Lifelong Learning in Sensor-based Human Activity Recognition

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KEYNOTE ABSTRACT

Sensor-based human activity recognition is to recognise users' current activities from a collection of sensor data in real time. This ability presents an unprecedented opportunity to many applications, and ambient assisted living (AAL) for elderly care is one of the most exciting examples. For example, from the meal preparation activities, we can derive the user's diet routine and detect any anomaly or decline in physical or cognitive condition, leading to immediate, appropriate change in their care plan. With the rapidly increasing ageing population and overstretched strains on our healthcare system, there is a rapidly growing need for industry in AAL.

However, the complexity in real-world deployment is significantly challenging current sensor-based human activity recognition, including the inherent imperfect nature of sensing technologies, constant change in activity routines, and unpredictability of situations or events occurring in an environment. Such complexity can result in decreased accuracies in recognising activities over time and further a degradation of the performance of an AAL system.

The state-of-the-art methodology in studying human activity recognition is cultivated from short-term lab or testbed experimentation, i.e., relying on well-annotated sensor data and assuming no change in activity models, which is no longer suitable for long-term, large-scale, real-world deployment. This creates a need for an activity recognition system capable of embedding the means of automatic adaptation to changes, i.e., lifelong learning. This talk will discuss new challenges and opportunities in lifelong learning in human activity recognition, with particular focus on transfer learning on activity labels across heterogeneous datasets.

SPEAKER'S BIOGRAPHY

Dr Juan Ye is a lecturer in the School of Computer Science at the University of St Andrews, UK. Her research interest centers on human behaviour recognition and analysis, specialising in ontologies, uncertainty and temporal reasoning, applied machine learning, and data mining techniques. From her PhD study to present, she has published 70 papers in top-tier journals and conferences, including three reviews on human activity recognition that identify the key research challenges and open questions. She has designed and developed techniques that novelly integrate data- and knowledge-driven techniques with emphasis on unsupervised learning, transfer learning, and emerging activity discovery.

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