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Editorial

HPC Software and Programming Environments for Big Data Applications

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The complexity of scientific and engineering problems has increased significantly as data have been generated at high speed. Traditional HPC systems have begun to provide a large data-processing infrastructure for high-performance big data processing. In particular, HPC software and programming environments provide a rich computing framework for large data issues that have not previously been resolved. However, traditional HPC system software and programming models were not originally designed and developed for big data application processing and were difficult to use. This special edition includes articles that address issues that improve existing software and programming environment and use them for high-performance big data processing.

This special issue includes nine papers. It covers hardware and software issues ranging from a paper to improve the performance of the big data framework to a paper to improve the performance of the application using the big data framework. The paper "EDC-Based Hardware-Level Fault Tolerance and Fault Secure Checker Design for Big Data and Cloud Computing" describes the hardware-level security concern for big data systems. The paper "Research on the Prewarning Method for the Safety of South-to-North Water Transfer Project Driven by Monitoring Data" proposes an intelligent prewarning method for the abnormal data processing in the South-to-North Water Transfer Project. The paper "Big Data in Cloud Computing: A Resource Management Perspective" identifies key features that characterize big data resource management systems. The paper "NUMA-Aware Thread Scheduling for Big Data Transfers over Terabits Network Infrastructure" proposes a NUMA (Non-Uniform Memory Access)-aware thread and resource scheduling for optimized big data transfers in terabit network. The paper "Deployment Strategy for Car-Sharing Depots by Clustering Urban Traffic Big Data Based on Affinity Propagation" presents an optimization method to determine the depot locations by clustering taxi OD points with the AP (Affinity Propagation) clustering algorithm. The paper "Mitigating Interference between Scientific Applications in OS-Level Virtualized Environments" describes an interference-aware scheduling method that mitigates the problem of performance interference based on applications' I/O and CPU usage profiles in OS-level virtualized environments. The paper "Cultural Distance-Aware Service Recommendation Approach in Mobile Edge Computing" proposes a cultural distance-aware service recommendation approach in mobile edge computing. The paper "Nonmetric Correction of Lens Distortion Based on Entropy Measure" presents a nonmetric correction algorithm for lens distortion based on entropy measure for the real vision system. The paper "Field Geometric Calibration Method for Line Structured Light Sensor Using Single Circular Target" presents a geometric calibration method for line structured light sensor.

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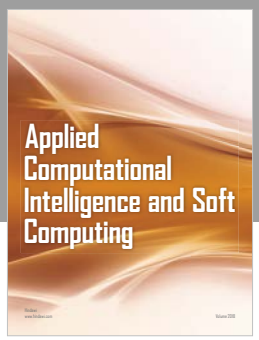

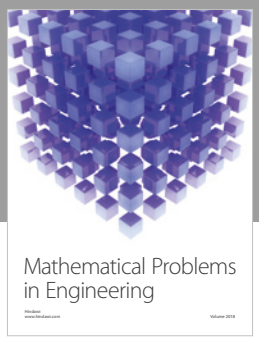

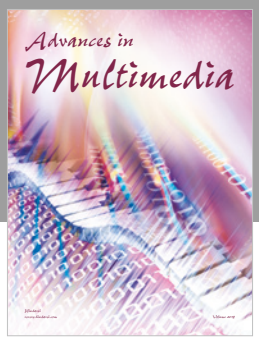

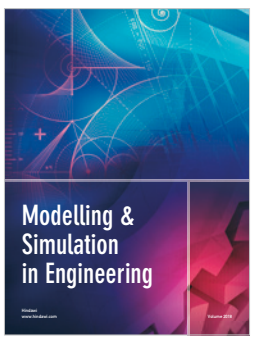

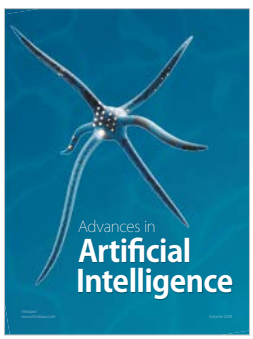

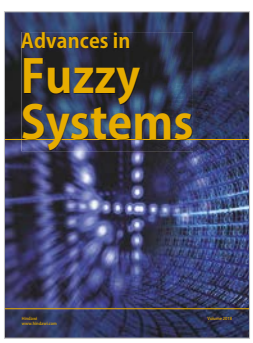

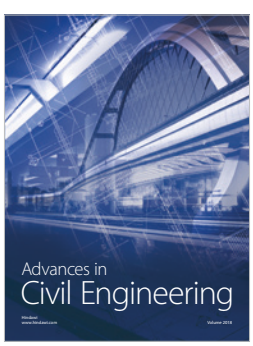

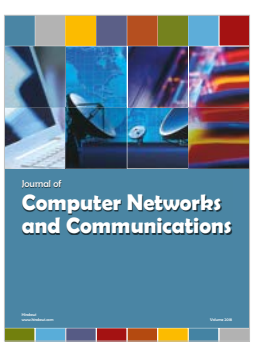

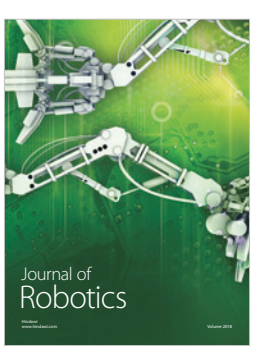

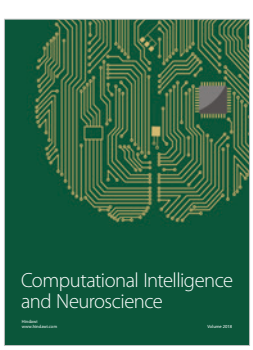

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