

FEATURE SELECTIONS FOR HUMAN ACTIVITY RECOGNITION IN SMART HOME ENVIRONMENTS

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ABSTRACT. *In this paper, three probabilistic models are applied to represent and recognize human activities from observed sensor sequences: Naïve Bayes classifier, forward procedure of a Hidden Markov Model and Viterbi algorithm based on a Hidden Markov Model. A variety of different feature selection methods is tested in order to reduce the dimensionality of the learning problem. The results show that the activity recognition performance measures of the three algorithms have a strong relationship with the dataset features that are utilized. Larger time feature values and smaller length size feature values will generate better results, relatively.*

Keywords: Activity recognition, Naïve Bayes classifier, Hidden Markov model, Viterbi algorithm, Smart home

1. Introduction. As the world's population ages, the number of elderly people living alone will enormously increase. With aging, health related problems also increase. Hence, the number of elderly people in need of assistance to have a normal life will increase rapidly. The number of care-givers will be outnumbered by the increasing elderly population. With the advent of smart home technologies, people with cognitive impairments can lead independent lives in their homes for longer duration of time. Smart homes can assist their residents by acting as a cognitive prosthesis, by handling various appliances/objects and also by facilitating emergency communication. Furthermore, cognitive health assessments performed in clinical settings do not always provide an adequate representation of a patient's behavior. Real life assessments of Activities of Daily Living (ADLs) can provide a better understanding of the subject than assessments performed in a clinical setting [1]. Computer vision sensing often works in the laboratory but fails in real home settings due to clutter, variable lighting, and highly varied activities. Video feeds have been used for activity recognition. Sensors such as microphones and cameras are commonly used as recording devices. Cameras and microphones face another challenge because they are perceived as invasive by most people [2-6]. Alternatively, motion sensor data can be used to recognize real-life activities done in a home. The CASAS smart homes [7] provide continuous monitoring capability that conventional methodologies lack. Being able to automate the activity recognition from human motion patterns, using unobtrusive sensors or other devices can be useful in monitoring older adults in their homes and keeping track of their ADLs and behavioral changes [8-15]. This could lead to a better understanding