
Crowd-Computers Interaction Research and its Role in Development

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Abstract

Crowd-Computers Interaction is the study of phenomena that are observable only when a large number of users interact with a network of computers and interactive devices. It is a novel field in Computer Science. Because such networks provide an opportunity of access to technology and social integration for people in less developed countries or living in poverty or deprived conditions, we believe that research in this field has the potential of having a great impact in social development. In this paper we will explain the challenges of such research, how collaboration is essential for it, and suggest methods and projects for its execution.

Author Keywords

Crowd-Computers Interaction; Social Development; Social Networks.

ACM Classification Keywords

K.4.2 Social Issues.

Introduction

Several authors have noted how the aggregated behavior of a group of individuals has different attributes and characteristics of that of a single individual [1]. Gustave Le Bon wrote in 1895 that "Under certain given circumstances, and only under

Key Features of Crowd-Computers Interaction

Number of users: There is a certain threshold in the number of users above which the phenomena related to CCI become apparent.

Diversity: Users are heterogeneous and the devices they employ to connect to the network are dissimilar as well. There is no one-size-fits-all approach.

Interaction cycles: Crowds interact with networks in cycles. The crowd acts providing information that sets a trend in the network, the trend then stimulates the provision of new information by the crowd and the cycle repeats.

Social recognition: Individuals need a form of social recognition through community belonging assurance or gain of reputation.

those circumstances, an agglomeration of men presents new characteristics very different from those of the individuals composing it. The sentiments and ideas of all the persons in the gathering take one and the same direction, and their conscious personality vanishes. A collective mind is formed, doubtless transitory, but presenting very clearly defined characteristics." [2].

The difference between individuals and crowds was also pointed out by Sigmund Freud in 1921 [8], James Surowiecki in 2005 [3], and Nicholas Christakis and James Fowler in 2009 [5] among others.

It can be argued that the most common approach in Human-Computer Interaction (HCI) is to study how individuals interact with computers. However, when it comes to the aggregation of multiple individuals interacting with a network of devices using a multi-platform application designed to provide services and functions to a mass of users, then new features and phenomena, that deserves particular attention and study, appear. This is the field of Crowd-Computers Interaction (CCI) [4].

The availability of the type of applications that provide functions and services to masses has seen an increment in the new millennium: social networks like Facebook, Twitter, YouTube, Instagram, Flickr, LinkedIn, and others; Massive Open Online Courses (MOOCs) are available through providers like EdX, Coursera, and Udacity; Crowd-funding sites like Kickstarter and Indiegogo, and a plethora of services that rely on crowds of users to provide unique functionality like Amazon's Mechanical Turk, ClickWorker or CrowdFlower.

What computers add to social interaction is the increment of influence of individual actions, the persistence of effects, the accumulation of information, the identification of trends and results, and the possibility of participation for people across countries and continents. The massiveness of social interaction reaches new orders of magnitude when mediated by computers [7].

CCI and Social Development

All the opportunities opened by CCI applications for communication, social relationships, project collaboration, remote work, trade, instruction and entrepreneurship are available to a wide audience that includes people in underdeveloped countries or living below the poverty line.

This availability has the potential to become the path to a better living, be it by enabling the increment of income or by satisfying needs that were previously unattended like communication with family and friends that have migrated to distant places or integrating the user into communities that provide social recognition or a sense of belonging.

Research and development in CCI has thus the potential to impact the lives of many people. In fact, an important portion of the millions of new users that connect to the Internet for the first time each day, using primarily mobile phones, comes from underdeveloped countries; and, normally, the main reason for connecting is to use applications that support social networks and massive interaction [6].

CCI in Action

Applications of CCI are already functioning to deliver its benefits to the masses and research has accompanied

those efforts. A short non-exhaustive list of literature references of projects in Latin America (LA) follows:

- *Mi Casa Es Su Casa: Understanding peer accommodation in developed and developing countries*, a research project to understand how peer accommodation services are perceived and used.
- *SAMM: driving assistance system for the senior citizen*, uses a context-aware and crowdsourcing model to optimize routes to support the mobility of senior citizens.
- *Understanding sustained community engagement: a case study in heritage preservation in rural Argentina*, documents the CrowdMemo project aimed to preserve local heritage in rural Argentina.
- *Collaborative Open Textbooks for Latin America—the LATIn Project*, which aims to contribute to solve the problem of high cost textbooks for higher education in LA, through the developing of a supporting architecture, a methodology and policies for spreading of cooperative open textbooks.
- *Crowdsourcing in the Brazilian IT industry: what we know and what we don't know*, findings from an empiric study on the topic.
- *“The Courage For” Facebook Pages: advocacy citizen journalism in the wild*, and *The new war correspondents: the rise of civic media curation in urban warfare*, both researches are a descriptive analysis on how social networks are used to circumvent the information blackout imposed by criminal organization, as a form of citizen advocacy journalism.
- *The rise and the fall of a citizen reporter*, uncover stories that may otherwise remain hidden.

- *How to Crowdfund Election Monitoring in 30 days: the Mexican Experience*, it is about the first crowdsourced electoral monitoring project in Mexico.

These research projects, as well as similar ones in other parts of the world, are already contributing to develop the new methodologies needed to advance the field.

The Challenges for CCI Research

As mentioned before, the focus in CCI research switches from the single user, or homogeneous group of users, interacting with a system or application designed for her, to a mass of heterogeneous users that interact through a network of dissimilar devices connected to several providers of functions and services.

In a previous work [4] we have pointed to questions that have to be addressed in order to advance research in CCI: what new aspects of HCI become apparent at the crowd level? Which ones are best studied at the crowd level than at the individual level? To what extent a successful crowd-computers interaction is related to a well-designed interaction at the individual level? Are there specific principles and heuristics that have to be observed when designing interactions for crowds? Among others.

The most challenging concern in the study of crowds from an HCI perspective is that “the user” is “the crowd” understanding the crowd as a collective mind as Le Bon argued or as a superorganism as Christakis and Fowler defined.

For human development it is also important to find how crowds vary from country to country or from cultural

setting to another. Is it possible to generalize findings about the crowd regardless of country, culture or economic conditions? What features of the crowd are defined by localization or economic development?

New methods and experiments have to be designed in order to observe and interview this particular user. Such approaches call for the collaboration of a widespread group of researchers in order to form a crowd that studies the crowd.

The computational tools that will support the network of devices for use of those researchers will eventually become the "computers" in the Crowd-Computers Interaction arrangement. All these computational tools have yet to be specified and designed.

Conclusions

In this position paper we have portrayed the characteristics and features of the study of aggregated interactions of large groups of users in networks of dissimilar devices.

The impact in terms of social development of applications designed for masses was discussed and several examples of how research and development is already happening were presented.

We argued for the development of collaborative research projects that may help bring the benefits of Crowd-Computers Interaction to the people that need it the most in the world through an approach in which a crowd of researchers studies crowds of users.

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