

Motivating Users to Build Heritage Collections Using Games on Social Networks

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Abstract. Efforts to motivate user participation and contribution towards digital libraries, such as heritage collections, are often unsuccessful, resulting in empty or underutilized collections. These collections have the potential to improve heritage preservation and education. However, without growth, they are of little use to society. Using a Facebook application, different techniques were compared for motivating user participation and contribution of content towards a heritage collection. It was found that direct competition outperformed a badge system and successfully motivated users to contribute. These results are particularly interesting since, in a developing country, such as where this research was carried out, community and collaboration are usually valued and favoured over competition.

Keywords: social networks, motivation, heritage collections, user generated content

1 Introduction

The digitization and management of cultural, historical and educational documents and artefacts in digital libraries has many benefits to society, such as: the preservation of digital versions of the physical objects; the preservation and/or remembrance of cultures and languages; educational uses; and awareness and dissemination of information. Many successful initiatives exist where libraries have digitized their collections, often with the help of large amounts of project funding [1]. However, libraries and institutions are not the only source of information, artefacts and documents that are worth preserving. For instance, the public often has historical and cultural information that is of interest but not available to libraries. Examples of these types of information include: family genealogies; old photographs; letters; immigration documents; and stories that have been passed down through generations. Owners of these private collections may not have the funding, resources or knowledge to create their own digital repositories and, thus, these artefacts or documents may never be added to a digital library without their owners being motivated to contribute them.

Digital libraries expand when new content is added, for instance, by the contributions made by the public and communities. However, unless there is

motivation for people to submit content, a digital library might stagnate. Unfortunately, this is too often the case. For example, the DSpace installation at Cornell University was found to be under-populated and not well used by faculty and a reason for this was that faculty members did not have the knowledge or the motivation to contribute to the repository [2].

One approach to motivate people to submit content to a digital library is to exploit social networks and the ways in which people interact, as well as to make use of crowdsourcing techniques. For instance, a game on a social network may provide a solution for motivating the public to participate in collecting, supplying and processing heritage data. This paper thus describes an attempt to use a Facebook application, functionally a game, for the purpose of gathering heritage pictures, useful metadata and for tagging. As part of this investigation, two motivation techniques are investigated in order to determine which leads to the highest participation in the collection of heritage data and a user experience study is conducted in order to gain an understanding of how users feel about contributing heritage data.

The rest of this paper is structured as follows. Section 2 discusses related work while the Facebook application and different motivational approaches are described in Section 3. Section 4 presents the evaluation of the motivational approaches as well as the application as a whole and, lastly, conclusions are presented in Section 5.

2 Related Work

A digital library expands when data is contributed to the collection. Depending on the purpose of the digital library and the type of data it stores, the data collection process may vary. For example, submission may be open to the general public, to a small specified community, to an individual, to an archivist or perhaps not open for submission at all. When submissions are open to the public or to a community, it is necessary to motivate participation and digital libraries may present this motivation in the services they offer. For instance, large and stable digital library systems allow collection owners, who are not interested or able to set up and maintain their own digital repositories, to contribute and thus preserve their collections. Offering a digitisation and preservation service is another form of motivation that can relieve an institution of the responsibility and cost of digitising, managing and preserving their collection, as is the case with Google Books¹, which promotes submission of old books by libraries by giving them digital copies of every book scanned. Europeana² motivates contributions by claiming that, by contributing to their repository, institutions make their collections more visible, increase traffic to their websites and expose their deep-Web content to search engines [3]. Owners of content may also be motivated to contribute to a digital library that promotes the sale of their products.

¹ <http://books.google.com/>

² <http://www.europeana.eu/>

Crowdsourcing presents an alternative to motivating user participation and can be a useful way of decreasing costs, decreasing the time taken to achieve goals, engage communities and improve the quality and value of data [4]. There have been a number of attempts at harnessing crowdsourcing participants with motivations such as monetary pay, prizes, community value, sense of purpose and recognition [5].

It is possible to achieve a crowdsourcing effect by creating a serious and/or social game that motivates players to perform a specific task. A serious game, although possibly entertaining, is one in which the primary focus is education and training [6]. For example, Foldit, a multiplayer online game, enlisted players worldwide to solve difficult protein-structure prediction problems, which provided new insight for the design of anti-retroviral drugs [7]. An ESP game motivated players to produce millions of labels for images on the Web without even realizing they were doing so [8]. The Peekaboom game had players locate objects in images and categorize labels as nouns, verbs, related nouns or text [9]. The Gopher Game is a social game where players supply content by uploading and sharing photos as proof of completion of tasks within the game [10].

