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Informatics and Intelligent Applications


First International Conference, ICIIA 2021
Ota, Nigeria, November 25–27, 2021
Revised Selected Papers

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Preface

The First International Conference on Informatics and Intelligent Applications (ICIIA 2021) aimed to provide a platform to bring together informatics and artificial intelligence/machine learning researchers and practitioners to exchange and share their research and innovation results in the field of applied informatics and applications.

ICIIA 2021 was held virtually during November 25–27, 2021. It was organized by the Centre of ICT//ICE Research at Covenant University, Nigeria. The theme of ICIIA 2021 was “Informatics for Sustainable Development.” ICIIA 2021 aspired to keep up with advances and changes to a consistently morphing field. We invited three leading experts to give keynote speeches that focus on state-of-the-art research. Participants from around the globe presented the latest studies through papers and oral presentations.

We received 108 submissions from around the world. All the papers were 10–16 pages in length. Each paper was allotted to three to five reviewers from the international Program Committee. We adopted a single-blind process for review. The whole program was divided into three tracks: Artificial Intelligence and its various applications, Emerging Technologies in Informatics, and Information Security. Based on the outcomes of the review process, 22 full papers were accepted to be included in this volume of Communications in Computer and Information Sciences (CCIS) proceedings published by Springer.

We would like to thank the team from Springer for their helpful advice, guidance, and support in publishing the proceedings.

We trust that the ICIIA 2021 proceedings open you to new vistas of discovery and knowledge.

November 2021

Sanjay Misra
Jonathan Oluranti
Robertas Damasevicius
Rytis Maskeliunas

Message from the Organizing Committee

On behalf of the Organizing Committee of ICIIA 2021, it is a pleasure to welcome you to the proceedings of the First International Conference on Informatics and Intelligent Applications (ICIIA 2021), held during November 25–27, 2021. ICIIA 2021 was planned to take place at the Center of ICT//ICE Research, Covenant University, Nigeria, but was held virtually due to the ongoing COVID-19 pandemic. The Department of Electrical and Information Engineering and the Department of Computer and Information Sciences of Covenant University jointly hosted ICIIA 2021.

Covenant University, the intended venue of the conference, is a gentle departure from the hustle and bustle of the busy metropolitan life in the city of Lagos. It is a serene campus with landscaped surroundings. It is currently among the most prestigious institutions of higher education in Nigeria and offers an excellent setting for conferences. Founded in 2002, Covenant University is ranked the best performing university by the National Universities Commission of Nigeria.

ICIIA 2021 included plenary lectures by leading scientists and several paper sessions which provided a real opportunity to discuss new issues and find advanced solutions able to shape new trends in the fields of Artificial Intelligence (AI), AI applications in various areas, security, and emerging technologies. The conference could not have happened without the dedicated work of many volunteers. We want to thank Covenant University for the sponsorship as well as our fellow members of the local organization team.

On behalf of the Organizing Committee of ICIIA 2021, we would like to thank everyone who participated in and contributed to this conference, making it much more productive and successful.

Sanjay Misra
On behalf of the Organizing Committee

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Keynotes

Begreen

Ernest Cachia

Department of Computer Information Systems, Faculty of ICT,
University of Malta, Malta

Abstract. The notions and ideas relating to green and sustainable Information Technology endeavors are becoming critical and crucial requirements governing many IT and IT-related innovations. The need to understand and respect our environment while striving to create solutions to improve the human condition is a relatively recent state of realization that derives from the fact that the two aspects are inseparable. Like all other scientific studies, this necessitates a structured and demonstrable approach that is based on appreciating and embracing digital realities, understanding human activity, processes, and the changing economic context and social patterns. Similar to the adoption of ubiquitous and pervasive data in the creation of innovative solutions, green and sustainable software development is based on the use and customization of opportunities encountered. Therefore, it is necessary that modern software developers understand the digital tools at their disposal, up-skill or re-skill, to contribute to this ethos. And based on that, innovate.

