Towns Conquer: A Gamified application to collect geographical names (vernacular names/toponyms)

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Abstract

The traditional model for geospatial crowd sourcing asks the public to use their free time collecting geospatial data for no obvious reward. This model has shown to work very well on projects such as Open Street Map, but comes with some clear disadvantages such as reliance on small communities of 'Neo-geographers' and variability in quality and content of collected data. This project aims at tackling these problems by providing alternative motivation specifically a smartphone based computer game service. Geographical names (vernacular names/ toponyms) have been identified as potential targets as they are difficult to collect on a large scale and easy to collect locally, thus ideal for crowd sourcing. The data set will be a toponyms database provided by the Spanish National Geographic Institute (IGN Spain). A location based game is targeted as it is easy to guide data collection with in-game rewards (prizes, points, badges etc.). Android is chosen for its accessible API and wide use.

1   Introduction

Crowdsourcing is a process that involves obtaining services, ideas, or content through public volunteer contribution. With this method we ask volunteers to perform tasks for contributing with our goal. In this case the task involves validating municipalities' toponyms in Spain. Toponym comes from the Greek word *topos* ("place") and *onoma* ("name"). In general it is synonymous of geographical name. Geographical names or place names are names that designate and identify the places around us: streets, towns, cities, rivers, mountains, landscapes etc... Place names are a fundamental part of our cultural heritage and an invaluable source of information for many areas of research, especially for language, as they are essential in the study of the evolution of languages.

The uniform use of correct names is an essential element in cartography. The first step in getting a consistent use of place names is its normalization, the establishment of the correct forms by the competent authority. The place name is the standard that has been established by a competent authority in response to standards or criteria set by that authority.

As shown in [1] the process to validate toponyms is time-consuming and tedious. In Spain it has taken over 10 years to implement a model to standardize the nomenclature of municipalities, yet today there are still conflicts with the names of some places, especially in regions with two languages.

Our research considers an innovative and different way of data collection, based on citizens volunteer participation, also known as crowdsourcing. Regarding crowdsourcing, the massive and persistent participation of the public over time is crucial to obtain a huge toponyms data repository to be able to do further research and analysis. However, editing names of municipalities is not a motivating task at first sight, so users might need additional motivation.

In this paper we are presenting an application that applies Gamification techniques to persuade users to contribute their amendments to the given toponyms database. The goal is for citizens to amend well known placenames while playing a game. This novel approach of collecting data provides a mechanism to motivate users to revise names by turning a demanding and repetitive task into an engaging and enjoyable one. From the users' point of view, they will be playing a game while contributing transparently with a toponyms repository whose data can be later used by the administration and for scientific purposes.

Figure 1: Spanish linguistic areas.
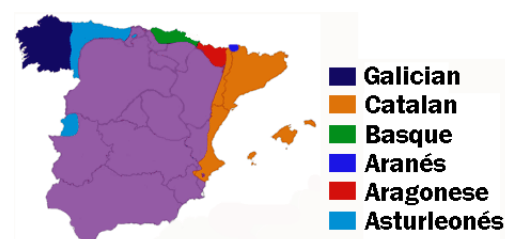
2   Background & Related Work

It is very important to have an error-free, exact and precise database. This is important in a *Geographical Information System* [2], as the contrary may alter its analysis. In this case, we will try to use a crowd to get geographical data to correct errors in the IGN´s database.

In the last few years, the crowdsourcing technique has been used in many projects to obtain data. In The Rise of Crowd Sourcing [3] Jeff Howe explains that the evolution of technology (Web 2.0) allows us to present a problem to a crowd of people and get a satisfactory solution, in many cases, better than hiring an outside company. Goodchild [4] compares the phenomenon of Volunteered Geographic Information with traditional citizen science and says that *"VGI has the potential to be a significant source of geographers"*

OpenStreetMap [5] is a clear example of crowdsourcing. A project whose objective is to acquire geographical data, and to reach that goal, they have developed an application where users can enter data. They have also promoted an online community. This is very important, because from a psychological point of view, people like to be part of a group. WikiMapia [6] is another collaborative map where anyone can submit geographic data. Meteoclimatic [7] is a nonprofessional Spanish Network of Automatic Weather Stations designed to provide weather information.

Crowdsourcing is not only used in the area of geolocation, there are other notable projects in other fields. "Fold it" [8], is a great example in biochemistry´s area. Wikipedia [9] is another good example.

3   Gamification Concepts

As mentioned above, in this project we intended to use Goodchild's concept of "Citizens as Sensors". This is a very straightforward way of collecting huge amount of data at a very low cost. Nevertheless, users need incentive to motivate them to acquire these data willingly and this is when the Gamification techniques can be useful.

Gamifying a repetitive or complex problem bridges the gap between a scientific problem and the citizens' reaction. That allows any citizen to contribute to science unconsciously by using mobile games. The rest of this section explains how we carried out the Gamification process.

The core concept for gamifying is engagement. Engaging users to do something is crucial to encourage citizens to collaborate with a project. In this case, the final goal is to revise toponyms to debug the IGN's database and allow for further analysis such as studies regarding conflicts over placenames... Engagement could be achieved by motivating people, so it is important to create nice and user-friendly applications that encourage people to provide the needed data.

[10] Discusses how we can motivate the general public to participate, highlighting how important is to attract and encourage common users to contribute to our goal to obtain a clean data set.