Motivations to submit content to digital libraries have been founded on the services the digital library offers to the submitters. Crowdsourcing and serious, social games may provide an alternative method of motivating participation. Thus, this paper investigates motivating submissions to a heritage digital library by crowdsourcing participation through a serious game on a social network.

3 Methodology

A Facebook application called “SaveMyHeritage” was created as an experimental platform to build a collection of heritage images. The Facebook Graph API was used to access user’s details such as a list of the user’s Facebook friends, as well as for publishing to the user’s wall and the OAuth 2.0³ protocol was used for authentication and authorization.

Three Amazon Simple Storage Service (S3) buckets were created in order to store the pictures in the collection. These buckets stored the image at varying qualities for the purpose of archive, dissemination and thumbnails. Pictures in the archive bucket were stored at full quality and were not used at all by the application as this would negatively affect load time. In order to improve the load time of the images, reduced quality images were used for dissemination and further reduced quality images were used for thumbnails.

The metadata associated with the pictures was stored in a MySQL database along with user details and tags. Users could add the following fields of metadata: *Title*, *Description* and *License*. In the case where the user was not the owner of the the picture, there was also an *Owner* field for attribution purposes. As the average user of the application is untrained in digital libraries and archives, these metadata fields were chosen for their simplicity. The fields were also kept to a minimum in order to not overwhelm the users.

³ <http://oauth.net/2/>

In order to compare the efficiency of different motivating factors, three versions of the application were built: a non-social version, a social competitive version and social non-competitive version. Besides the motivating factors, the three versions of the application were identical in every way, which allowed for a direct comparison of the different techniques by means of a user study. In the next section, the different motivational techniques are described.

3.1 Motivational Techniques

The three different versions of the Facebook application were built to evaluate the effect of different motivational techniques. The first application, the non-social application, had no obvious social interaction among users and no form of competition or implicit motivation to contribute. Using this system, users are able to upload images, add and edit metadata, browse “my collection” and “full collection”, which refer to their personal collections and the combined collection of all users respectively, tag images and search and browse images by tags.

The second application made use of social competitive techniques in order to motivate users to contribute. These techniques included social interaction among users as well as a competitive atmosphere that was intended to motivate users to outperform other users. This was achieved by including a leaderboard. Users improve their score on the leaderboard by adding pictures, metadata and tags. For every picture contributed the user earns 3 points, as well as 1 point per tag or item of metadata. A mini-leaderboard on the side of the gallery shows the top three users as well as two users above and two below the current user. Therefore, the mini-board shows between 3 and 8 users depending on the current users location on the board. The current user is shown in bold. This system lets the current user compete with other users nearest to him/her in rank while still giving the top players credit. Above the mini-leaderboard is a link called leaderboard. This takes the user to a more detailed leaderboard that shows not only rank but score and profile picture as well. The user can view three perspectives of the leaderboards. First is the main leaderboard that displays all users in order of rank. There is also a Top 10 leaderboard that only displays the top ten players. Next, there is a Friend Leaderboard. This leaderboard ranks the user only against his/her Facebook friends. A screenshot of the social competitive system is shown in Figure 1. The users’ names have been blurred for anonymity.

The third application made use of social non-competitive techniques in order to motivate users to contribute to the digital library. This application includes social interaction, but without a competitive atmosphere. Instead, users have a badge that reflects their level of contribution and users are motivated to upgrade their badge, thereby outperforming themselves. Users begin with a blue badge (up to 20 points) and are later awarded bronze (up to 60 points), silver (up to 120 points), gold (up to 200 points) and platinum badges as they contribute data such as pictures, metadata and tags. The cut-off points chosen for each badge are easy to reach by users at first but become more challenging as they progress.

