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Overview

Information science and communication systems play a vital role in everyday lives, and with greater advancements in technology, the enormous growth of computational intelligence can benefit several sectors. For many decades, ASTM International's *Journal of Testing and Evaluation* (JTE) has continuously presented special issues on computational intelligence and information systems, and this initiation paves the path for researchers to contribute new ideas and methods towards the development of efficient communication systems; moreover, the continuous exposure in information science and communication systems provides a platform to develop more robust approaches. The aim of this special section is to highlight the unique areas of communication systems and their applications, as well as various innovations in multi-discipline areas, and also to present some technical remonstrance and its countermeasure.

All the papers that appear in this special section review methods, challenges, and remedies, various applications and domains, and develop new information systems and communication systems and models.

The first six papers by Ravi, Arun, Vanitha, Geetha, Kumaresan, and Sivakumar deal with Wireless Sensor Networks (WSN), which are an evolving field with unique features, including the ability to easily deploy with several distinct applications. Normally, sensor networks consist of tiny nodes with restricted computing and communication capabilities. WSN is the biggest share of studies in the last century. The papers presented focus on WSNs and activities such as routing, energy efficiency protocol, data scheduling, fuzzy decision making, disease prediction in healthcare, and management considerations in these unique problems. This unique problem ultimately covers a wide variety of subjects in the paradigms and developments of WSNs. It is both for educational audiences (postgraduates, educators, and students) and professional audiences. It is presumed that readers are acquainted with the ideas and paradigms of WSN concepts and their associated ideas. It guides developers of technology solutions from academia, research institutions, and industry, giving them a broader view of wireless sensor networks.

The next paper, by Shashikiran Venkatesha, addresses a fault-tolerant for the multicore processor that can run multi-threaded applications quicker than the multiprocessor scheme that consists of various single-core processors; this is due to the brief range between them, which allows the processors to interact more quickly with the multicore processor. In this paper, the author states that having a multicore processor is also cheaper than having various single-core coupling processors. However, with an increase in the number of cores, it proves inefficient to use the bus as an interconnection with growing complexity. The increasing number of cores raises the demand for a strong subsystem for memory. An attempt was produced in this unique problem to evaluate the effect of memory size on multicore processor performance by varying memory size.

The next two papers, by Paulin and Aarthy, focus on the deep learning approach. Deep learning has become an incredibly active study area that paves the way for the learning of contemporary machines. Deep learning is widespread with applications for disease diagnosis, audio/visual speech recognition, and machine learning. Leading technology companies (such as Apple, Google, Facebook, Microsoft, etc.) and research institutions are engaged in researching this hot artificial intelligence method, which includes data analytics and machine learning applications. These two papers focus on the challenges and remedies in the field of speech recognition and healthcare disease diagnosis based on the thermal images.

Recent advances in various fields of growth and research are enabling new distributed systems and associated applications. According to Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update (<https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white-paper-c11-738429.html>), it has been estimated that the number of mobile devices in the year 2020 will increase to 27.1 billion, which is approximately equal to the world's population in that same year. In the following paper, author Prabu focuses on an ocean color monitoring system with a distributed computing model to cover the large spatial data. This article also focuses on normalized

difference vegetation index with uncertainty generation techniques and the methods that have been used for ocean surfaces.

The Internet of Things (IoT) is a pervasive trend that transforms all we do and the infrastructure that promotes us. From smart cities and homes to Industry 4.0, businesses, critical infrastructure, healthcare, retail, and wearables, vast information flows are progressively processed using machine learning algorithms—which is changing our lives. This unprecedented scale, omnipresence, and interconnectivity also generate an atmosphere in which the safety and integrity of these applications become a major problem. The next two papers, by Balakrishnan and Ranjani, focus on the association of missing data in spatial data. An easy technique of machine learning, such as clustering, can organize and group distinct information, after which it is possible to use other cognitive and predictive methods to enhance results.

The following papers by authors Prabu and Karthi focus on cloud computing with biometric systems and spatial data indexing. The advancement of spatial data analysis and biometric systems with cloud computing provides a different platform for the researcher to devote novel ideas and methods. With enhancing information range and veracity, it has become more difficult to accomplish such processing within an appropriate timeframe. The current cloud infrastructure is a sub-optimal solution for these situations as the produced information is transmitted to different remote cloud centers. However, in these articles, the authors clearly state that integrating machine learning methods into the current cloud can provide enhanced efficiency. There is also a large amount of data stored in the cloud that can be used as input for the biometric system and spatial data analysis. These articles will be useful for researchers and senior-level graduates in related fields. They provide a reference path for system designers, researchers, and practitioners in a distributed environment.

Revathy's article reviews the importance of safety for big data. Many sectors and governments now recognize big data. Big data's effective mining allows businesses to enhance their competitive advantage and add value to many social and economic industries. Indeed, several governments have initiated major projects with enormous investments to extract the highest advantage from big data. Also, significant attempts have been made by the private sector to maximize earnings and optimize resources. Big data sharing, however, brings new safety and privacy issues. When implemented in the context of big data, traditional techniques are no longer suitable. This particular problem introduces the difficulties of big data safety and state-of-the-art techniques, processes, and solutions used to safeguard data-intensive information systems.

The papers by Sujatha, and Gopinath, Ashokkumar, and Ranganathan center on the analysis of machine learning models and their applications. Current organizational machine learning and technological advances include thermal image processing, artificial intelligence, information science, robotics, and prediction models, as well as a broad range of techniques. The constantly evolving machine learning landscape makes staying up-to-date in the field difficult for professionals. These articles describe: (1) Fundamental concepts and theories of machine learning, (2) methodologies of development and design, (3) development of new software tools and techniques, (4) healthcare and business application, (5) organization and social data analysis, (6) surveillance data analysis, (7) data clustering, and (8) diabetes disease prediction using thermal image.

The papers by Saravanan and Subramaniam discuss the analysis of mobile networks and their impact. Mobile communication, mobile devices, and mobile computing are now widespread. The *Mobile Computing and Commerce Encyclopedia* (2007, IGI Global, Hershey, PA) introduces papers to readers that cover a broad variety of mobile technologies and their applications. However, the authors review many problems and difficulties that still need to be resolved, such as mobile marketing, mobile advertising, mobile payment, and voice-based mobile permission. This involves using evolving mobile technology like radio frequency identification and sensor networks.

The next paper, a case study by Ravi in Ethiopia, presents a new energy system for wind and solar energy by using HOMER software. In this case study, the author also addresses solar radiations, wind energy potential, and the cost of the energy system.

The paper by Blessy Trencia Lincy focuses on the importance of feature selection in data mining pre-processing methods. Pre-processing of data is an essential step in data mining. Many researchers devoted their novel ideas to improve feature selection methods. However, the enormous growth of data creates

new challenges and limitations. In this article, the author reviews a selection of methods and develops a new wrapper-based hybrid feature selection technique; the author also discusses the importance of the featured selection and its characteristics and advanced methods.

The next paper, by Pulidindi, discusses the importance of technology to handle electronic health records and telemedicine in hospitals. This research study is carried out in Vellore district, Tamil Nadu, India.

The final paper by Harshass addresses e-technology development in construction industries. The author highlights the benefit in e-technology in supply chain management in construction domains. The author also discusses the significant improvements on e-technology in procumbent system.

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