mTagATune: mobile TagATune

Audio Files Tagging Mobile Game

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***Abstract*—mTagATune is a mobile application based on TagATune [9] and developed in JAVA for Android cellphones. mTagATune implements the concept of GWAP [2] and seizes the capabilities and wide acceptance of current smartphones. GWAP promotes the creation of computer games that encourage people to do voluntary work. mTagATune implements a game that collects information on audio files to facilitate future searches on them. By means of a collaborative game, mTagATune enables an ubiquitous collection of information on audio files that can later be used in search results.**

I. INTRODUCTION

Despite technological advances, computers still do not have the creativity or perception human beings have by nature. Due to this fact, computers today cannot subjectively classify certain sets of elements such as audio files, image files, etc.

Currently, data bases exist that contain thousands of audio files, although searching these repositories with subjective criteria is not possible due to the fact that each audio file would have to be tagged first with words that necessarily convey subjective meanings.

One solution to this problem is using the technique known as Human Computation [1]. This technique views the human brain as a processor inside a distributed system, where each can process a small part of a much larger computation.

Currently, there are millions of people around the world who use digital games as a form of entertainment. Many of these games can be accessed through the Internet. The massive expansion of mobile telephones allows users to play games where they could not play before: during trips or while queuing at the bank. The first games launched for mobile telephones were very simple due to physical limitations, but with the new generation of cellphones, the so-called smartphones, games are becoming more and more complex, with better performance, even using resources such as global positioning systems and the Internet.

One branch of Human Computation, called Games with a Purpose (GWAP) [2] promotes the idea of creating games in which the activity people engage in forms part of a processing that produces information, which can later be used in other successive processing.

GWAP encourages people to do voluntary work, but not with the intention of obtaining income, as is the case of employment. If we think about the task of tagging music fragments, the amount of elements requiring processing is enormous which would require a tremendous workforce to complete it, yielding the task impractical due to cost.

Smartphones, with their many advantages, allow for the implementation of GWAP on mobile telephones, providing permanent access to the games and increasing the amount of players (and, as a result, the amount of hours dedicated to each game as well). This increases the data processed, which gives better use to the time players spend on each game.

II. BASES

As we have mentioned before, Human Computation posits the theory that the brain can be seen as a small processor inside a distributed system, where each brain can process a small part of a much larger computation. Human Computation is a technique in which a computation executes its function by delegating certain steps to humans. In traditional computation, humans use a computer to solve a problem: the human provides the computer with a formalized description of the problem and receives a solution they must interpret. Human Computation reverts the roles; the computer asks a human or group of humans to solve a problem and collects, interprets and integrates their solutions.

This data analysis technique is called Human Computation because it combines the collective intelligence of a certain number of human participants to solve a task that cannot be automatized easily. A common example of Human Computation is the Completely Automated Public Turing test to tell Computers and Humans Apart (CAPTCHA). CAPTCHA is a challenge-answer test used in computing to determine whether the user is human or not. The term was first used around the year 2000 by Luis von Ahn, Manuel Blum and Nicholas J. Hopper from Carnegie Mellon University, and John Langford

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from IBM. The typical test consists of the user entering a set of characters shown in a distorted image on screen. A machine is supposedly unable to understand and enter the sequence correctly, leaving the human the only one able to pass the test.

GWAP is a combination of the Human Computation technique and the billions of people around the world willing to invest time playing online. The concept of GWAP could be defined as games in which each participant processes a part of a larger computation, which is solved by combining the processing contributed by each player. In this context, "processing" makes reference to the mental exercise the player engages in to solve the part of the computation they are assigned. Some examples of GWAP can be found in work by Luis von Ahn[3]; the Google engine has an experimental version of a GWAP for the classification of images, called Google Image Labeler[4]. The goal of the Google Image Labeler game is to generate tags associated to images that can be used to improve image search results. The mechanism of the game consists of showing two users an image, and for every match, both users get points. These points motivate users to input a large amount of tags. Afterwards, when a word has been entered many times for the same image, it is assumed that it describes the image correctly and fit to be used in the search engine. Note that in this mechanism, players have no knowledge of who is their team mate during the game and have no way to communicate, thus it is impossible for users to cheat by agreeing on the words they will use.