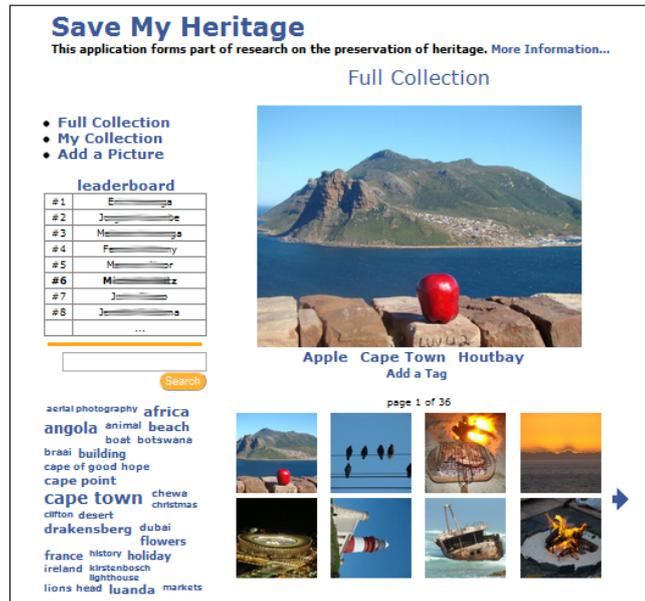


Fig. 1. Sectional screenshot of the social competitive system

4 Evaluation

The Facebook application was evaluated in two ways. First, the effect of the different motivational approaches was evaluated in order to gain insight into what factors motivated users the most to contribute to the digital library of heritage images and then the best motivating factor was investigated further. Thereafter, the content of the actual digital library was evaluated by analyzing the database records of the system. These two evaluations are discussed below.

4.1 Badge versus Score - A Comparison of Approaches

A survey was created in order to compare the efficiency of the motivational techniques, namely the score-based, competitive approach and the badge-based, non-competitive approach. No detailed instructions were given except for users to contribute heritage data to the collection. Users were not limited by a specific theme. There were twenty five responses to the survey. The survey was conducted using LimeSurvey over a period of two weeks. Figure 2 shows the percentage of respondents who answered “yes”, “no” and “uncertain” to the questions: “Have you added pictures / tags / metadata⁴ in order to improve your badge / score?”

As can be seen from Figure 2, in all cases, the percentage of respondents who answered “yes” was higher for the score-based social competitive approach

⁴ For better understanding by participants, the word ‘information’ was used in the survey in place of the word ‘metadata’.

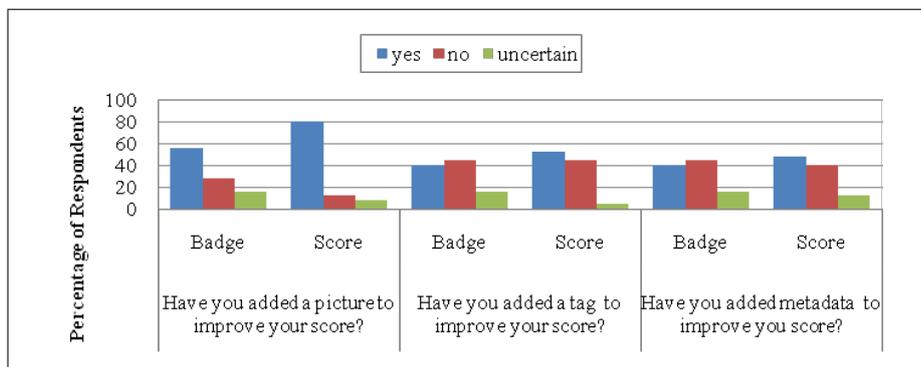


Fig. 2. Comparison of badge and score as motivating factors

than the badge-based social non-competitive approach. For the case of tags and metadata, the responses were almost equally weighted between “yes” and “no” for both badge and score. However, the “yes” responses for pictures were clearly higher than “no” responses for the score-based approach, showing that the social competitive approach was much better at motivating users to contribute data than the social non-competitive approach.

4.2 Evaluation of the Competitive Approach

Since the social competitive approach was found to be the best motivator for getting users to contribute to a digital library, it was further investigated in order to determine what effects motivated users to contribute to the digital library. In the social competitive application, users are awarded points for their contributions and are placed on a leaderboard according to their score. Thus, the more competitive users are, the more likely it is that they will contribute to the digital library in order to improve their score. This, in turn, improves the application’s ability to collect pictures, tags and metadata.

