Public Abstract

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Rapid aging of the population in the US requires increased attention from health care providers and from the entire society as a whole. While the elderly population (aged over 65) will increase by 8% until 2050 in the developed countries, the working-age population (age between 15 and 64 years) will decrease and its ratio to the elderly population will decline from 4.3 to 2.3. A possible solution to prevent unreported health problems in independently living older adults is through automatic health monitoring systems. The aim of this dissertation is to use sensor network technology to detect changes in health status of elderly living alone, alert health care providers, and augment traditional health care. In this dissertation, we address three topics. First, we discuss the problem of measuring the temporal similarity of two multidimensional time series. The second topic of this work is predicting health patterns using time series similarities. Third, we also propose three methods for identification of deviations in patterns of activities of daily livings (ADL) of older adults and use them to generate alerts for the healthcare providers. ADLs such as bathroom visits can be monitored by automated in-home sensor systems. Our proposed methods find periodicity in sensor time series data using clustering, item set mining, and statistical approaches.