

## Research Article

# Personalization in Mobile Activity Recognition System Using -Medoids Clustering Algorithm

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Nowadays mobile activity recognition (AR) has been creating great potentials in many applications including mobile healthcare and context-aware systems. Human activities could be detected based on sensory data that are available on today's smart phone. In this study, we consider mobile phones as an independent device since sending the data to central server can generate privacy issues. Furthermore, applying AR on mobile phone does not only require an effective accuracy rate but also the lowest power consumption. Normally, an AR model learnt from acceleration data of a specific person is distributed to other people to recognize the same activities instead of generating different models individually. This work often cannot create accurate results on the prediction in broad range of participants. Moreover, such AR model also has to allow each user to update his new activities independently. Therefore, we propose an algorithm that integrates Support Vector Machine classifier and -medoids clustering method to resolve completely the demand.

## 1. Introduction

Currently, mobile-based AR has been applied widely in various technological aspects to enhance the quality of life. In healthcare applications, it has been used to assess physical activities and aid cardiac rehabilitation, detect a fall event as in our achievement [1], predict user's energy consumption based on monitoring activity of daily living (ADL), and generate daily, weekly, and monthly activity reports in order to promote health and fitness. In context-aware pervasive computing systems, mobile accelerometer has gained significant achievements. In term of user's device security improvement, gait recognition is studied as a potential protection mechanism [2, 3]. Moreover, human activity information can also be used to adapt automatically the behavior of using mobile phone. It can include sending calls directly to voicemail if a user is bicycling or jogging, turning on music when jogging is taken place, and so forth. In order to gain these benefits, mobile phone accelerometer data must be processed at device or central server via communication channels (Wi-Fi, Bluetooth, etc.). In this study, we consider mobile phones as an independent device since sending

the data to central server from mobile device can generate privacy issues [4]. Normally, there are steps in AR. First, data windows from segmentation of accelerometer signals are taken. Second, some features that describe the clearest properties of studying activity are extracted. These preprocessing steps are the most important parts of AR system since the last step is classification that can be studied by any existing machine learning algorithms.

Some recent mobile achievements attempted to recognize ADL as in [5, 6]. However, these achievements also remain restrictions including the instability of accuracy especially in cross-people prediction which measures the sustainability of classification features in predicting activities of new people based on a trained model from a specific person and lacking of evidence about energy consumption since mobile devices are powered by limited energy resource and memory storage. To resolve these problems, in our latest studies [7, 8], we proposed (1) an effective classification feature extraction to balance accuracy and energy consumption and (2) an adaptive strategy for energy saving by selecting appropriately the combination of feature classification (CF) and sampling frequency (SF) for each activity.

























