Vision-Based Daily Routine Recognition for Healthcare with Transfer Learning

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Abstract : We propose to record Activities of Daily Living (ADLs) of elderly people using a vision-based system so as to provide better assistive and personalization technologies. Current ADL-related research is based on data collected with help from non-elderly subjects in laboratory environments and the activities performed are predetermined for the sole purpose of data collection. To obtain more realistic datasets for the application, we recorded ADLs for the elderly with data collected from real-world environment involving real elderly subjects. Motivated by the need to collect data for more effective research related to elderly care, we chose to collect data in the room of an elderly person. Specifically, we installed Kinect, a vision-based sensor on the ceiling, to capture the activities that the elderly subject performs in the morning every day. Based on the data, we identified 12 morning activities that the elderly person performs daily. To recognize these activities, we created a HARELCARE framework to investigate into the effectiveness of existing Human Activity Recognition (HAR) algorithms and propose the use of a transfer learning algorithm for HAR. We compared the performance, in terms of accuracy, and training progress. Although the collected dataset is relatively small, the proposed algorithm has a good potential to be applied to all daily routine activities for healthcare purposes such as evidence-based diagnosis and treatment.