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Learning and Managing Context Enriched Behavior Patterns in Smart Homes

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Abstract

In a society with a growing population of elders, providing efficient and cost-effective long-term care has become central to reducing the economic and societal impact of this demographic shift. Part of the solution to improving the well-being of the elderly at home are smart homes. We examine the role of smart homes in monitoring the activities of the elderly, identifying safety hazards in the home, and understanding environmental changes that may correlate with the deterioration of cognitive and physical health. In this paper, we present LaPlace, a system used to manage context enriched behavior patterns learned in a smart home with sensing devices. LaPlace is based on a formal model to represent intelligible, context enriched behavior patterns, an online adaptive learning algorithm called TIMe which was created for learning such patterns. Context-awareness provides insights about behavior that may otherwise go unnoticed. TIMe is a one-pass algorithm that uses a stream processing model. The TIMe algorithm is presented in this paper along with an extensive evaluation of it using real life datasets.

Keywords: Context-awareness, Behavior Learning, Frequent Pattern Mining, Smart Homes, Stream Mining, Pervasive Computing

1. Introduction

In an aging society, providing efficient and cost-effective long-term care for the elderly has become central to reducing the economic and societal impact of this growing demographic. A solution for improving the well-being of the elderly at home are smart homes. We are particularly interested in the role of smart homes in monitoring the activities of the elderly in their homes and in identifying safety hazards. Since activity and behavior patterns provide insights about a person's health and well-being as well as their ability to live independently,

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