K. TAMAMIZU, S. SAKKIBARA, S. SAIKI, M. NAKAMURA, K. YASUDA. A machine learning approach to recognizing indoor activities based on the detection of environmental change. Gerontechnology 2018;17(Suppl):118s; https://doi.org/10.4017/gt.2018.17.s.114.00 **Purpose** Elderly care will rely more on the home, which poses a burden to the family as caregivers. Under these circumstances, systems and technologies that reduce the burden of elderly care at home attract great attention. To assist elderly care at home, our research group has proposed a sensing and care system that captures Activities of Daily Living (ADL) of the elderly based on dialog triggered by environment changes in a home[1]. The system consists of an environment sensing section in which a sensor box[2] is used, an activity recognition service which recognizes the elderly's activities, and a care service which cares for the elderly by using a Virtual Agent (VA) based on recognized activities. In the current system, however, it is difficult or impossible to record ADLs by elderly in each case via dialog system because of health conditions. In this paper, we focus on auto recognition in the activity recognition service which estimates the elderly's activities using machine learning. **Method** We introduce an auto recognition service for the current system (*Figure 1*). To make classifiers which recognized activities, first, we preprocess collected data. Next, we use a machine learning service on the cloud and we make the classifiers for every characteristic environment (*Table 1*). As for the implementation tool, we use Microsoft Azure Machine Learning (Microsoft AML). Microsoft AML is one of the machine learning services on the cloud. In Microsoft AML, we can select learning algorithms, split data, and evaluate trained models by laying out modules and connecting input and output of these modules through a web browser. In this study, we used a Multi-class Decision Forest decision forests which is one of the ensemble learning algorithm based on a decision tree. **Results & Discussion** To evaluate classification accuracies of auto recognition, we conducted the experiment in which we installed sensor boxes in an actual house, collected sensor data and activity logs, and executed auto recognition. We installed sensor boxes at the living, washroom, room A, and entrance in the home where two elderly people were living. In this experiment, auto recognition targeted one of two elderly people. The system collected activity logs by speech dialog with the VA based on changing points, but the system notified the subject of results of change point detection and let the subject record activities on the ground of the experiment environment. *Table 1* shows the result of evaluating classifiers that were made from collected activity logs and sensor data. To increase accuracies, we consider the improvement of accuracy of change point detection, adjusting installation position of sensor boxes, and changing the granularity of expression of activity that users should record.

References

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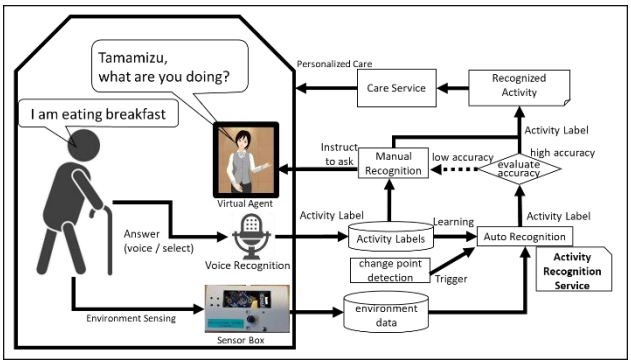

Figure 1. System Architecture

Table 1. Accuracy of Classifiers Made per Locations

location	oeverall accuracy	average accuracy
roomA	93.50%	93.66%
entrance	85.33%	89.88%
washroom	58.57%	44.71%
living	86.94%	61.00%