Chapter 72
Visualization of Human Behavior Data:
The Quantified Self

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ABSTRACT

Although in recent years the Quantified Self (QS) application domain is growing, there are still some palpable fundamental problems that relegate the QS movement in a phase of low maturity. The first is a technological problem, and specifically, a lack of maturity in technologies for the collection, processing, and data visualization. This is accompanied by a perhaps more fundamental problem of deficit, bias, and lack of integration of aspects concerning the human side of the QS idea. The step that the authors tried to make in this chapter is to highlight aspects that could lead to a more robust approach in QS area. This was done, primarily, through a new approach in data visualization and, secondly, through a necessary management of complexity, both in technological terms and, for what concerns the human side of the whole issue, in theoretical terms. The authors have gone a little further stressing how the future directions of research could lead to significant impacts on both individual and social level.

1. INTRODUCTION

Knowledge of the self is the mother of all knowledge. So it is incumbent on me to know my self, to know it completely, to know its minutiae, its characteristics, its subtleties, and its very atoms. (Khalil Gibran)

In this chapter our proposal is to outline some aspects of human behavior generated data in the light of a specific research branch, the so called Quantified Self (QS) area. We think that time has come to sketch current status and new directions in a field that even being explored for years, only recently, also thanks to some technological advances, is finding its practical application. We will analyze the first attempts

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to trace and represent human activity through the description of some experiments in this direction (e.g. LifeLog DARPA Project, MyLifeBits Microsoft Project, etc.). The chapter will then describe the most important application fields of QS, in order to draw a clear picture of the current situation and to give an overview of the most promising sectors in which this approach will be developed in the coming years.

In particular, we will describe the distinctive means to monitor and render human behavior and the applications aimed to persuade people to change their practices of everyday life, in areas related to health, mood and fitness but also with few references to sports, training, social networking, transportation, consumptions, emotions and communications.

The chapter will cover then two fundamental problems of the QS today, the technological problems and the theoretical problems both in terms of data visualization of large dataset and in terms of behaviour change theories that still make difficult to adopt a non-purely empirical QS approach. Will be then drawn the directions to handle these problems toward a more robust and credible QS scenario through new ways of representing data and new directions in the management of complexity, both on the technological side and on the human side of the topic. Then we will go further considering future directions of research with both individual and social impacts.

2. WHAT IS THE QUANTIFIED SELF?

The QS is a school of thought which aims to use the increasingly invisible technology means in order to acquire and collect data on different aspects of the daily lives of people. These data can be "input" from the outside (such as the calories or the CO2 consumed), or they can be "states" (as the mood or the oxygen level in the blood) or parametric indicators of performance or activity (such as the kilometers run, the mail sent, or the mp3 heard). The purpose of collecting this data is the self-monitoring and the self-reflection oriented to some kind of change or improvement (behavioral, psychological, medical, etc.).

It is immediately evident how this approach, which we will analyze in more details in the following pages, raises a series of theoretical problems (for example, what are the foundations of human behaviour change?) but even before a series of technological issues. How can this data be collected (input)? With what kind of sensors? And above all, how this knowledge can be returned to the user (output)? With what kind of data visualization techniques? In this short arc, from doing an action (recorded by a sensor and stored by a database) to have the "image" of that action (displayed on a screen), there are about 200 years of research studies in different fields.

Just to do a little bit of history of this topic, the whole spectrum of toolset, application and technical approaches related to this type of thinking has taken different names over time. It can be found in literature as "Personal Informatics," "Personal analytics," "Self Tracking," and "Living by Numbers" according to the focus on what has been emphasized by each definition.

Considering only the QS sunrise, the movement was founded in 2007 by the editors of "Wired" Gary Wolf and Kevin Kelly, with the purpose of creating collaboration between users and manufacturers involved in the development of self-knowledge through self-tracking technology. In 2008, the same Wolf and Kelly opened the site "quantifiedself.com". In 2010, Wolf spoke at TED Conference, and in May 2011 in Mountain View the movement held the first conference specifically on QS.

There are some basic points that define the QS movement: the data collection, the displaying of these data, and the cross linking of these data in order to discovery some possible correlations. The interest that is developing in these years around this current is also evidenced by the proliferation of gadgets that