According to [11], to perform a good gamification process we have to motivate and engage the user with the gamified application. For this purpose, we have to consider 4 key

points: status, access, power and stuff. *Status* recommends splitting the game progress in stages or levels so users can compare their achievements with other users. *Access* allows users to unlock new features depending on their contribution to the game. Transferring *power* to some users by letting them do actions that are not allowed to be done by all users is important to foster competition. Finally, *stuff* recommends providing a set of rewards or prizes as an incentive to keep playing.

Regarding the target users analysis, we used the classification found in [12], where the author divides users into four different types, namely: *killers*, *achievers*, *socializers* & *explorers*. The next section describes how we applied gamification concepts to our gamified application.

4   Towns Conquer game

This section describes in detail how we developed Towns Conquer prototype, regarding logical components and the application of gamification concepts.

4.1   Architecture

For this Project, we followed a multi-layer (Figure 2) architecture that could be implemented and extended by other applications with a similar purpose.

Figure 2: Architecture of the prototype.
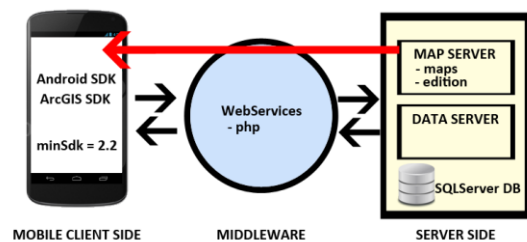
There are two ways to use the application. Users can access it through their smartphones using an Android device or through a web browser in a computer. Here, users can submit names of toponyms.

The second layer contains web services for processing the collected data and communicates with the database. When the process ends, the result is communicated to the user.

On the third layer we find a Map Server and a Data Server. The first provides users basemaps layers, the geographical situation of the toponyms, the name that is at present stored. The second one has all geographical data, user´s profiles, logs…

Before copying the IGN´s database on the server, a consistency check of the data was performed. We found 1,902 entities without coordinates (Figure 3), which have been copied to another database for study and removed from the main database. We also found 11 entities with wrong coordinates, which have been corrected.

4.2   Prototype

Towns Conquer is a game developed for the Android platform and web browser, where users have to enter the name of Spanish towns to earn points and win the territory. It will use a map of Spain as a gameboard and existing administrative boundaries (Table 1) as cells. The final goal of this game from the user's point of view is to conquer as much land as possible, starting by conquering provinces, then regions and finally all of the country.

Table 1: Administrative Boundaries Spain

Level	Number
Regions	17
Province	50
Municipalities	8116

To conquer territory, the user must choose a province and then validate the name of the province municipalities (Figure 4).

Figure 3: Game prototype

Each time the user enters the name of a municipality, we add a point within this province. This province will be conquered for the user with more points, therefore, the user who revised more municipalities' names will have more points. Similarly, the next administrative level, regions, will be conquered for the user who has conquered more provinces within this region (Figure 4). Finally, the user with more regions has all the terrain and is the conqueror of Spain, and is thus the current winner (Figure 5).

The game is global among all users of the application, therefore, the user's territories can be conquered by a different user if the player stops playing. The purpose is to try to prevent the player to leave the game.

Figure 4: Game Geo-Ranking

As for prizes, the idea is that users earn points to increase their level, either by validating entities or unlocking achievements (Table 2)

Table 2: Example of achievements

Achievements	Goals
1. Beginner	Play in a province
2. …	Validate 10 municipalities
3. Explorer	Play in two provinces
4. …	Validate 5 municipalities with less than 200 habitants
5. …	Validate 10 municipalities with more than 50,000 habitants
6. …	Validate 50 municipalities
7. Conqueror	Conquer a province
…	…

It also allows the users to share their progress in the game with Facebook or other social networks
The real goal of the game is clean up the IGN's toponyms database using Crowdsourcing and Gamification. Thus, we get a lot of feedback that would not be possible with dedicated expert users alone. Using this data we present statistics with the names provided for each township and we can see if there are any conflicts in any of them. In the case of a conflict, an authorized IGN officer will solve the problem.

4.3   Preliminary results

For the first test we have chosen the province of Castellón because it´s an area that we know well and presents the problem of having two official languages, with the consequence that the name of the toponyms may appear in any of these. As we expected, in IGN´s database, we found some toponyms in this area that appear with different nomenclatures.

In the next figure we can see an example of conflict in one municipality, the database has two names for the same placement.

Figure 5: Views of the application

Several versions of android had been tested, verifying that SDK works correctly for all.

5   Conclusion

We are developing an application that will be released to the public in the coming months, whose objective is to solve the inexactness of many toponyms in IGN´s database. Using crowdsourcing we are going to achieve the best solution because data is going to be collected at low cost by people who know their environment.

To engage people, we have presented the application as a game where users can obtain: recognition by the online community, prizes and a way to practice geography as a hobby.

The geographical data obtained will facilitate the proper functioning of many of the IGN's GIS.

In the future we should add more points to check those that belong to smaller or unofficial entities. We should also consider if the filtering of the data is going to be reviewed by the user's community or with an application.

The project could be extended to other countries to validate other geographical entities because crowdsourcing is a low cost method whose effectiveness is tested.

The application will be available for download from GEOTEC web site[1].

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[1] http://www.geotec.uji.es/

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