A *Serious Game* to persuade people to use stairs

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1 Introduction

In the last few years, the number of overweight people in wealthy countries, either among adults and children, is dramatically increasing mostly due to an incorrect diet and the lack of physical activity [6] [3]: modern technologies allow people to avoid simple strains of everyday life, like climbing the stairs using elevators and escalators. But people tend to avoid the pedestrian way even for short distances, e. g., few meters by foot, or a single floor of stairs, thus dramatically reducing the amount of physical activity they do in everyday life. This is particularly true for office workers or people with a sedentary job.

Some applications, available on the market try to incentivize people to make more physical activity [4] [5], using external devices to measure it and dedicated applications or audio/visual feedbacks to increase user's engagement. "Piano Stairs" [7] is a project which had transformed a stair into a piano to promote the use of stairs. The project reached amazing results even if not long-lasting. BeWell [2] is a smartphone application that aims to promote well-being through sleep monitoring, physical activity measurement and social interaction analysis. This application shows that sensors of the smartphones allow a wide analysis about people's behavior and that it is possible, through constant feedbacks, to change people's behavior and lifestyle.

In this work, we propose *ClimbTheWorld*, a *real-time*, *non-intrusive*, *pervasive* and *portable* application that wants to incentivize people to take stairs instead of elevators or escalators. The use of a smartphone instead of external (and expensive) devices can reduce the entry barriers to the system and increase the number of potential users. The main idea is to provide fun while people make stairs, using a *serious game* and *gamification* principles instead of providing medical-like feedbacks that could be boring.

2 Game description

ClimbTheWorld is based on a series of different levels of difficulty. The main goal of the user is to climb several real-world buildings, e. g., the Eiffel Tower, the Empire State Building, the Great Pyramid of Giza. The total number of necessary steps depends on the height of the building and on the difficulty settings, i.e. the number of steps made by the user is multiplied by a factor, which ranges between 1 and 5 according to the settings. Once the user reaches the top of the building, a gallery of pictures about the

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building or about the view from the top of the building are shown to the user. Number and quality of the pictures depends on the level reached by the user. In addition to the different levels, several bonus are used to try to push the user to make better of the days or weeks before and earn points (in this case, earn steps or bonus images).

Our system wants to be as much pervasive as possible, e. g., the system does not require a particular position of the smartphone, thus detecting the number of steps without affecting the normal habits of users. This is particularly important: the more requirements and restrictions a system ask to the user, the less probability it has to be used.

3 Persuasive Issues

According to the Fogg Behavior Model [1], the key points of our application are *triggers*. In particular, for this application the *triggers* has to be effective but avoid to be intrusive, to increase people's engagement and so the chance to change users' behavior.

To support behavior change, we exploit the natural competitiveness of people over friends, using social networks. Our game allows posting the reached achievements or goals, associated with a personalized avatar. To push people to make stairs, the avatar changes according to physical activity made, from a sleepy employee to a running sportsman. Moreover, users can collaborate to climb a building in less time or they can compete to get before a goal.

Another key aspect of our persuasive system is how to show and provide *triggers* to the users, at the right time and a suitable situation. In fact, since we want to foster competition between friends, it is important to constantly maintain active and on the challenge each user. For this reason, we have to build a constant-but-intelligent system of feedback about other users: i. e., an update about opponent's scores and challenges is completely useless and harmful when the user is working or sitting on a chair, while it is much more suitable and useful while he/she is walking. In this way, stimuli to take stairs will be provided only during suitable user's actions.

4 Conclusions

At the time of writing, we have developed the game and integrated it in Facebook social network. We are currently improving the algorithm of step recognition, which initially provided a precision of about 80% and about 69% of recall, and developing the feedback/*trigger* system.

An initial test of the game, involving a small set of about ten users, has shown a great interest and engagement that are promising for further positive results. The users are asked to play with the game for a short interval of time and then they answer to a questionnaire. Almost all the users declare that they are interested in the use of *ClimbTheWorld* and that they think it could push them to increase their daily physical activity.

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