

# In this Issue

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Editor-in-Chief, Irena Bojanova, presents a summary of the articles featured in this issue.

Welcome to the third *IT Professional* issue of 2021. This issue features a Special Section consisting of four invited articles to commemorate the 75th Anniversary of the IEEE Computer Society. In addition, it presents seven peer-reviewed feature articles on different topics and column/department articles of current interest.

## 75TH ANNIVERSARY OF THE IEEE COMPUTER SOCIETY

The IEEE Computer Society (CS) has reached a significant milestone this year—75 years of serving the global computer science, engineering, and technology community.<sup>1</sup> CS is known for its unparalleled international conferences and peer-reviewed publications. This magazine, *IT Professional*, is one of its top publications, which also sponsors the ITIP Symposium at the highly popular IEEE COMPSAC conference.

To honor the CS's 75th anniversary, we feature a Special Section, "Continuing IT Evolution and Revolution," guest-edited by San Murugesan. This section discusses the fast-paced technological evolution of computing and perspectives on the future. It consists of a Guest Editor's Introduction and four invited articles: "75 Years of Astonishing Evolution of IT: 1946–2021" by George Strawn, "Multimedia Computing—The First 50000 Years (Travels Down Memory Lane)" by Sorel Reisman, "The Duality of Data and Knowledge Across the Three Waves of AI" by Amit Sheth and Krishnaprasad Thirunarayan, and "Demanding Fair and Ethically Aligned IT for the Future" by Robert N. Charette.

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## OTHER TOPICS OF COVERAGE

This issue presents seven peer-reviewed articles, which focus on artificial intelligence (AI) and machine learning (ML), the Internet of Things (IoT), and smart societies and cities.

AI is any technique that enables computers to mimic human behavior; it focuses on building smart algorithms. ML is the ability to learn without being programmed; it focuses on teaching an algorithm to do the task at hand. A subset of ML is deep learning (DL); it is about extracting patterns from data using neural networks. The first four articles discuss the use of the following technologies underlying AI: ML and its subset DL, natural language processing (NLP), and computer vision.

In "Multimodal AI to Improve Agriculture," Parr *et al.* discuss how advances in NLP and computer vision are being applied to address agricultural problems. They present recent examples of using AI to improve core scientific knowledge, agricultural research management, and agricultural practice. Via two case studies, the authors demonstrate new ways to accelerate the progress in personalized nutrition and invasive pest detection. They also discuss the challenges that need to be addressed.

In "A Review of Artificial Intelligence's Neural Networks (Deep Learning) Applications in Medical Diagnosis and Prediction," Djavanshir *et al.* review applications of DL in medical diagnosis and prediction. They present and compare convolutional neural networks, fully convolutional networks, and generative adversarial networks for medical image analysis. The authors summarize the strengths and weaknesses of DL in medical imaging and conclude that DL applications in medicine show promising results.

In "Deep Learning-Based COVID-19 Detection Using CT and X-Ray Images: Current Analytics and Comparisons," Rehman *et al.* present DL-based COVID-19 detection using CT and X-ray images and

## NEW EDITORIAL BOARD MEMBERS

We extend a cordial welcome to the new *IT Professional* Editorial Board members: Carlos E. C. Galhardo, Shaoshan Liu, and Aswani Kumar Cherukuri.



Carlos E. C. Galhardo has been a researcher at the Brazilian National Institute of Metrology, Quality and Technology, Inmetro, Rio de Janeiro, Brazil, since 2010. He was at NIST as a guest researcher from fall 2019 to fall 2020. His research interests include data analysis and mathematical modeling in interdisciplinary applications. Nowadays, he is working on models and methods to analyze security weaknesses (program analysis). Galhardo received the PhD degree in computational physics from Universidade Federal Fluminense, Rio de Janeiro, Brazil, in 2010.



Shaoshan Liu is the founder and CEO of PerceptIn, Inc., a company focusing on providing visual perception solutions for robotics and autonomous driving. He has authored or coauthored 80 research papers, 40 U.S. patents, and more than 150 international patents on autonomous driving technologies and robotics. Liu received the master's degree in public administration (MPA) from Harvard Kennedy School, Cambridge, MA, USA, and the PhD degree in computer engineering from the University of California, Irvine, CA, USA. He is a senior member of the IEEE, a Distinguished Speaker of the IEEE Computer Society, a Distinguished Speaker of ACM, and a founder of the IEEE Special Technical Community on Autonomous Driving Technologies.



Aswani Kumar Cherukuri is currently a professor with the School of Information Technology and Engineering, Vellore Institute of Technology, Vellore, India. He has more than 20 years of teaching and research experience. He has authored or coauthored more than 150 publications in book chapters, international journals, and conferences. His research interests include machine learning, information security, and quantum computing. He is a member of the IEEE and a senior member of ACM. He is a distinguished speaker of ACM and vice-chair of the IEEE Taskforce on Educational Data Mining.

data analytics. The authors describe data science use cases that use ML techniques for data analysis and prediction.

In "A Machine-Learning-Based Approach for Autonomous IoT Security," Saba *et al.* present an ML-based approach for autonomous IoT security to achieve optimal energy efficiency and reliable data transmissions. For network performance optimization, they use a model-free Q-learning algorithm and to assure data confidentiality, they use a cryptography-based deterministic algorithm.

The next three articles highlight advances related to the IoT and smart societies.

The IoT is a reality now, and we all enjoy its numerous applications. The Internet of Planets (IoP) is a new paradigm in which planets in a solar system communicate with each other using the Internet.<sup>2</sup> A main issue would be the lack of continuous connectivity in heterogeneous networks, which can be addressed by delay-tolerant networks (DTN).<sup>3</sup> In "Internet of Planets (IoP): A New Era of the Internet," Kang *et al.* propose a time (delay) information-based DTN routing scheme,

which is able to predict routing paths for achieving efficient data transmissions among the nodes that have comparatively periodic moving patterns. The proposed algorithm analyzes the network status by using delay and authorization history in order to select an efficient relay node from DTN. The authors claim that further research to achieve more stable DTN routing will make it possible to actually connect planets via the Internet.

Smart societies and smart cities aim to enhance the living environment and to improve residents' quality of life. One of the technologies that can help is the unmanned aerial vehicles (UAVs), commonly known as drones,<sup>4</sup> which are capable of capturing high-resolution images and videos as well as valuable information such as day/time and GPS location. In "Aerial Data Aiding Smart Societal Reformation: Current Applications and Path Ahead," Behera *et al.* present scenarios for using UAV aerial images for offline map generation, climate change observation, precision agricultural, mining areas inspection, waste management, and traffic management. The authors discuss research areas in using drone-based aerial image databases, as well as corresponding challenges. They also introduce notable UAV-based image datasets, which are publicly available for use by industry practitioners.

Finally, in "Smart Cities in China: A Brief Overview," Yang *et al.* discuss the urbanization process, analyze the development of smart cities, and reflect on current challenges. Their research identifies people-oriented and in-depth urban informatization as the most prominent characteristics of Chinese smart cities construction.

The challenges that they focus on are data silos, severe environmental pollution, technology bottlenecks, security, and privacy.

We hope you enjoy these articles as well as this issue's insightful column/department articles. We thank all the authors, guest editors, and reviewers for their contributions, and our readers and subscribers for their continued support. We welcome your comments and suggestions for further enhancing *IT Professional* as the premier magazine for IT professionals.

## REFERENCES

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