Biography: Professor Ernest Cachia currently holds the position of Head of the Department of Computer Information Systems, and for 12 consecutive years (2007–2019), held the position of Dean of the Faculty of Information and Communication Technology. Professor Cachia is also the Chairman of the Institute of Aerospace Technologies at the University of Malta and Director of the Malta Air Traffic Services (MATS) company. Professor Cachia is the Nationally (Maltese) appointed representative on the European Union’s European Open Science Cloud (EOSC) Steering Board. Furthermore, Professor Cachia is the University of Malta representative on the Malta Competition and Consumer Affairs -sitting on the EU CEN e-Skills e-Competencies Common Framework (e-CF) Standardisation Committee, he is a founding member of the Malta IT Agency e-Skills Alliance, member of the Malta Cloud Forum within the Malta Communications Authority, member of the e-Skills (Malta) Foundation, and a founding member of (former) EuroCloud (Malta) organisation. Professor Cachia is also one of the mentors and panel members on the “SeedGreen” EU and National Governmental Green Project Awareness initiatives. Professor Cachia is also a member of the Managing Committee of the COST Action on Gene Regulation Knowledge Commons (GREEKC) working in the domain of FAIR Score assessment of Gene Ontology Tools. Professor Cachia acted as the Innovation and Technology Module Leader in the creation of a Joint Masters program for Border Management, coordinated by Frontex, the European Border Guard and Border Management Agency. Professor Cachia is also a member of the IT Services Board of Directors of the University of Malta.

Modern Challenges in Computational Science

Osvaldo Gervasi

Department of Mathematics and Computer Science, University of Perugia

Abstract. In recent years we have witnessed an impressive development of technology, which is continuously breaking down barriers considered insurmountable, and a massive and pervasive spread of services that require increasingly high-performance networks and computers. Scientists are called to reinvent algorithms and computational approaches in order to face the growing and ambitious questions posed by the market, society and science, particularly in times of extreme difficulty such as the Covid-19 pandemic.

In this lecture we will try to illustrate some concepts that can ignite in the researcher the desire to explore new frontiers of computational computing to face the challenging demands of a fast-moving world.

Biography: Prof Gervasi is Associate Professor at the Department of Mathematics and Computer Science, Perugia University. His **Research interests** are Computational Science, HPC, Virtual Reality and Artificial Intelligence. He is **Co-Chair of:** The International Conference on Computational Science and Its Applications (ICCSA) in 2004 (Assisi, Italy), 2005 (Singapore), 2006 (Glasgow, UK), 2007 (Kuala Lumpur, Malaysia), 2008 (Perugia, Italy), 2009 (Sewon, Korea), 2010 (Fukuoka, Japan), 2012 (Salvador da Bahia, Brazil), 2013 (Ho Chi Minh City, Vietnam), 2014 (Guimaraes, Portugal), 2015 (Banff, Canada), 2016 (Beijing, China), 2017 (Trieste, Italy) 2018 (Melbourne, Australia), 2019 (Saint Petersburg, Russia), 2020 (Online) and 2021 (Cagliari, Italy) and the ACM Web3D 2007 Symposium (Perugia, Italy). He published more than 100 papers and **co-edited** more than 90 books. He was **invited speakers** at the International Conference on Computing, Networking and Informatics (ICCNI 2017), OTA (Nigeria), Oct 29–31, 2017; at the Advanced Signal Processing (ASP2016), Manila (Philippines) Feb 12–14, 2016, at the 6th International Conference on Adaptive Science and Technology (ICAST2014), Lagos (Nigeria) Oct 29–31, 2014; at the International Conference on Hybrid Information Technologies 2006, Jeju Island (South Korea), at the First International Conference on Security-enriched Urban Computing and Smart Grids 2010, Daejeon (South Korea), at the Future Generation Information Technology Conference 2010, Jeju Island (South Korea), and at the Future Generation Information Technology Conference 2012, KangWanDo (South Korea). He was **president of the Open Source Competence Center (CCOS)** of the Umbria Region, Italy from 2007–2013 and **ACM Senior Member and IEEE Senior Member**, Member of the **Internet Society (ISOC)**, co-founder of the ISOC Italian Chapter, Member of the **Web3D Consortium** and **The Document Foundation (TDF)** Member since 2013.

Contents

AI Applications

Variation of the Intercession Coefficient Used as a Hyper Parameter in Machine Learning in Regression Models	3
<i>Fabricio Echeverria, Marcelo Leon, Zila Esteves, and Carlos Redroban</i>	
Adaptive Neuro-Fuzzy Model for Vehicle Theft Prediction and Recovery	20
<i>Akintunde Saminu, Olusegun Folorunso, Femi Johnson, Joel Akerele, Solanke Ilesanmi, and Folurera Ajayi</i>	
Heart Disease Classification Using Machine Learning Models	35
<i>Sakinat Oluwabukonla Folorunso, Joseph Bamidele Awotunde, Emmanuel Abidemi Adeniyi, Kazeem Moses Abiodun, and Femi Emmanuel Ayo</i>	
A Deep Learning-Based Intrusion Detection Technique for a Secured IoT System	50
<i>Joseph Bamidele Awotunde, Kazeem Moses Abiodun, Emmanuel Abidemi Adeniyi, Sakinat Oluwabukonla Folorunso, and Rasheed Gbenga Jimoh</i>	
Predicting Students Performance in Examination Using Supervised Data Mining Techniques	63
<i>Kazeem Moses Abiodun, Emmanuel Abidemi Adeniyi, Dayo Reuben Aremu, Joseph Bamidele Awotunde, and Emmanuel Ogbuji</i>	
FEDGEN Testbed: A Federated Genomics Private Cloud Infrastructure for Precision Medicine and Artificial Intelligence Research	78
<i>Emmanuel Adetiba, Matthew Akanle, Victor Akande, Joke Badejo, Vingi Patrick Nzanzu, Mbasa Joaquim Molo, Victoria Oguntosin, Oluwadamilola Oshin, and Ezekiel Adebisi</i>	
Predicting the Outcomes of Football Matches Using Machine Learning Approach	92
<i>Usman Haruna, Jaafar Zubairu Maitama, Murtala Mohammed, and Ram Gopal Raj</i>	

