EDITORIAL

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Guest Editorial: Artificial-intelligence-based network security and computing technologies in wireless networks

This dedicated Special Issue on Artificial Intelligence-Based Network Security and Computing Technologies in Wireless Networks aims to provide improved knowledge for state-of-the-art worldwide research and development communities in wireless communication networks and mobile computing systems. It aims to do so by calling for novel formulations, innovative techniques, and optimised solutions to highlight key issues related to these problems in a forum for shared research and ideas. Artificial intelligence (AI) is a growing trend, driving data in research areas including 5G and beyond communication networks, Internet of Things, social networks and computing techniques and algorithms and so on. In communication networks, system-generated data, information such as sensors, nodes and agents, as well as human-generated data such as texts, photos and videos, create large volumes of data, whilst new levels of security and reliability are required. Similarly, to meet the network transmission speed to compile and send data more quickly, advanced computing techniques are used in communication networks. It has been found that unlimited applications resolve networking and computing technique issues in telecommunications but also provide solutions in interdisciplinary area applications. Wireless networks also pose a unique challenge to the computing and network security community. The need to address wireless networks security and computing techniques and provide timely, solid technical contributions with advanced technologies such as AI, machine learning, and deep learning establishes the motivation behind of this Special Issue.

The prime aim of this Special Issue is to motivate researchers to publish their latest research works focussing on the issues, and challenges and their solutions in the field of wireless networks and computing technologies. The proposed submissions and presentations should be original and unpublished works.

1 | PAPERS IN THE SPECIAL ISSUE

The Special Issue is composed of five outstanding contributions.

Swetha et al. proposes a novel neural network named Capsule Network (CapsNet) as an efficient algorithm to provide error-free implementation of deep learning over the databases. An electrocardiogram (ECG) measures the electrical stimulus of heart non-invasively. Convolutional neural networks (CNN) act as one of the most powerful machine learning techniques to classify ECG arrhythmia and other cardiovascular diseases. Nonetheless, they have functional flaws, including ignorance of spatial hierarchies between eatures, and they are unable to acquire rotational invariance. To overcome these problems of CNNs, CapsNet is proposed. The main objective of this paper is to implement CapsNet for use in ECG signal classification from the Massachusetts Institute of Technology-Beth Israel Hospital database and compare its efficiency with the pretrained CNN network.

Chilakala Sudhamani et al. investigate cooperative spectrum sensing in cognitive radio networks, which consume a large amount of energy during spectrum sensing and reporting. An energy-efficient reporting scheme named reduced energy consumption scheme for reporting has been proposed in this paper to reduce energy consumption. In this scheme, all secondary users will sense the channel and make a local decision about the spectrum. All local decisions are forwarded to a common node known as a fusion centre, which counts the presence or absence of the primary user based on the secondary users' local decisions. Whenever the count is greater than or equal to the threshold, the fusion centre will send a stop-reporting feedback signal to the secondary users. In this way, energy consumption is reduced by diminishing reporting from secondary users, and energy efficiency is improved. The simulation and numerical results show a notable improvement in the energy efficiency of a reduced spectrum sensing scheme compared with the conventional spectrum sensing method.

Aman Kumar Mishra et al. deal with a cell-free massive Multiple Input and Multiple Output (MIMO) (mMIMO), which has two distinctive advantages: first, macrodiversity from large numbers of distributed access points, and second, interference cancelation from cellular mMIMO, which is envisioned to be the next-generation wireless technology for beyond 5G. However, its practical deployment is extremely challenging from an economic perspective owing to large numbers of long cables, and from a technical perspective because of network synchronization. A cell-free mMIMO system based on Radio Stripe (CFMMRS) network is one

such architecture of cell-free mMIMO suitable for practical deployment. This work proposes dynamic neural network–based distributed sequential uplink processing for detecting symbols in the uplink of CFMMRS network architecture. Simulation results show that the proposed algorithm outperforms traditional iterative successive interference cancellation-based detection method.

Siddharth Yadav et al. demonstrate intriguing aspects of query data searching whilst using gatherings terms. These are semantically correlated but separated from the search results. The query is used to analyse best travel routes to make travelling systems more intelligent. Such findings can be applied in real-time applications such as airlines, trains and buses, providing distinctive flight-diverse travel classes for the lowest cost and shortest route. In this work, the gathered data is called query aspects; it investigates a method for Web applications that analyses data from a user's search data and generates a list of shortest and lowest cost travel routes. Here, the proposed intelligent algorithm is developed and used to analyse the searching data effectively. The user selects from a list of the low-cost shortest routes by choosing the mode of commutation of his or her choice (flight/train/bus). The proposed method reduces customer dependencies on solely vehicles (cab, bus or train) services in which the prices are too high and travel time is more. The proposed method demonstrates a suitable performance through visualisation of data against considered peer methods.

Varma et al. focus their research on high-dimensional permission attributes, which are bottlenecks in the design of optimised malware detection systems. Identification of useful permission attributes is difficult; a number of different approaches were previously explored in the literature. A bat optimisation algorithm for wrapper-based feature selection (BOAWFS) is proposed in this paper and evaluated on the CICInves and Mal2019 benchmark dataset. The performance of BOAWFS is compared against cuckoo search optimization and grey wolf optimization algorithms. Five classifiers are compared for wrapper feature selection, including random forest, support vector machines, K-nearest neighbour, decision tree (DT), and nearest centroid. BOAWFS consistently outperformed all five classifiers. With 200 agents and 100 iterations, the BOAWFS-DT outperformed with 93.73% accuracy after reducing the features from 4115 to 518. The considerable contribution of BOAWFS is that 1.67% improvement in accuracy with 87.41% redundancy removal in features is achieved for the high-dimensional permission-based android malware dataset.

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