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Guest Editorial – Parallel and Distributed Computing and Applications

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Computational systems that can perform multiple operations or tasks simultaneously have been under many years of development and evolvement, adapting to the requirements on energy efficiency and conservation in global economy. The objective of this special collection is to publish and overview recent trends in the interdisciplinary area of parallel and distributed computing, applications and technologies. This special collection include the following 3 papers, covering topics of data locality optimization in Spark computing environment, neural network accelerators with optical computing and communication, human action recognition based on skeleton features.

The first paper "Optimizing Data Locality by Executor Allocation in Spark Computing Environment" improves the data locality in Spark computing by executor allocation for reduce stage. They firstly calculate the network distance matrix of executors and formulate an optimal executor allocation problem to minimize the total communication distance. Then, when the network distance between executors satisfies the triangular inequality, an approximate algorithm is proposed; and when the network distance between executors does not satisfy the triangular inequality, a greedy algorithm is proposed.

The second paper "Efficient Neural Network Accelerators With Optical Computing and Communication" presents a comprehensive review for the efficient photonic computing and communication in electronic Artificial Neural Networks accelerators. The related photonic devices are investigated in terms of the application in ANNs acceleration, and a classification of existing solutions is proposed that are categorized into optical computing acceleration and optical communication acceleration according to photonic effects and photonic architectures. They also discuss the challenges for these photonic neural network acceleration approaches to highlight the most promising future research opportunities in this field.

The third paper "Human Action Recognition based on Skeleton Features" proposes a novel feature descriptor, named as ExGist, to describe the skeleton information of human bone joints for human action recognition. The joint coordinates are extracted using OpenPose and the thermodynamic diagram, and ExGist is used for feature extraction. The advantage of ExGist is that it can effectively characterize the local and global features of skeleton information. By comparing the performance on different classifiers, ExGist achieves better results with an accuracy rate of 89.2%.