Activity Recognition Based on Inertial Sensors for Ambient Assisted Living

Davis and colleagues evaluated three machine learning algorithms, namely Support Vector Machine (SVM), a hybrid of Hidden Markov Models (HMM) and SVM (SVM-HMM) and Artificial Neural Networks (ANNs) applied on a dataset collected between the elderly and their caregiver counterparts. Obtaining a 91.4%, 97.6% and 99.7% for the machine learning algorithms ANN, SVM, SVM-HMM respectively. Demonstrating that the SVM- HMM hybrid approach achieving the highest detection accuracy.

Deep Learning Algorithms for Human Activity Recognition using Mobile and Wearable Sensor Networks: State of the Art and Research Challenges

OPPORTUNITY, Skoda and PAMAP2 are some of the widely used datasets for classical machine learning algorithms. The Boltzmann Machine, Auto encoder and Convolutional Neural Networks and Recurrent neural network Deep Learning Methods were presented and their characteristics, advantages and drawbacks were equally exposed. For automatic feature learning in diverse areas like health, image classification, and recently, for feature extraction and classification of simple and complex human activity recognition in mobile and wearable sensors there has been an increased adaptation of computation power, deep learning and artificial intelligence methods with the emergence of deep learning.

There has been an enhanced performance accuracy in areas like deep learning based decision fusion, implementation of deep learning on-board mobile devices, transfer learning and class imbalance problems that enable implementation of human activity recognitions.

Enhancing Activity Recognition using CPD-based Activity Segmentation

A change in point detection-based activity segmentation model increases the performance of activity recognition by segmenting behavior-driven sensor data in real time.

Robust activity learning technology is required in the IOT environment to provide proper services to its residents. By providing the information about activity transitions and insights on activity start/end times and durations, activity segmentation improves the robustness of these technologies. The beginning and ending point of each activity is known when recognizing activities from a pre-segmented data.

Proposing a daily human activity segmentation based on change point detection techniques in an online or streaming fashion, using unscripted data from smart homes, the performance of alternative segmentation and window based activity recognition algorithms were evaluated using pre-defined metrics. Results provide evidence that detecting activity transitions and utilizing segment features in activity recognition improve recognition performance while also providing activity boundary and transition insights.

Human Activity Recognition using Recurrent Neural Networks

Working on raw input reduces both handcrafting features and the time and effort required in the preprocessing of data which can be time consuming in AAL(Ambient Assisted Living).Improvement in performance, increased accuracy and better results can be attained by the Deep Learning based approaches from raw sensory inputs. The classification of activities like cooking, bathing and sleeping can be performed applying the Long Short-Term Memory classifier (LSTM).