Guest Editorial

Virtual communities, a typology

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Abstract. Virtual communities are complex systems interweaving technical and human aspects. We propose here to identify usual functions provided by virtual communities and define a typology based on the common objects or goals shared by their users. The papers included in this special issue show some examples of research works lead in some of these categories of communities.

Keywords: Virtual communities, Online communities, Web communities, artificial intelligence, Web intelligence

1. Introduction

There is a consensus to define Virtual Communities (sometimes called Online or Web Communities) as social networks of individuals or artifacts with a shared interest or a shared goal, using ICT-mediated communication means. Virtual communities have the potential to support a wide variety of activities related to information seeking, information provision, and information sharing, in addition to socializing and other types of interactions. Their members have their own profile and share a common environment providing facilities that range from simple communication channels to any complex shared system composed of processing and storage capacity. We present here different functions provided by Virtual Communities and we propose a typology according to the shared objects or goals before introducing the research works of this special issue.

2. Functions in virtual communities

The functions related to Virtual Communities can be classified in different categories: Interaction, production and control, management of shared content, management of member's profile, and at a meta-level, management of communities. These categories and their related functions can be majored or minored depending on the types of communities, as described in the next section.

Interaction functions enable communication between members: messaging, forums, video-conferencing.

Production and production control functions allow the creation of shared content or shared decision from the members of the community: workflow management, event and calendar management functions, shared editing tools, voting system, policy enforcement functions.

Management of shared content functions allow storing, versioning, accessing data within the community (i.e. files in various formats).

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Management of member's profile functions enable the implementation of a profile for each member.

Management of communities functions are situated at an upper level because they are ne for necessary for launching communities and managing their life cycle.

3. A typology of virtual communities

We propose in this section an original typology of Virtual Communities. The aim of this typology is to identify different situations according to the expectations of the virtual community users and to what they have in common.

Our typology of Virtual Communities is composed of the following categories: task-centric, topic-centric, user-centric, group-centric, ephemeral, and implicit.

In *Task-centric virtual communities*, members share a same task. The collaborate together, using the community tools, to produce a single, eventually complex, result. A simple example is the collaborative writing of a document. Another example can be found in online video games where team members collaborate for a quest.

Topic-centric virtual communities are implemented when members share a same topic of interest. Within the community, they search and exchange information (document, data, knowledge) related to this topic. A web portal dedicated to medical questions is such an example of a topic-centric virtual community.

The main objective of *Supervision-oriented communities* is to create conditions for interaction with and control of one or several persons or systems, based on data produced on the supervised side. In this type of communities, one can distinguish between two different topologies of communities. In the first topology, a community supervises a single "center". This is typically the case of care providers (medical professionals, relatives) supporting coordinately a remote patient to help enhancing his/her health condition, or a team of experts in different fields supervising a plant system. Also social Network Sites (SNS) offer this type of communities because each user is the center of his/her community of friends/followers giving feedback.

The second topological case of supervision-oriented communities concerns the supervision of group of users or systems. The community is then not on the side of the supervisors, but on the supervised side. The data shared within the community is then an aggregation of data from group members, and the feedback given by supervisor is sent to whole group. Supervision-oriented communities can also mix centric and group based topologies. Communities for collective sport exercising or diet program belong to this type of communities. They avoid the feeling of isolation and personalized focus, and they can take advantage of group motivation effect. SNS support also groups however they generally don't aggregate group member's data.

In *Ephemeral virtual communities* the existence of the community is limited within a spatial or/and temporal space. Interactions appear in relation with a given location or event, and in this sense it can be considered as a sub-category of topic-centric community. The specificity is that the community exists the time of the member's stay at this location or for the time of the event. Such communities can be implemented during sport or cultural events for instance.

Finally, *Implicit virtual communities* are composed of users of an Internet-based application who are sharing a same behavior on this application. It can be for instance the users of a streaming platform who listen to folk and rock music. In this case, membership is detected by the application, and the interaction between users is also done through the application which considers the actions of each member and adapts eventually its behavior consequently to the community (for instance in generating recommendations).

4. Research works on virtual communities

The papers included in this special issue give examples of such communities. The domain of topic-centric virtual communities is addressed by the three first papers:

In the paper entitled *Enriching How-To Guides with Actionable Phrases and Linked Data*, the authors Lagos, Gallé, Chernov and Sándor address the problem of knowledge linking in topic-centric virtual communities. They propose a new method to detect actionable phrases and link these terms to other entries, especially in the Linked Open Data cloud in order to make this knowledge easily shared with the community members.

The second paper, *A Model for the Behaviors and Incentives of Users in a Decentralized Data-sharing Network* from Esfandiari, Amin, Kadri and Telfer, shows another example of topic-centric virtual communities. In this paper a model is proposed for repre-

senting the behavior of users participating to a decentralized data-sharing system. Through their simulation the authors show that their system is more resistant to attacks, and that it can provide an incentive for users to contribute to the system.

Yamak, Saunier and Vercouter propose in their paper *Automatic detection of multiple account deception in social media* a method to detect fake accounts created on a well known topic-centric virtual community: Wikipedia. These fake accounts, called sockpuppets, are created in order to manipulate its content. The goal of their work is to identify features that allow the automatic detection of sockpuppets using machine learning.

The fourth paper of this special issue is proposed by Ye, Wang, Li, Liu and Li. It concerns the domain of implicit communities and is entitled *Tracking Millions of Query Intents with StarrySky and Its Applications*. This article presents StarrySky, a system that uses community detection algorithm to cluster queries and assign these query clusters to concepts. The system is able to track query intents of users. Experiments have been conducted and they show the performance of the system and its interest in several real-world applications.

At last, the paper *Impact of Social Influence on Trust Management within Communities of Agents* from Yaich, Boissier, Picard and Jaillon proposes a model to adapt individual and collective policies using social influence. This study is not limited to a specific kind of virtual community as it can be considered in any community where there exists trust relations between its members.

We sincerely hope that the readers will appreciate these papers and find them useful for their research and developments.

5. List of reviewers

As invited editors of this special issue we are grateful to reviewers who spent time reading and evaluating the papers, and providing guidance to the authors. Their recommendations have been appreciated by all authors.

Reviewers: Amblard Frédéric, Delestre Nicolas, Galland Stéphane, Gateau Benjamin, Hu Yuh-Jong, Jaillon Philippe, Jung Jason, Khalil Wissam, Muhlenbach Fabrice, Pauchet Alexandre, Paulheim Heiko, Raghavan Vijay, Singer Philipp, Soualmia Lina, Stahl Christoph, Such Jose, Villata Serena, Wiktorski Tomasz, Yaich Reda.