C-H. LU, L-C. FU. ***Improving performance of activity recognition via reciprocal model cooperation on an ADL infrastructure.*** *Gerontechnology 2014;13(2):257;* doi:10.4017/gt.2014.13.02.269.00 **Purpose** The ability of the elderly to perform mundane tasks is a good indicator of whether or not they can live alone safely. Improving activity performance is crucial, particularly when the intended users of the system are elderly people since a smart home can reduce its false alarm or service-miss rate to improve quality of activity-aware services. In order to recognize the activities elderly people do on a daily basis, we can use sensors. Useful features are extracted from the data for training activity models (AMs), which will be used to recognize all activities of interest. However, there is no ideal activity model that can reliably recognize activities of interest under all circumstances. To improve the performance of activity recognition, this study takes advantage of model cooperation on the proposed ADL Infrastructure. **Method** The ADL infrastructure has an integration platform that exchanges all messages among various components, each of which has its corresponding agent (*Figure 1*). By leveraging the ADL infrastructure, all AMs can share the extracted features from the sensors and can control the actuators integrated with the platform. In addition, all AMs integrated with the infrastructure can reuse the underlying features, or can reciprocally cooperate with one another to improve the overall performance. The work was supported by National Science Council under Grant NSC 102-2221-E-155-073. **Results & Discussion** The ADL infrastructure has been successfully applied to the human-preference assisted activity recognition[1]. In this study, three well-known strengths of classifiers, including a Bayesian Network (BN), Decision Tree (DT), and a SVM[2], were employed for system evaluation. A label voter (LV) was implemented to estimate the most likely activity by a majority voting mechanism from the three classifiers. The precision has been improved[1], but the recall presented in *Figure 2* can be slightly improved since most of the recall was originally good enough except for in the 'Going Out' activity. This exception stems from the unstable sensor readings for this activity, which cause false negative results. However, if any classifier in the ensemble detects an activity, the recall will be improved (like 'Going Out' activity of *Figure 2*), and the service-miss rate will be reduced at the cost of precision. Based on this promising result, we are now enabling the system to transfer an activity model of an elderly person to another by reusing as much data instances.

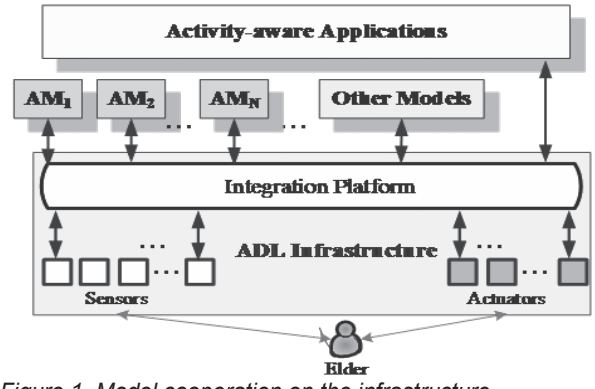

Figure 1. Model cooperation on the infrastructure

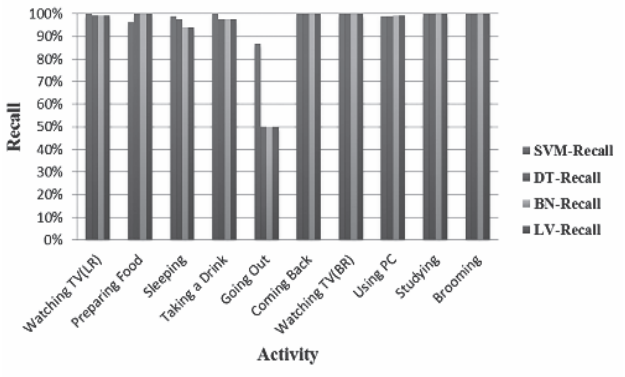

Figure 2. The recall with/without model cooperation

References

1. Lu CH, Fu LC. Proceedings of The 9th IEEE International Conference on Ubiquitous Intelligence and Computing 2012; pp 1009-1014; doi:0.1109/UIC-ATC.2012.51
2. Stikic M, Schiele B. LNCS 2009; 5561:156-173; doi:10.1007/978-3-642-01721-6_10

Keywords: housing & daily activities, activity recognition, reciprocal model cooperation

Address: Information Communication, Yuan Ze University, Taoyuan, Taiwan
Email: jhluh@saturn.yzu.edu.tw