Thirty participants were recruited to participate in a second survey. The survey was conducted using LimeSurvey over a period of two weeks. Users were required to follow a set of instructions involving contributing heritage images, tags and metadata as well as searching and browsing the collection. Almost all of the participants were between the ages of 20 and 29 and most participants held bachelors or honours degrees in varying fields. The purpose of the survey was to investigate the ways in which the participants were competitive. The results of the survey are summarised in Figure 3.

Figure 3 shows the percentage of participants (y-axis on the left) who reported wanting to beat their friends’ scores or other users’ scores as well as the percentage of participants (y-axis on the right) who answered “Yes” to knowing their position on the friend leaderboard and the main leaderboard. The majority of participants reported wanting to beat their friends’ scores (80%) and users’ scores (67%), with most of these participants wanting to beat both. However,

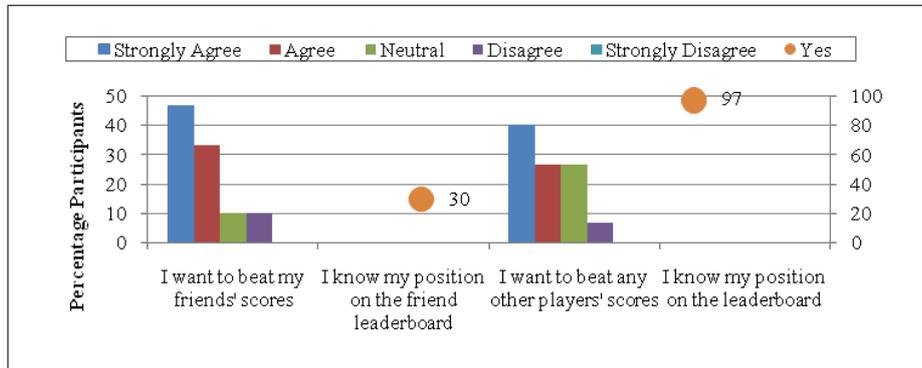


Fig. 3. Competitive nature of participants

only 30% of participants knew their position on the friend leaderboard. In comparison, 97% of participants knew their position on the main leaderboard. This inconsistency is probably a result of the mini-leaderboard showing a summary of the users' position on the main leaderboard and not on the friend leaderboard. Given that more participants are interested in beating their friends' scores, it may be beneficial to have the friend leaderboard (or both leaderboards) displayed in the mini-leaderboard. These findings clearly demonstrate that users were competitive while using the application and that the leaderboard was successful at encouraging competition by showing users their position.

In the survey, participants were also asked if they continued to use the application after completing the required tasks. If a participant responded "Yes", they were asked if they had contributed pictures, tags or metadata in order to improve their score on the leaderboard. Most participants (73%) reported that they continued to use the application after completing the required tasks. Figure 4 shows the percentage of users who contributed pictures, tags and metadata in order to improve their score on the leaderboard. The percentage of total users is displayed on the left, whereas the percentage of continuing users is shown on the right.

As can be seen from Figure 4, the majority of participants contributed pictures and tags in order to improve their score. However, fewer users contributed metadata in order to improve their score. The results show that users were motivated by the leaderboard to contribute pictures and tags but not as motivated to contribute metadata. This could indicate that the users were possibly unaware that adding metadata could improve their scores, or that users found these tasks boring, difficult or useless. These possibilities are discussed further in the next section.

4.3 User Experience

A user experience study was also conducted as part of the second survey on the competitive approach in order to gain an indication of whether the users

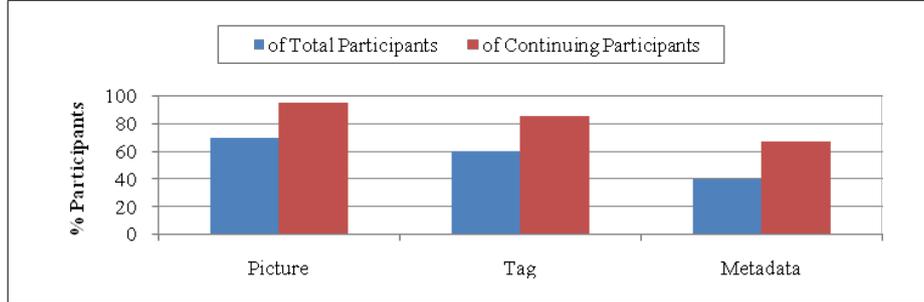


Fig. 4. Participant contribution through competition

are likely to spend time on the application contributing data, whether they are likely to continue using the application and whether they would recommend the application to friends. These factors influence the application’s abilities to collect heritage pictures as well as metadata and tagging.

