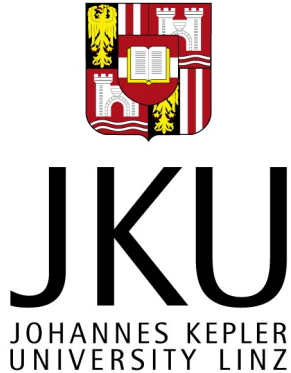


Sensor Based, Automated Detection of Behavioural Stereotypes in Informally Formed Workgroups

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Abstract

Are computers capable of detecting social structures? Reality Mining is a field of research which tries to answer this question. This work uses Reality Mining techniques in order to detect behavioural stereotypes in informally formed workgroups.

The focus lies on real time analysis of communication patterns in order to classify work group members, using software on smart phones and users desktop computers.

Related Work

From sociology we learn how to analyse the structure of a group via sociograms and sociomatrices [Mor34]. Psychology provides models of stereotypes in work groups [Sch57].

Reality Mining is the field of research which provides techniques to sense complex social systems in real time. Our computing devices leave plenty of traces which provide valuable data for analysis [EP06], [Und10].

Classification

The goal of classification here is to assign a defined stereotype to each person within a workgroup. The focus is to detect stereotypes like a groups leader, a groups workforce or a groups misfits.

From real time sensing of communication data a social network model is created. The model is represented as directed graph as shown in the sociogram of Figure 1.

Graph theory algorithms [Die05] are applied on every update of the network model. The scores are then used as indicator for stereo-types.

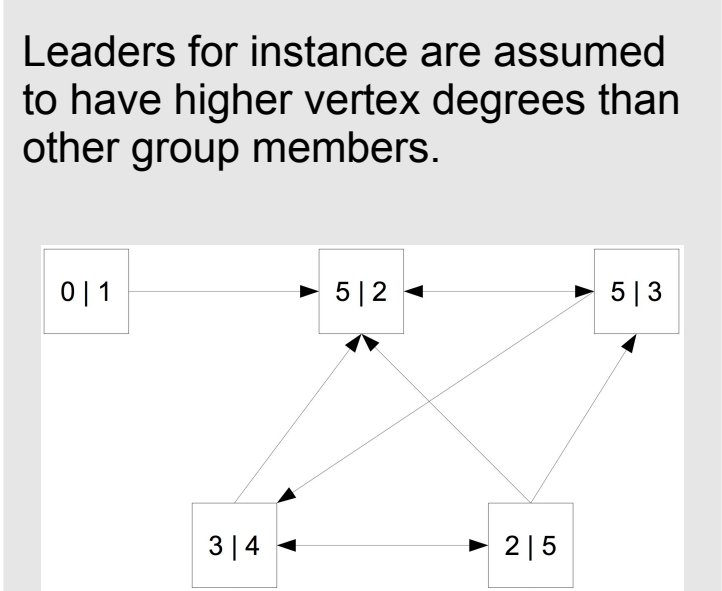


Figure 1: Sociogram with Vertex Degree Scores calculated until recursion level 1

Prototype

The prototype provides an exemplary implementation of the processing queue shown in Figure 2. It uses a groups communication data in order to sense a groups model. The sensed data is qualitative data about phone calls, e-mail messages, instant messages and in person meetings from bluetooth proximity sensing.

This data is visualized for every user within a web dash board; see Figure 3. The dash board also provides a scores panel where one may view several scores from different algorithms.

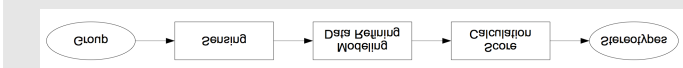


Figure 2: Processing queue in order to generate scores from real time communication sensing

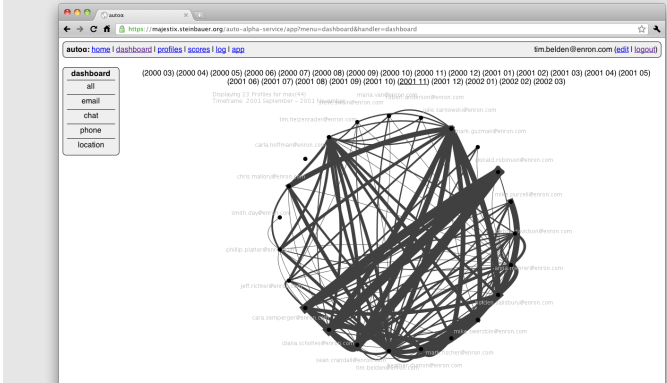


Figure 3: Dashboard showing a visualization of the social network model of an real world work team

Evaluation

Whereas the data sensing, collecting, visualization and score calculation is concerned, the prototype showed, that such a system is deployable in a workplace scenario.

For the score calculation it is shown that certain scores calculate to outstanding values. Scores like the vertex degree provide good measure to detect leaders in groups or misfits. Results were only checked on static datasets available from Enron corporation.

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