



## Editorial: Mobile Networks in the Era of Big Data

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### Editorial:

There is an exceptional rupture of research activities in big data, which illustrate enormous potential in making decisions, optimizing operations, mitigating security threats and also in a variety of fields, such as retail, advertisement, manufacturing, healthcare and insurance. Data from Mobile devices and networks like smart phones, cellular networks, Sensor networks, Vehicular Networks is an important source of big data. Thus, Mobile networks play a critical role in big data generation, delivery, and processing. Big Data will have profound impacts on the design and operation of Mobile networks.

We received 46 paper submissions, from which 7 submissions have been transferred and 8 papers withdrawn. After a rigorous single blinded peer review process only 14 papers have been accepted and 17 papers have been rejected, i.e., our acceptance rate is about 45% not considering the transferred and withdrawn submissions. Hence, this special issue features 14 high quality research papers that can demonstrate proofs-of-concept, services, solutions for research challenges, case studies, analytics, real world examples and successful deliveries of Big Data and Mobile Networks.

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The first article [1] deals with mobile communication, where base stations handle mobile devices. The process of assigning mobile nodes to other base stations (because they handle already too many mobile devices or the devices leave the supported area) is called *heterogeneous handover*, which is needed for seamless integration of networks. The contribution [1] proposes a vertical handover for LTE based on various signal measures like the enhanced weighted sum method for handover decision making. Finally, relevant criteria are utilized and their benefits analyzed.

The current state-of-the-art textual password authentication mechanisms are prone to eavesdropping, dictionary attacks and shoulder surfing. Hence, the second article [2] proposes a secure group communication scheme between group members using graphical passwords, which are quite secure using the elliptic curve cryptography technique for key distribution and are easier to remember in comparison to textual passwords. Furthermore, the proposed scheme ensures negligible overhead in terms of communication and computation.

Patients and healthcare seekers exchange their knowledge on health-related issues on online healthcare community discussion forums. The contribution [3] analyzes these discussion forums as e.g. Medhelp for pregnancy data by utilizing metrics like quality of information, emotional support, source trustworthiness, replier competition and recipient involvement, and proposes a knowledge contribution model.

Synthetic Aperture Radar (SAR) images are often degraded due to noise (being an undesirable fluctuation in a random portion of the image), blur (reducing the object visibility) and artifacts (like the shadowing effect). The contribution in [4] provides an analysis for the impact of image artifacts (like shadow effects) in real time images for the purpose of detecting and removing the shadowing effect from very high resolution (VHR) SAR images and aerial view Images.

Targeted anti-forensic attacks eliminate statistical footprints left by contrast enhancement on histograms, such that image modifications become undetectable, and also introduce anomalies in the spatial domain. The contribution in [5] presents a novel algorithm that exploits the statistical anomalies through Laplace modeling of the histograms for detection of anti-forensic contrast enhancement. Experimental results

demonstrate the effectiveness of the proposed algorithm in detection of contrast enhancements executed both by regular as well as anti-forensics techniques.

The contribution in [6] proposes (i) an efficient algorithm for identifying cloud services based on Quality of Service (QoS) metrics given by the cloud consumer using the decision tree classification algorithm, (ii) an efficient algorithm for cloud service resource registry aiming to enable cloud service providers to register their services with its QoS attributes, and (iii) a cloud service resource discovery for searching in the cloud service registry for cloud services using the Split and Cache (SAC) algorithm. An error regarding the authors names in [6] are corrected in the Erratum [7].

Vehicular Ad hoc NETWORKS (VANETs) are a highly dynamic network due to the rapid mobility of vehicles. Effective communication in VANETs is enabled by introducing a topology in the network, which can be determined by clustering algorithms. These clustering algorithms must be suitable for highly dynamic networks stabilizing the VANET topology. The contribution [8] proposes an improved variant of the Reputation based Weighted Clustering protocol (RWCP) for VANETs. The RWCP is framed by taking the direction of vehicles, position, velocity, number of nearby vehicles, lane ID, and the reputation of each node into consideration. Simulations and experiments with realistic maps from OpenStreet Maps show the benefits of the proposed method concerning mean cluster lifetime, packet delivery ratio and control packer overhead in comparison with state-of-the-art approaches.

The authors of the paper [9] propose the extension *k-repetitive-nearest-neighbor* of existing nearest-neighbor heuristics. Starting with a tour of  $k$  nodes the algorithm then performs a nearest-neighbor search from there on. The final result is determined as the shortest tour under all permutations of  $k$  nodes as starting tour of the nearest-neighbor search. The proposed approach reaches about 10% to 40% above the optimum in experimental results.

Task scheduling aims to balance the workload on a cloud server. Existing approaches are not optimized to handle burstiness workloads containing bursty user demands and provide high-quality cloud services. The contribution in [10] proposes the Threshold Based Multi-Objective Memetic Optimized Round Robin Scheduling (T-MMORRS) technique which employs a burst detector to decide on the usage of Weighted Multi-Objective Memetic Optimized Round Robin Scheduling (WMMORRS) for burstiness workload, and the Threshold Multi-Objective Memetic Optimization (TMMO) approach for normal workloads. The experimental results demonstrate that the T-MMORRS technique enhances the scheduling efficiency and also minimizes the energy usage in the cloud in comparison to state-of-the-art approaches.

Recommender systems provide information filtering approaches to suggest relevant items like movies and locations based on dynamic user preferences and interests. The authors of [11] propose a novel Hybrid Location-based Travel Recommender System (HLTRS) through exploiting the ensemble based co-training method with swarm intelligence algorithms to enhance the personalized travel recommendations. Experimental results using real-world large-scale datasets demonstrate a better performance of the proposed HLTRS over existing state-of-the-art recommender systems.

The paper [12] introduces an autonomic prediction model for auto recovery of attacked VM instances in a cloud. The proposed approach to auto recovery and self-healing in the VM's by an intelligent hypervisor offers a continuous progression of any process in the schedule without any job disruption.

Encryption typically secures data in transmission also for cloud computing applications. State-of-the-art encryption techniques encrypt whole data packets in a session using the same session key. Hence once a single packet is decrypted within an attack, all the packets of that session are compromised. The work [13] proposes a packet encryption scheme to ensure that a packet key will only be used once throughout the session, with minimal latency and maximum security for real-time mobile cloud applications.

Various designs of hierarchical interconnection networks (HINs) for massively parallel computer (MPC) systems aim to replace the conventional ones which showed poor performance in scaling the network size. Recently, a Shifted Completely Connected Network (SCCN) is proposed as a new HIN topology. The authors of [14] discuss routing protocols of SCCN and evaluate the time cost-effectiveness factor of SCCN.

We wish all readers of this special issue interesting hours. Please enjoy reading the papers of our special issue.

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