

Pervasive Inference and Large-scale Impact of Social Sharing

R. Sofia¹, R. Brito², P. Mendes¹, M. Bianchi², C. Camilo²

¹SITI, COPELABS, University Lusófona

²CTIP, COPELABS, University Lusófona

rute.sofia@ulusofona.pt, rodrigoisbrito@gmail.com, p4867@ulusofona.pt, camilo.cristina@gmail.com

Abstract

This early innovation project is focused on advancing interdisciplinary research concerning the impact of social sharing, and emotions on the emergence of social cohesion, namely, how crowds become groups; how far relational networks and shared group identities derive also from emotional contagion based on theoretical arguments concerning the idea that emotional communication functions to bond people together. To explore these social sciences theories, COPELABS and partners are developing algorithms and technology capable of inferring, in a non-intrusive way, the spreading of individual influence via the use of sensing to extract data during interaction of individuals. In order to reach this ambitious vision, COPELABS is creating an international discussion group comprising experts from social sciences and pervasive computing, to boost the discussion concerning how non-intrusive sensing mechanisms can be applicable to personal mobile devices; to test hypotheses concerning social bonding and emotional states contagion processes in groups; to analyze if/which sensors are best in gathering specific states; to provide a measurable contextualization of specific emotions, as well as to provide a platform that can assist the scientific community in understanding how social cohesion is formed in regards to emotional states' propagation.

Keywords: Self-organization; social sharing; emotional contagion; group formation; community modeling.

1 Introduction

In the context of *Information and Communication Technologies (ICT)*, exploring theories in the cognitive and social psychology domain are essential to further push self-organization paradigms into a direction that truly becomes human-centric. Up until now the dynamics of social structures and self-organization paradigms have been derived

from interdisciplinary observation coming mostly from biology (e.g. animal kingdom). This allowed fields such as artificial intelligence to advance; however, in the context of pervasive communications where infrastructures organize in a viral or autonomous way, such theories still lack the human-centric perspective. In ICT, recent activities have recognized the need to embrace an interdisciplinary perspective that allows embedding self-awareness into ICT systems. This is the case of RECOGNITION (EU FP7 2010-2013)¹, which aimed to develop a radical new approach for embedding self-awareness in ICT systems. The RECOGNITION project was based on the cognitive processes that the human species exhibits for self-awareness, seeking to exploit the fact that humans are ultimately the fundamental basis for high performance autonomic processes. This is due to the cognitive ability of the brain to assert relevance, extract knowledge, and make decisions.

COPELABS is working on a radically new approach based on social psychology, namely, the idea that social sharing/emotional sharing is relevant to assist in better understanding social structures dynamics, derived from social psychological findings that have been delving with why some crowds become groups while others do not. For instance, being able to recognize, via non-intrusive pervasive technology, an emotional contagion process across individuals that may or may not have been previously acquainted, assists scientists in a better definition of network and social structure dynamics; creates a new way to look into self-organization aspects which are today crucial to assist opportunistic data dissemination and transmission; allows the two different disciplines, psychology and computer science, to converge in the development of theories that are the basis to social structures dynamics and hence, the basis to develop an Internet that is truly human-centric.

A common, interdisciplinary perspective on the emotional/communal sharing process can assist the development of truly self-organizing, human-centric models which are relevant to psychology in the context of group forma-

¹EU FP7 RECOGNITION, Relevance and Cognition for Self-Awareness in a content-centric Internet. Available at <http://users.cs.cf.ac.uk/Recognition.Project/wordpress/>.

tion, and relevant to computer science, in the context of self-organization.

This work has the following main goals:

- To derive self-organization models from correlations between individual emotional processes, tracked via non-intrusive sensing.
- To contribute to a better understanding of representations of groups and actual group dynamics.
- To bring pervasive sensing technology to a new level, incorporating the capability to infer, via activity recognition, markers that define an emotional state (e.g. like/dislike).

To assist in reaching these goals, COPELABS and its peers are developing interdisciplinary research in the context of a multi-agent self-organized system of sensing entities able to provide an accurate understanding about group dynamics (influence and consensus) based on theories that stem from social psychology. The purpose is to go beyond individual similarities, to define intra and inter-group relations in computer science models as well as to test effects of dissemination and expression of interests on individual representations of groups, as well as the impact of the dissemination of interests in the promotion of social interaction. And, last but not the least, to study whether or not pervasive, non-intrusive technology application impacts the behavior of people (individual and crowds).

2 Vision and Target Breakthrough

Up until now the modeling and analysis of self-organizing and/or viral networks has considered aspects derived from the animal kingdom, e.g., swarming behaviour. While in the case of our work we intend to explore the idea that emotional communication and social sharing functions to bond people together, independently of their daily physical proximity, to push further self-organization and community modeling, two aspects that are today the basis for pervasive communication and networking in ICT.

In order to reach such an ambitious vision, this work integrates an interdisciplinary methodology that takes into consideration sensing aspects derived from self-organization and non-intrusive sensing as well as findings from social psychology.

A first breakthrough derived from this work is approaching self-organization with an interdisciplinary perspective that combines complex systems with social psychological theories, integrating the theories behind how communication/propagation of emotions bonds people together, to develop new self-organizing algorithms, thus integrating a truly human-centric perspective. A second breakthrough is the investigation of group sensing solutions based on self-organizing models. While prior-art is focused on devising personal sensing systems, our work project aims to devise solutions able of sensing smart data to learn about social bonding in social structures, augmenting the understanding that pervasive systems have about the needs, desires, and behavior of groups. This is novel, as today sensing

approaches always consider intrusive processes, or the intrinsic participation of the person, known as participatory sensing. The development of non-intrusive sensing is essential to devise a truly intuitive system, aiming to ensure a fast adoption by any person.

3 Current Status and Available Results

This work is currently being developed by a set of international and applied in the context of an early-stage international group of interest under development, having COPELABS as coordinator. The initial partner network includes partners from social psychology (COPELABS, Oslo University, CIS-IUL) as well as from computer science (COPELABS, Lakeside Labs, Tecnalia, Democritus University, University of Cambridge, Universidad de Deusto).