BEHAVIOR RECOGNITION BASED ON WI-FI CSI: PART 2

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Wi-Fi channel state information (CSI)-based human behavior recognition has become a promising research area in recent years. The rationale is that different human behaviors introduce different multi-path distortions in Wi-Fi CSI, which presents several unique advantages: unaffected by external light, with better coverage (even supporting through-wall sensing), and user privacy preservation. There are also numerous research challenges of CSI-based human behavior recognition, including behavior recognition model/theory using Wi-Fi CSI, Wi-Fi CSI data mining, quality-enhanced and adaptive sensing models with Wi-Fi CSI, behavior recognition with individual differences, the flexibility of such CSI-based behavior recognition systems, and so on.

IN THIS ISSUE

The papers submitted to this Feature Topic have been organized as Part 1 and Part 2. Part 1 involved four articles and was published in the October 2017 issue. The other four are published as Part 2 in this issue. The four articles cover different topics of CSI-based human behavior recognition, as described below.

The first article, "Wi-Fi CSI-Based Behavior Recognition: From Signals and Actions to Activities" by Wang *et al.*, classifies Wi-Fi CSI-based behavior recognition applications into three granularities — signals, actions, and activities — and provides a set of insights for designing new schemes. The article also discusses the challenges, possible solutions to these challenges, and some open issues involved in CSI-based behavior recognition.

The second article, "Exploring Training Options for RF Sensing Using CSI" by Domenico *et al.*, studies the role of training in human behavior recognition approaches that rely on Wi-Fi CSI. It provides insights on when it is possible to reduce the amount of training. An interesting finding of this work is that a reduced training model might not impact recognition performance.

The third article, "Learning Human Activities through Wi-Fi Channel State Information with Multiple Access Points" by Li *et al.*, introduces the deep learning paradigm into Wi-Fi CSI-based human activity sensing. The authors focus on the activity recognition problem in the Wi-Fi environment with multiple access points and design a convolutional neural network (CNN)-based method to learn human activities instead of traditional pattern-based approaches.

The last article, "Exploiting Wi-Fi Channel State Information for Residential Healthcare Informatics" by Tan *et al.*, describes a methodology that identifies Doppler shifts in Wi-Fi CSI, caused by human activities that take place in the signal coverage area. The technique is shown to be beneficial in recognizing different types of human activities, and subsequently facilitating applications in the healthcare domain.

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