



Special issue on the technologies and applications of big data

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Big data represents the collection of data characterized by volume, variety, velocity, value, veracity and variability. These characters make it difficult to apply traditional data processing techniques for insight extraction. Big data serves as a source for confident decision making in industry and society at large. Thus, research in technologies relevant to big data receives increasing attention from not only academia and industry but also from practitioners and governments.

The applications of big data technologies have far reaching implications in various industries such as agriculture, manufacturing, healthcare, transportation, education and so on. The aim of this special issue is to present high quality research articles from academia and industry on the recent advances in different aspects of big data

technologies and applications. These articles have been selected after a rigorous review process.

Weather forecasting finds its application in air traffic, marine, agriculture, forestry, utility companies, military application and general public. However, in most part of the world statistical and numerical analysis techniques are used. Therefore, the first paper [1] presents machine learning based approach for weather forecasting. Compared to traditional approach, the proposed approach using machine learning has higher accuracy.

Image segmentation in image analytics is used for pattern detection, photo montage and object recognition application. Image acquisition in under water is a challenge and in general produce low quality images. Therefore, the next paper [2] presents segmentation procedure for underwater images. The algorithm improves color correction and contrast enhancement compared to other existing algorithms.

Social network consists of a set of social actors and social interactions between actors. For information retrieval and interaction identification of influential node is essential. Existing graph-based methods consider only numeric measures for keyword extraction. The next paper [3] presents Semantic graph-based Keyword Extraction Method (SKEM) for ranking. The performance of the proposed SKEM model is validated with real-time tweets of Twitter API.

Search engine algorithm consists of a set of rules that a search engine uses to rank listings in response to a search query. For example, Google uses 'Page Rank Algorithm' for its searches. The next paper [4] proposes a more efficient way of searching the web and better organizing the search result based on the categories of the pages.

One of the main concerns in using cloud technology is preserving security and privacy. The secure processing of personal data in the cloud represents a huge challenge. Most of the existing security controls in cloud computing are not suitable for mobile cloud computing. Therefore, the next article [5] presents the design of a trivial information relaying scheme (TIRS) for mobile cloud computing. The

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proposed design has reduced overhead compared to other approaches in mobile cloud environment.

The next paper [6] presents the implementation of a framework for Distributed Denial of Service (DDoS) attack detection for cloud environment. The framework has been implemented using OpenStack cloud environment. The authors have used real-time data set to prove its efficiency compared to existing solutions.

Internet of Things (IoT)—network of physical objects find wide applications in agriculture, transport, home, healthcare, etc. Safeguarding connected devices and networks in the internet of things (IoT) has led to serious security threats. Medical device used in the hospital severe security vulnerability. Therefore the next paper [7] presents risk assessment technique for security attacks on the Internet of Medical Things (IoMT). The technique helps to identify the highest impact causing security attacks in IoMT.

In the refinement of healthcare practices, interrelated visitation and excessive medications rates are vital. Hence, the next paper [8] extracts pertinent data evidence in a novel manner using a new bivariate probability model and probes their balancing nature.

Greenhouse gases trap heat and make the planet warmer. Therefore, governments are committing themselves to reduce carbon emissions to acceptable levels. Micro Grid (MG) is one of the possible solutions to reduce carbon emission. Therefore, the next paper [9] identifies the limitations of existing Micro Grids and proposes Smart Micro Grid based on integration of modern ICT technologies such as sensors, Fog and Cloud computing etc., to overcome the limitations. The paper presents first of its kind Fog Micro Data Center (fogMDC) powered by micro grids and controlled by Software Defined Networks (SDN). The authors concentrate on performance modeling and economic modeling to guarantee QoS for time sensitive IoT applications. The proposed solution has been evaluated using real time meteorological data.

According to International Federation of Global & Green ICT “IFGICT”, green computing is the study and practice of environmentally sustainable computing or IT. The next paper [10] presents models and load balancing techniques for green computing. The authors show that their approach reduces carbon footprint. A container is a standard unit of software that packages up code and all its dependencies so the application runs quickly and reliably from one computing environment to another. The authors propose containers over virtual machine for reducing carbon emission.

The decentralized type of networks mobile ad hoc network (MANET) faces challenges in load balancing and energy efficiency. Inspired from behavior of ants in colonies, the next article [11] proposes to compute the optimal

path. The authors propose Ant-based Efficient Energy and Balanced Routing (A-EEBR) technique for choosing next hop using metrics such as delay, energy drain rate, congestion and link quality. The proposed new approach performs better compared to existing Ant-based Energy Saving Routing (A-ESR). This paper also addresses energy efficiency for reducing carbon foot print.

A vehicular ad hoc network (VANET) consists of groups of moving or stationary vehicles connected by a wireless network. VANET forms the backbone for efficiently communicating among the vehicles. However, VANETs do not have a stable topology. The next article [12] proposes dynamic routing protocol considering Quality of Service (QoS) needs and topology changes. The proposed algorithm has improved packet delivery ration, mean routing load and end-to-end delay.

Context-aware adaptive systems adjust themselves in response to the changes in the operating environment, namely the context at runtime. Correctness of the adaptive systems is ensured using adaptive rules. These adaptive rules must be complete and consistent even when the system experiences unforeseen environmental challenges. Therefore, the next paper [13] presents technique for generation of adaptive rules. The proposed technique generates new adaption rules even in undefined context situation.

Equivalence Class Clustering and bottom-up Lattice Traversal (ECLAT) algorithm is an association rule mining technique. The next paper [14] presents an enhanced version of ECLAT for selecting best cloud service provider by cloud service brokers. The cloud service providers can be ranked based on their past performance using the Enhanced ELCAT (EELCAT) algorithm.

Scheduling is one of the core issues in cloud computing for efficient utilization of resources. Conventional scheduling techniques do not minimize Service Level Agreement (SLA) violations, resource wastage and energy consumption. Therefore, the next paper [15] presents multi objective scheduling algorithm. The proposed Nature-inspired Meta-heuristic Threshold based Firefly Optimized Lottery Scheduling (NMT-FOLS) Technique outperforms existing state of art and conventional scheduling algorithms.

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Dr. Sven Groppe is a Lecturer and Tutor at the University of Lübeck, Germany. His publication record contains over 100 publications, including the book Data Management and Query Processing in Semantic Web Databases, published by Springer. He was a member of the DAWG W3C Working Group, which developed SPARQL. He was the project leader of the DFG project LUPOSDATE, an open-source Semantic Web database, and of

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