Guest Editorial Preface

Special Issue on Recent Advances in Cloud Computing, Machine Learning, and Security in Web-Based Applications

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This special issue is based on a hybrid research paradigm that includes papers on cloud computing based-research, machine learning, and web-based applications. It highlights the state-of-the-art research in web engineering and practices of cloud and social computing to ensure an efficient environment for web Engineering systems. Web Engineering allows people to upload, retrieve, store and collect information, which has grown tremendously over the years and poses a serious concern in extracting, analyzing and managing the information over the Web. At the same time, cloud computing has become a delivery platform in the field of computing services. Social network analysis is a platform, where we can analyze peoples’ thoughts, experience and opinions within the interaction between each other.

The papers included in this special issue focus on a number of new emerging technologies in cloud computing and web-based applications. Recently, many issues are still waiting for solutions in these areas. Cloud computing has drawn gigantic attention in research and business communities. Major applications include scheduling and effective use of cloud computing services, as well as load balancing among these services. As business moves data into the cloud, it becomes essential to manage such data efficiently.

In the first article “Dynamic Backfilling Algorithm to Increase Resource Utilization in Cloud Computing”, the authors presented a novel task scheduling algorithm to schedule deadline-sensitive leases in cloud computing. The authors used backfilling approach to assign the small leases before the commencement of large ones. It not only improves the performance, but also avoids starvation. The authors compared the proposed algorithm with traditional backfilling and backfilling with analytic hierarchy process algorithm, and tested using 55 independent leases and 10 virtual machines.

Authors of the second article, “An Approach for Load Balancing in Cloud Computing using JAYA Algorithm”, applied a well-known algorithm, called JAYA to perform load balancing in cloud computing. The authors compared the proposed algorithm with genetic algorithm and particle swarm optimization in terms of average response time and data center request servicing time. They conducted simulations on a wide variety of VMs (i.e., 50 to 1000), user bases and datacenters to observe the efficiency of the proposed algorithm.

The third article, “A Systems Overview of Commercial Data Centers: Initial Energy and Cost Analysis”, addressed the market segmentation of the leading data center operators and discussed the infrastructural considerations, namely energy consumption, power usage effectiveness, cost structure, and system reliability constraints. Moreover, it presents data center network design, classification of the data center servers, recent developments, and future trends of the data center industry. Furthermore, the emerging paradigm of mobile cloud computing is debated with respect to these research issues. Preliminary results for the energy consumption of task scheduling techniques are also provided.
The next three articles addressed important issues in web-based applications using machine learning to identify network attacks, preserving privacy in social networking, and ontologies in managing multidimensional association rules. Authors of “A SVM-Based Ensemble Approach for Intrusion Detection,” proposed an intrusion detection model, which aims at distinguishing-type attack in the network. The authors applied both supervised (i.e., support vector machine) and unsupervised (i.e., K-means) machine learning techniques to produce better results and used three benchmark datasets, namely KDD corrected, NSLKDD and GureKDDCup. The proposed approach produces 99% accuracy, and minimizes both type-1 and type-2 errors in all the datasets.

In the second article “A Novel Framework for Preserving the Privacy of Online Users Against XSS Worms in Online Social Network”, the authors discussed a robust client-server framework, i.e., OXSSD, which detects and thwarts the propagation of XSS worms from different platforms of OSN-based web applications. OXSSD splits the web application into different views. These views undergo parsing for extracting malicious XSS attack worms after the successful action authentication. In addition, clustering is applied on these extracted worms for generating the compact XSS attack template. Finally, sanitizer primitives are injected on these compressed templates in a strictly context-aware manner. The XSS worm detection capability of OXSSD was evaluated on different platforms of OSN-based Web applications. The performance evaluation outcomes reveal that OXSSD is quite capable enough to detect the XSS attack worms with high detection rate, less rate of false positives and false negatives.

Finally, the last article “A hybrid Pre-Post Constraint-based Framework for Discovering Multi-Dimensional Association Rules Using Ontologies”, developed an ontology-based model to filter multi-dimensional association rules. The filtering model defines filtering constraints on the original dataset using an ontology representation. Three types of constraints are applied to the datasets on which the association rule discovery is performed; the hierarchical constraints are defined on the hierarchy level that is used in the mining process. The dimensional or object property constraints limit the number of dimensions used in the association rules discovery. They are also used to discover semantically related association rules. The final type of constraints is the data type property constraints which are defined on a single dimension and used to discover rules with specific characteristics on a single dimension.

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