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Editorial: Machine Learning and Intelligent Wireless Communications (MLICOM 2017)

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Editorial:

With the rapid development of wireless communication technologies, the number of wireless users is increasing substantially. However, researches have shown that there is a big gap in terms of the current wireless communication technologies and the future requirements. Therefore, there is an urgent need that the wireless communication technologies should be more intelligent in order to better satisfy the requirement of future wireless users. Driven by this demand, machine learning which offers computers the ability to learn without being explicitly programmed is widely focused. In particular, evolving from pattern recognition and artificial intelligence, machine learning investigates the study and establishment of algorithms which can learn from and make predictions on complicated scenarios. Thus, with machine learning, the complicated scenarios analysis and prediction in wireless communication technologies could be facilitated in order to make optimal actions. In other words, the application of machine learning in wireless communication technologies is with great potential to obtain more intelligent wireless communication systems with better performance.

This special issue features six selected papers with high quality. In the first article, "Simultaneous Cooperative Spectrum Sensing and Energy Harvesting in Multi-antenna Cognitive Radio", authored by Xin Liu, etc., an energy harvesting-based multi-antenna CR is proposed, which lets the SU harvest the radio frequency (RF) energy of the PU signal and the noise to supplement the energy loss. Time splitting model and antenna splitting model have been proposed to realize the simultaneous cooperative spectrum sensing and energy harvesting for multi-antenna CR, in which cooperative spectrum sensing, energy harvesting and data transmission can be performed in one SU.

The second article titled "Dual-domain compressed sensing method for oceanic environmental elements collection with underwater sensor networks" considers the data gathering underwater networks for monitoring oceanic environmental elements (e.g. temperature, salinity) under compressed sensing (CS) theory. By utilizing the spatial sparsity of active sensors' data, the authors introduce an activity and data detection based on CS at the receiver side, resulting in an efficient data communication by avoiding the necessity of conveying identity information. Simulation results validate the effectiveness of the proposed scheme compared to IDMA-CS scheme and an optimal sensing probability problem related to minimum reconstruction error is explored.

In the next article with the title "Routing Algorithm with Virtual Topology Towards to Huge Numbers of LEO Mobile Satellite Network Based on SDN", the routing issues in SDN are investigated. This paper considers SDN network is a dynamic, controllable, cost-effective and adaptable system. It is suitable for communication networks with high bandwidth and high dynamic characteristics. Therefore, combining SDN ideas with the new generation of LEO satellite networks can achieve more flexible monitoring and management of the network, and can make the network expansion more convenient. Joint the Depth-First-Search (DFS) idea and Dijkstra algorithm for the huge numbers of LEO mobile satellite network based on SDN is proposed to improve the computational efficiency and the reliability of calculation result.

The fourth article with the title "The performance of physical-layer network coding in asymmetric Rayleigh fading

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two way relay channels" mainly study PNC in asymmetric two-way relay Rayleigh fading channels. This paper classifies the systems into five asymmetric cases. On this basis, the bit error rate(BER) performances of PNC in both symmetric and asymmetric cases with asymmetric factors fixed are theoretically studied and simulated. The simulation results show that the BER performance of PNC with one of the asymmetric factors is variable when two channels are relatively unreliable.

The fifth article with the title "Energy-Efficiency Maximization with Non-linear Fractional Programming for Intelligent Device-to-Device Communications" aims to maximize the energy efficiency of wireless communication system in the context of underlaying device-to-device communications. This paper focuses on the formulated power control and resource allocation problem which is non-convex in the fractional form and proposes a dual-based algorithm in general. Numerical simulations demonstrate that the proposed algorithms outperform the conventional algorithm in terms of the energy efficiency.

In the last article titled "Maximum a Posteriori Decoding for KMV-Cast Pseudo-Analog Video Transmission", a maximum a posteriori (MAP) decoding for KMV-Cast pseudo-analog video transmission is proposed to further eliminate the residual noise in the received video/image. The simulation results show that the proposed decoding method has the best performance compared with other two algorithms, such as KMV-Cast and SoftCast.

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