

Towards an open product repository using playful crowdsourcing

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Abstract Despite the ubiquity of barcodes there is no common product repository available today linking product master data to the corresponding barcodes. This paper proposes a social network game (Product Empire) that motivates users to scan barcodes and to enter basic product information, such as product name, brand and category and to upload a picture. A first prototype has been implemented and applied in an initial formative user study with 10 users who have generated 80 product scans with user-generated descriptions in a week time frame. This result shows the potential of generating an open product repository by motivating users with a game approach.

1 Introduction

Initially introduced by sociologists to describe personal ties between individuals who share similar interests [Tö87], social networks have become the terminology for describing online social interactions among users. More than 400 million users met on Facebook in February 2010, accordingly Facebook received more internet visits than Google [NG10]. Beyond sharing of comments, feelings and emotions social networks also become popular to run services and games building upon the relationships of the underlying user base.

We believe that these new forms of collaboration and participation of social networks can be applied for user-generated content. In this paper we use social networks for establishing a game, ProductEmpire, that motivates people to scan products and to enter basic product descriptions into a database. Accordingly, an open barcode-product database could emerge that provides basic product master data for various emerging consumer applications on mobile phones – e.g. ShopSavvy¹, Barcoo, CodeCheck – providing price comparison and additional information on products. These types of mobile applications require a filled product repository containing a mapping between barcode numbers and the related product information, otherwise it might happen that a product scanned by the user is not recognized. As there exists no common product repository most of the applications build an own repository that hardly covers all the product data that is needed or only for a certain area. For example ShopSavvy may have

¹ ShopSavvy: <http://www.biggu.com>

a rather good coverage of consumer electronics in the US whereas its Swiss competitor may own rich data about the Swiss market. Furthermore, Amazon Web Services already provide data on many items, the data set is still limited as it does not include grocery products. Furthermore, Amazon does not permit to use their database with mobile applications without an explicit approval. Other databases such as the ones of big retailers or of companies in general are mostly proprietary and not accessible or too small.

Additionally, also the retailers themselves have problems concerning the accuracy of product master data. Inconsistencies of up to 80% [UK09] require costly manual workarounds to source missing data and to correct errors of wrong product displays or mismatches at the checkout. It is estimated that this incorrect data will cost the industry £700m over the next 5 years, and a further £300m in lost revenues according to [UK09].

The goal of this paper is to build an open product information repository following a crowdsourcing approach [Ho06]. We apply motivational concepts from pervasive gaming and social networks, similar to FarmVille² or MafiaWars³: using virtual credit and status awards being shared over social networks we motivate mobile phone user to scan barcodes, describe products, and check and revise descriptions of others. We build upon the experiences of related approaches which combine games with the goal of gathering data [Ah06]. CityExplorer [Ma08], CenceMe [Mi08] and mCrowd [Ya09] even prove the success of using smart phones to harness sensing data with the aid of voluntarily users. We believe that crowdsourcing using pervasive games as motivation provides the basis for creating an open product information repository.

The remainder of this paper is structured as follows. Section 2 explains the game concept of our approach and Section 3 depicts the technical setup up of our first prototype implementation. Section 4 reports about the insights of our formative user study. Finally Section 5 gives a conclusion and an outlook on future work.

2 Concept

This section presents the game concept of our approach. The goal behind this game is to motivate people to scan product barcodes with the built-in cameras of their smart phones and to enter basic product information, such as product name, brand, and product category as well as to upload a picture. The game concept is inspired by social network games such as FarmVille and MafiaWars and Järvinen's recommendations for designing social network games [Jä09]. Users are constantly rewarded with a virtual currency and users broadcast their achievements with feeds over the network which should attract new players. Rankings between players are used to intensify the competition.

² FarmVille: <http://www.facebook.com/FarmVille>

³ MafiaWars: <http://www.facebook.com/MafiaWars>

2.1 Game Overview “Product Empire”

The overall players’ goal in the game is to build up an own empire of products and thus to climb to the top of a virtual high society of a real city. Figure 1 shows a rough illustration of the game concept:



Figure 1: Game Concept – Big Picture

Users add products by scanning barcodes and entering product descriptions to increase their ranking in the virtual society. Additionally, they can post feeds in social networks to present their latest achievements. Finally, all the scans and product information are collected in a database that can later be used to cross check retailer product labeling or provide a base for consumer applications.

2.2 Game Description

In the following the features of the game are described:

Build your Empire: The more products players own, the bigger their empire is. To acquire a product, players use their mobile phone to scan the barcode of a real product, take a photo and enter product information. This activity is rewarded by an amount of virtual coins. If the player is first to scan a certain product (barcode), he is announced as the virtual owner of this product.

Climb to the top of the High Society in your city: The goal of the game is to get into the highest class of the virtual society. To climb up in this society, players have to acquire products and coins that together define their score. Depending on the scores of players in the same city, each player belongs to one of the five virtual social classes, ranging from "Poor dogs" to "VIP".

Social interaction with players around you: Players can interact with other players using a real map on which all players have their virtual home bases. The icons of the home depict the social status of the player. Viewing the home base of a player shows besides the ranking information also a list of all owned products. Players can invest a certain amount of coins to steal products from each other. Based on fortune, the player either becomes the new owner of the product or loses the invested coins.

