Iran University of Science and Technology

Computer Engineering Department

Action Extraction from Social Network Graphs Using Casual Sructures to Increase Applicability of Extracted Actions

A Thesis Submitted in Partial Fulfillment of the Requirements

For the Degree of Master of Science in Computer Engineering

By:

Alireza Khanshan

Supervisor:

Dr. Eynollah Khanjari Miyaneh

February 2019

Abstract

Knowledge discovery and data mining provide an array of solutions for real-world problems. When facing business requirements, the ultimate goal of knowledge discovery is not the knowledge itself but rather making the gained knowledge practical. Consequently, the models and patterns found by the mining methods often require post-processing. To this end, actionable knowledge discovery has been introduced which is developed to extract actionable knowledge from data. The output of actionable knowledge discovery is a set of actions that help the domain expert to gain the desired outcome. Such a process where a set of actions are extracted is called action extraction. One of the challenges of action extraction is to incorporate causal dependencies among the variables to find actions with higher effectiveness compared to when no such dependencies are used. The goal of this paper is to dive into the lesser studied subject of "action discovery in social networks" and intends to extract actions by utilizing the casual structures discovered from such data. Furthermore, in order to capture the underlying information within a social network, we extract the corresponding structural features. We propose a method called SF-ICE-CREAM (Social Features included Inductive Causation Enabled Causal Relationship-based Economical Action Mining) to overcome the challenges introduced above. This method uses structural features to find the underlying causal structures within a social network and incorporates them into the action extraction process.

Keywords: Knowledge discovery, data mining, actionable knowledge discovery, action extraction, causal network, feature extraction