O. Yürüten, P. Pu. ***Recommendation technology for behavior change.*** *Gerontechnology 2016; 15(suppl):28s*; doi:10.4017/gt.2016.15.s.916.00 **Purpose**. The modern sensor technology helps us collect time series data for activities of daily living (ADLs), to recommend healthy behavior changes. Most of the existing approaches rely on user ratings of items. However, it would be too costly to manually label every ADL. Thus, there is a need to formulate new methods to extract behavior profiles from sensor data, and to develop recommendations based on these profiles. In this spirit, we propose a novel approach that analyses time series ADL with a combination of matrix decomposition and dynamic time warping, and obtains common behavior patterns followed by people. **Method** The method consists of a robust principal component analysis as a preprocessing step[1], and then agglomerative clustering routine with Dynamic Time Warping[2] as a distance metric. We use this method to obtain clusters from the time series data for physical activities collected from people with wearable sensors. **Results & Discussion** Based on average silhouette width scores, this approach outperforms baseline algorithms' clustering quality by 12% ($p<0.05$)[3], and the obtained patterns represent strong structures in the underlying data (*Figure 1*). In our scalability analysis, we have found out that our method has equivalent runtime complexity to a state-of-the-art method. Secondly, we have measured the clustering qualities of our method and the state-of-the-art method: our method performs roughly the same in sparse datasets, but outperforms the state-of-the-art method in dense datasets[4]. The obtained patterns can help us identify the innate capabilities of people to maintain or achieve healthier lifestyles. Based on these indications, we have constructed a behavior recommender. The system uses our method to construct behavior profiles for its users, and recommends behavior patterns that are achievable for a given user. In the near future, we aim to report more detailed outcomes of this recommender system with online recommendation scenarios.

References

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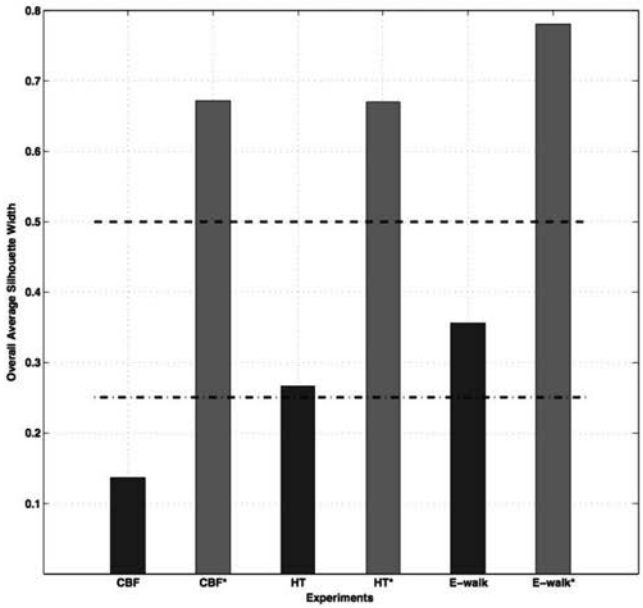

*Figure 1. Clustering quality of our method against baseline methods[4]; CBF=Cylinder-Bell-Funnel dataset; HT=HealthyTogether dataset; E-walk=E-walk dataset; *=results with our method*