3 Implementation

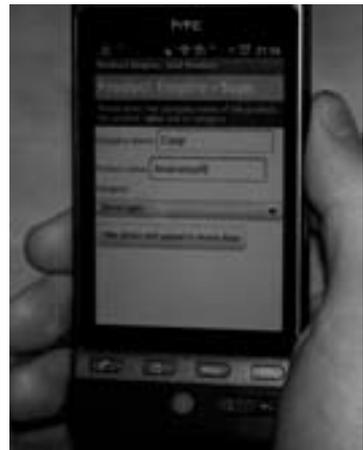


Figure 2: A player scans a product barcode (left) and enters product information (right)

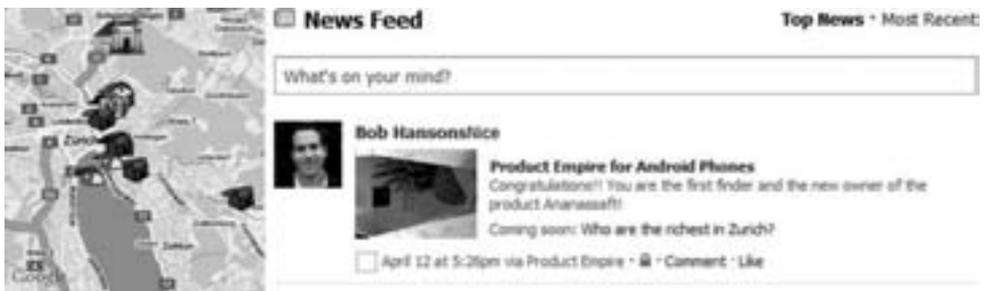


Figure 3: Map view of players' home bases (left) and Facebook feed of a scanned product (right)

On the client side the game was implemented on smart phones with the Google Android SDK 1.6⁴. The ZXing library⁵ provided the barcode scanning capability and the Android FBConnect⁶ was used to access Facebook. Figure 2 shows a player that scans a product barcode and enters product information. Figure 3 shows then the players' home bases in which their products are stored and the scanned product when it is posted as a feed on Facebook using the prototype. The server was developed with the Ruby on Rails 2.3.5⁷ framework and uses the Facebooker Wrapper 1.0.53⁸ to integrate with Facebook. A running version of the Android client can be obtained from our project homepage⁹.

4 Discussion and first Experiences

A formative user study has been conducted with 10 participants composed of working colleagues and students. The game was played in Zurich for one week and a real price for the best player, sweets worth 10 Euro, was announced prior to the start of the game. The analysis of the results revealed that even though there were just a small number of participants (10), the subjects scanned, described and took pictures of more than 80 products in one week. The interviews of the subjects revealed that they all enjoyed playing the game. Especially the feature of stealing products of other players was perceived to be exciting. Even during the study participants discussed about the game and about events such as when they lost a product that they scanned and felt attached to. The subjects also liked the google map overlaid with the different players' home appearance depending on their ranking. This made it easy to see other players around them growing. Two users reported about getting lost on the map when searching other players that were located far away from them. The interviews also revealed that manually entering product information directly from the beginning of the game was perceived as tedious. Therefore, within the first three days of the study, the game had been adapted in the way, that certain product information that can be already extracted from external sources, e.g. amazon, was already prefilled for the user. Thus, new players can start adding products without too much manual work before they hunt for completely new products that are awarded by more coins. One user also cheated. He entered several times fictional product names in order to save typing effort. Thus, he gained higher scores. Accordingly, a peer-review mechanism of product data among users should be implemented in future developments. Three users also commented about motivational aspects and features continuously added to the game in order to keep users participating over longer periods of time.

The preliminary outcome of this first formative user study was rewarding as it showed the potential of motivating users to scan and collect product information as part of a game. Longer running user studies with larger user bases will be subject of future work.

⁴ Android SDK 1.6: <http://developer.android.com/sdk/android-1.6.html>

⁵ ZXing Library: <http://code.google.com/p/zxing>

⁶ FBConnect: <http://code.google.com/p/fbconnect-android>

⁷ Ruby on Rails 2.3.5: <http://rubyonrails.org>

⁸ Facebooker Wrapper: <http://rubygems.org/gems/facebooker>

⁹ ProductEmpire: <http://dev.im.ethz.ch/wiki/ProductEmpire>

5 Conclusion & Outlook

This paper presented a game-based approach to build up an open product information repository in order to tackle the problem of incorrect data in the retail industry and the lack of data for mobile consumer applications. Our approach combines crowdsourcing, pervasive games and social networks to build up this database. Users are motivated to scan barcodes of products and enter product information as part of a pervasive game. Furthermore, the game is integrated with social networks to build a community around the game and to allow users to broadcast their achievements over the network. The concept of this game was presented and a first prototype has been implemented on Android smart phones and integrated with Facebook.

A formative user study with ten participants had been conducted in which participants voluntarily scanned, described and took pictures of more than 80 products within one week. As described in the discussion section, the initial user feedback revealed that the users enjoyed playing the game and especially the interaction with other users by stealing products from each other. However, the participants also depicted shortcomings of the approach. For instance the need of typing of too much product information from the very beginning of the game was disliked.

For the next prototype it is planned to address the problem of wrong entered product data. As part of the game, user cross checking of product information will be added. Furthermore, the possibility to protect certain products from stealing will be implemented as some users were personally attached to certain products they scanned and which they afterwards lost. Moreover, the navigation in the game map to find other players will be facilitated. Subsequently, we will conduct a user study with more participants and a longer duration to further evaluate the feasibility of our approach.

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