Guest Editorial Preface

Special Issue on System Modeling Applications Into Next-Generation Internet

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Different from current TCP/IP network structure, Next-Generation Internet (NGI) proposes revolutionary networking architectures, such as Information-Centric Network (ICN), Software-Defined Network (SDN), Data Center Network (DCN), etc. Although these emerging NGI paradigms have shown many significant advantages in the improvement aspects of network optimization and Quality of Service (QoS), they always face some severe challenges. For example, with the explosive increasing of information data, network performance usually cannot reach relatively optimal, and the super-high requirements of users cannot be satisfied well. As a key technique solution, system modeling plays an important role in a network information age, and it can conduct large-scale data evaluation, traffic scheduling, robustness analysis, etc. By considering system modeling into NGI, the above-mentioned challenges can be improved greatly. For example, the request distribution of users is analyzed to improve QoS; the mathematical model of traffic is built to guarantee without network congestion. Furthermore, system modeling will simplify NGI and make it more modular from the perspective of system framework. Therefore, this special issue focuses on applying system modeling into NGI and contains five papers.

The first paper, "Research on Collaborative Machine English Translation Using the HICN Technology," considered Hybrid Information Centric-Networking (HICN) scenario to enable the power of smart city. In this work, a method using collaborative machine learning and quality estimation technique was proposed, which set a fixed threshold to filter pseudo-parallel data during unsupervised neural machine translation training. The quality estimation was used to evaluate and screen the pseudo-parallel data with high performance generated during reverse translation training. The results indicated that the proposed method outperformed the state-of-the-art methods.

The second paper, "WSN-Driven Posture Recognition and Correction Towards Basketball Exercise," established a human posture estimation framework by using monocular camera and Wireless Sensor Network (WSN). First, the daily basketball training images were collected by monocular camera and transmitted through WSN. Second, the collected images were processed by an observation and reasoning model based on component and graph reasoning. The basketball player's posture was depicted by the rotation invariant features of edge field. The extracted features were used to learn a boosting classifier as the observation model. The experimental results showed that the posture recognition rate could achieve more than 88% for basketball player's action.

The third paper, "Abnormal Emotion Detection of Tennis Players by Using Physiological Signal and Mobile Computing," adopted the pulse wave signal to implement the emotion estimation for the athletes. First, the pulse wave signals were collected by using a portable sensor via mobile computing. Then, the collected pulse wave signals were removed noises by wavelet transform. Last, the denoised pulse wave signals were represented as the features in time domain and frequency domain to input into a trained classifier for determining the current emotion status. The experimental results showed that the proposed method could recognize more than 90% of the abnormal emotion.

The fourth paper, "AI for Health-Related Data Modeling: DCN Application Analysis," focused on the features of health-related data, and outlier detection during data preprocessing was studied. Meanwhile, an improved algorithm for health-related data-based outlier detection was proposed. The experimental results revealed that the proposed outlier detection algorithm had a smaller running time, and more outliers were detected compared to three baselines. In addition, local importance based random forest feature selection algorithm was proposed to measure the importance of each feature. The experimental results indicated that the proposed algorithm could select optimal feature subset to apply health-related data.

The last paper, "A Diffraction Service Composition Approach Based on S-ABCPC: An Improved ABC Algorithm," considered the advantages of Artificial Bee Colony (ABC) to make a diffraction service composition for addressing the continuous development of service ecosystem. The experimental results proved that the proposed approach was efficient.

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