dynamical systems shapes their controllability under feedback and feedforward policies.

Biography
Kristofer Bouchard received degrees in mathematics and cognitive science at Brandeis, followed by PhD in Neuroscience at UCSF, and postdoctoral studies in neural engineering at UCSF and computer science at LBNL. He is the PI of the Neural Systems and Data Science lab at LBNL/UC Berkeley, and leads the Computational Biosciences Group at LBNL. His research focuses on understanding how distributed neural circuits gives rise to coordinated behaviors and perception. His lab takes a two-pronged approach to this problem by conducting in vivo neuroscience experiments and developing data science tools.

Dynamic Context-Aware Decision Support System

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Abstract
The dynamic context-aware decision support system focuses on its ability to understand and evaluate the constantly changing situational context that shapes decision-making. This context encompasses a range of variables such as location; time; user behavior and available resources. However; the complex nature of these components presents a formidable challenge to informed decision-making; a challenge that takes on particular importance in rapidly evolving domains such as the stock market; pandemics; and e-health. For example; in e-health - an emerging interdisciplinary field at the intersection of medical informatics and public health - time series models [1]; which frequently use regression analysis; are exploited to establish sophisticated correlations between estimators; covariates and historical time series values [2]. The highly dynamic nature of stock markets; characterized by fluctuations influenced by a range of variables; has attracted a great deal of attention from researchers. Researchers have proposed various machine learning models aimed at accurately predicting non-linear variations. These models consider external dynamics such as company news; social trends; political events; and natural disasters; all of which have an impact on stock market prices [3].

In summary; researchers are exploiting advanced artificial intelligence techniques to provide robust decision support systems that effectively navigate dynamic environments.

Keywords
Decision Support System; Dynamic Context; Adaptivity; Computer Science

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Biography
Dr. Dalel Kanzari is an associate professor in the department of computer science at the “Institut Supérieur des Sciences et Technologies Appliquées-University of Sousse-Tunisia”.
Her research interests focus on decision support systems; with an emphasis on their adaptability to contextual dynamics.In our research; we focus on the application of advanced artificial intelligence techniques; such as game theory; fuzzy logic; neural networks and multi-agent systems; to practical scenarios in various fields such as fintech; healthcare; sentiment analysis and other relevant areas. Our main goal is to deepen the understanding and improve the implementation of decision support systems in real-world contexts; with an emphasis on emulating human reasoning and behavior. Through this exploration; we aim to enrich the development and deployment of decision support systems that closely mimic human-like decision-making processes.
She obtained her Phd in computer science applied to management at the University of Tunis in collaboration with UPEC-ParisIV;

"In the Wild" Video Content as a Special Case of User Generated Content and a System for Its Recognition

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Abstract
In the five years between 2017 and 2022, IP video traffic tripled, according to Cisco. User-Generated Content (UGC) is mainly responsible for user-generated IP video traffic. The development of widely accessible knowledge and affordable equipment makes it possible to produce UGCs of quality that is practically indistinguishable from professional content, although at the beginning of UGC creation, this content was frequently characterized by amateur acquisition conditions and unprofessional processing. In this research, we focus only on UGC content, whose quality is obviously different from that of professional content. For the purpose of this paper, we refer to "in the wild" as a closely related idea to the general idea of UGC, which is its particular case. Studies on UGC recognition are scarce. According to research in the literature, there are currently no real operational algorithms that distinguish UGC content from other content. In this study, we demonstrate that the XGBoost machine learning algorithm (Extreme Gradient Boosting) can be used to develop a novel objective "in the wild" video content recognition model. The final model is trained and tested using video sequence databases with professional content and "in the wild" content. We have achieved a 0.916 accuracy value for our model. Due to the comparatively high accuracy of the model operation, a free version of its implementation is made accessible to the research community. It is provided via an easy-to-use Python package installable with Pip Installs Packages (pip).

Biography
Mikołaj Leszczuk, DSc, is an associate professor at the AGH Department of Telecommunications. He is scientifically interested in multimedia subjects, especially video applications. He is specialized in the accurate description and standardization of methods of QoE/UX analysis. He is a board member of the Video Quality Experts Group (VQEG), chairing the Quality Assessment for Computer Vision Applications (QACoViA) subgroup. The VQEG group was established in 1997 and brings together experts involved in both subjective and objective assessment of video quality. Furthermore, several times, M. Leszczuk was invited to work for the Video Quality in Public Safety Working Group (VQiPS). The VQiPS Working Group, supported by the US Department of Homeland Security, has been developing public safety video surveillance applications. M. Leszczuk is also a senior member of the Institute of Electrical and Electronics Engineers (IEEE).