Information Security

The Post-quantum Probabilistic Signature Scheme	107
<i>Mouhamed Lamine Mbaye, Demba Sow, and Djiby Sow</i>	

Deploying Wavelet Transforms in Enhancing Terahertz Active Security Images	121
<i>Samuel Danso, Shang Liping, Deng Hu, Justice Odoom, Liu Quancheng, Emmanuel Appiah, and Etse Bobobee</i>	
Collaborative Integrity Verification for Blockchain-Based Cloud Forensic Readiness Data Protection	138
<i>Omoniyi Wale Salami, Muhammad Bashir Abdulrazaq, Emmanuel Adewale Adedokun, and Basira Yahaya</i>	
State Based IoT Security for Tamper Prevention	153
<i>Arunesh Kumar, Christina Eunice John, A. Joshua, Baskaran Kaliamourthy, and Chamundeswari Arumugam</i>	
Exploring the Security of Software Defined Network Controllers	165
<i>Prabhjot Kaur, Shiv Patel, Sanjana Mittal, Surbhi Sharma, and Sergey Butakov</i>	
Privacy Protection in Geolocation Monitoring Applications	179
<i>Kush Patel, Krishna Vyas, Monika Patel, Dhruv Vyas, and Sergey Butakov</i>	
Emerging Technologies in Informatics	
Stakeholder's Perspective of Digital Technologies and Platforms Towards Smart Campus Transition: Challenges and Prospects	197
<i>Israel Edem Agbehadji, Richard C. Millham, Bankole Osita Awuzie, and Alfred Beati Ngowi</i>	
Social Spider and the Prey Search Method for Global Optimization in Hyper Dimensional Search Space	214
<i>Samuel Ofori Frimpong, Richard C. Millham, Israel Edem Agbehadji, and Jason J. Jung</i>	
Population Size Management in a Cuckoo Search Algorithm Solving Combinatorial Problems	227
<i>Marcelo Chávez, Broderick Crawford, Ricardo Soto, Wenceslao Palma, Marcelo Becerra-Rozas, Felipe Cisternas-Caneo, Gino Astorga, and Sanjay Misra</i>	
Global Optimization: A Hybrid Social Spider-Prey and Kestrel-Based Search Strategy in Multi-dimensional Search Space	240
<i>Israel Edem Agbehadji, Bankole Osita Awuzie, Alfred Beati Ngowi, Richard C. Millham, and Samuel Ofori Frimpong</i>	

Development of Secured Smart Display for Art Industry	256
<i>Emmanuel Abidemi Adeniyi, Joseph Bamidele Awotunde, Kazeem Moses Abiodun, Wareez Olasunkanmi Adeboye, and Gbemisola Janet Ajamu</i>	
Method to Interpret Algorithms and Design Workflows in the Complex Computer-Aided Design Development	268
<i>Nikolay Voit and Semen Bochkov</i>	
Comparing Stochastic Gradient Descent and Mini-batch Gradient Descent Algorithms in Loan Risk Assessment	283
<i>Abodunrin AbdulGafar Adigun and Chika Yinka-Banjo</i>	
Deriving Architectural Responsibilities from Textual Requirements	297
<i>Guillermo Rodriguez, J. Andrés Díaz-Pace, Luis Berdun, and Sanjay Misra</i>	
Extending Traceability Technique to Client Forensic Investigation	311
<i>Adesoji Adesina, Ayodele Ariyo Adebisi, and Charles Korede Ayo</i>	
Correction to: Deploying Wavelet Transforms in Enhancing Terahertz Active Security Images	C1
<i>Samuel Danso, Shang Liping, Deng Hu, Justice Odoom, Liu Quancheng, Emmanuel Appiah, and Etse Bobabee</i>	
Author Index	325