Participants were asked to choose “Strongly Agree”, “Agree”, “Neutral”, “Disagree” or “Strongly Disagree” for each of the following statements related to the Facebook application: “It could be useful;” “It is easy to use;” and “It is fun to use.”

These survey questions were adapted from work by Lund [11] on user experience questionnaires. The results are shown in Figure 5.

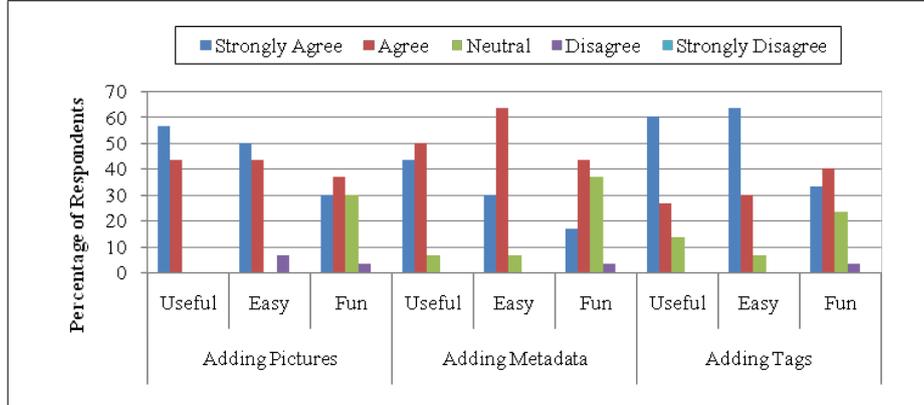


Fig. 5. User experience adding pictures, metadata and tags

The participants responded positively to most statements related to the functionality of adding pictures. These results show that users had a positive experience adding pictures as well as providing tags and metadata. The results also indicate that participants had more fun adding pictures and tags as opposed to

metadata, thus providing a possible reason why the contribution of metadata was lower than that of pictures and tags.

4.4 Application Usage

Although the final evaluation survey had thirty participants, there were other users of the application. Some users used the application during early evaluation phases and others found the application through the social network.

As of 10 March 2012, the application had 101 users, 314 pictures and 736 tags. The 314 pictures were uploaded by 56 of the 101 users. This gives an average of 3.1 pictures per user, or an average of 5.6 pictures per contributing user. Of the 314 pictures contributed, 265 had a title, 78 had a description, 72 had an attribution, 266 had a license and 275 had at least 1 tag. On average, pictures had 2.3 tags each. However, if only the pictures with at least 1 tag are taken into account, the average is 2.7 tags per picture. The 736 tags had 430 distinct keywords.

These results suggest that users enjoyed tagging pictures. Furthermore, although the surveys showed that users were not as interested in adding metadata, most of the pictures were in fact labelled with metadata.

5 Conclusions

The public and communities can provide valuable artefacts and documents that are worth preserving in a digital library. However, motivating users to contribute to digital libraries can often be difficult, leading to stagnation. In investigating the use of a game on a social network to promote content submission to a digital library, it was found that direct competition is more effective than a non-competitive approach. This finding is useful not only within the context of this research but may be applied in other contexts where motivational techniques are needed, such as in games, work environments or education. It is possible that competition may not always be appropriate in some contexts and communities. However, competition has shown itself to be worthwhile for consideration. For example, in a developing country, specifically an African country where the culture centres on community, it may be assumed that community and collaboration would be favoured over direct competition. However, the results of this research indicate otherwise. Most of the participants were born and/or grew up in an African country. However, the participants reported being more motivated by direct competition than by a non-competitive, collaborative approach.

In the future, different ranking methods should be compared in order to achieve the best possible motivation for users. Progress bars, levels, tasks and quests may also be used to motivate through competition. Other motivation approaches may be compared, for example combining competition and collaboration by either creating team based competition or rewarding collaboration with points. The approach used in this research is not limited to a standalone software tool but can be part of a broader repository. For example, a system can

be built to integrate with a repository. Content can be collected automatically using SWORD⁵ (Simple Web-service Offering Repository Deposit) to submit remotely, bridging the gap between social network and repository.

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⁵ <http://swordapp.org/>