Machine Learning, Robotic and Toy Computing Minitrack

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Abstract

The goal of this minitrack is to present both novel and industrial solutions to challenging technical issues as well as compelling smart application use cases. This minitrack will share related practical experiences to benefit the reader and will provide clear proof that machine learning technologies are playing an ever-increasing important and critical role in supporting robotic and toy computing applications - a new cross-discipline research topic in computer science, decision science, management sciences, and information systems.

1. Introduction

The pervasive nature of digital technologies as witnessed in industry, services and everyday life has given rise to an emergent, data-focused economy stemming from many aspects of human individual and ubiquitous applications. The richness and vastness of these data are creating unprecedented research opportunities in many fields including urban studies, geography, economics, finance, entertainment, and social science, as well as physics, biology and genetics, public health and many other smart devices. In addition to data, text and machine mining research, businesses and policymakers have seized on machine learning technologies to support their decisions and proper growing smart application needs.

Machine learning employs software tools from advanced analytics disciplines such as data mining, predictive analytics, and text based on a set of algorithms that attempt to model high-level abstractions in data by using multiple processing layers with complex structures or non-linear transformations. At the same time, the processing and analysis of machine learning applications present methodological and technological challenges. Further machine learning applications are advantaged by a rise in sensing technologies as witnessed in both the number of sensors and the rich diversity of sensors ranging from cell phones, personal computers, and health tracking appliances to Artificial Intelligence (AI) technologies designed to give contextual, semantic data to entities in a ubiquitous environment that previously could not contribute intelligence to key decisions and smart devices.

Recently AI technologies have been applied to robotic and toy computing. Robotic computing is one branch of AI technologies, and their synergistic interactions, that enable and are enabled by robots. Robots now can easily capture a user's physical activity state (e.g., walking, standing, running, etc.) and store personalized information (e.g., face, voice, location, activity pattern, etc.) through the camera, microphone, and sensors by AI technologies. Toy computing is a recently developing concept which transcends the traditional toy into a new area of computer research using AI technologies. A toy in this context can be effectively considered a computing device or peripheral called Smart Toys.

There are three research papers presented in this minitrack. The first paper is “RoboTalk - Prototyping a Humanoid Robot as Speech-to-Sign Language Translator” by Homburg et al. The second paper is “Non-personal Data Collection for Toy User Interfaces” by Priscilla de Albuquerque et al. The third paper is “Modeling Privacy Preservation in Smart Connected Toys by Petri-Nets” by Yankson et al. All the three papers show significant research results in this cross-discipline research topic.