GWAP-based games are not only used to generate information about images, they are also used for other types of multimedia data, such as audio files. There are many games for this type of data in particular, such as Listen Game[5] or MajorMiner[6]. In MajorMiner, participants are asked to describe a 10-second song fragment, and points are assigned when their descriptions match those of other participants. The user listens to the audio file and describes it in a few words. Words that had been used once before award the player a point. The player that uses a word first gets two points. Words that have been used by at least two players previously award no points to the player. These rules were written to encourage players to be meticulous, and the length of the fragments is aimed at making players more objective and specific. Similarly to Google Image Labeler, during the game, the user cannot communicate with other participants or see the information they generated for the particular fragment.

Both Google Image Labeler and MajorMiner use an agreement mechanism called output-agreement[7]. In this mechanism, two or more players are shown the same entry and they must agree on the output they produce to obtain points. For this mechanism to work, it is essential for users not to see the data generated by the other users during the game. For this reason, users are not allowed to communicate with each other when playing. Tagging audio files presents some difficulties, as it is not simple for two users to coincide in the description of an audio file. Unlike images, often containing a few identifiable objects, sounds can be described by abstract concepts such as "temperature" (e.g. warm, cold), "mood" (e.g. cheery, sad), a situation it evokes (e.g. heavy traffic, festivals, etc.) or categories with no clearly defined boundaries (e.g. Acid-Jazz, Jazz-Funk, Smooth Jazz, etc.).

As a counterpart to output-agreement there is another agreement mechanism, called input-agreement[8]. This mechanism presents each user with an entry (both users may get the same or different ones) and are asked to input information about this entry. At all times, the user can see the data the other user is inputting. When the time ends, users are asked to determine whether both received the same entry or not based on the data entered by each. If they guess correctly, they obtain points and their descriptions are assumed to be right. This mechanism does not demand that players produce the same input to obtain points, which grants more flexibility and makes it a good option for games aimed at generating information from audio files.

TagATune [9] is an audio file tagging game that uses the input-agreement mechanism.

III. SMARTPHONES: THE NEW DESKTOP

We currently live in a world in which digital communications have modified the way in which people communicate. Mobile telephony has a central role in this change, as it is no longer used only for talking, but also for capturing and reproducing videos, taking pictures, playing, keeping a work schedule, visiting news pages and using dynamic maps, among others.

Each day, cellphones come with more and more features, their screens are wider and more precise, they come with better cameras, they play music and incorporate GPS navigators. They are always-on mobile devices, and they represent a great challenge to the new applications that stop being isolated entities that exchange information through user interfaces. This new generation of applications allows users to share music, games, boards, live videos and others.

According to statistics from Gartner, only in the third quarter of 2010, smartphone sales accounted for almost 20% of total mobile telephone sales, with over 80

million units worldwide [10]. This growth suggests that the percentage of users with smartphones will grow steadily, replacing the old cellphones entirely. The number of mobile Internet users has grown together with the use of smartphones, making it likely that the there will be more Internet users that access it through mobile phones than through desktop computers in a few years [11]. Another interesting piece of information is the increase in downloads and use of applications in mobile phones. Evidence of this trend is the fact that the Apple App Store has reached the number of 10.000 downloads in less than 3 years [12] and over 350.000 applications for its users. This information adds up to other operating systems, such as Android Market that in 2010 reached the number of 170.000 available applications [13]. Out of those, 25.000 are entertainment-related applications, which is the category with the most applications available.

The great advantage of current mobile devices is that they are available for users anytime, anywhere. People can now use their telephones to entertain themselves where it was impossible before, for example, during a commute or in a bar.

IV. Description of mTagATune

mTagATune (mobile TagATune) is a GWAP application for mobile devices, smartphones specifically, based on TagATune.

The growing trend in the use of mobile devices and the advantages they offer encourages an environment adequate for the application of GWAP in mobile phones, making it possible for people to play in more places, thus increasing the amount of data published.

A. How the Game Works

mTagATune is a mobile application that implements the concept of GWAP and allows for audio file tagging. The goal of mTagATune is to collect semantic information to be used in search results and further indexation.

When a user enters the game, after registering, they are assigned a partner. Because this type of application cannot ensure that the user is paying attention, once the partner is selected, both are asked to confirm that they are ready to begin the game. In case one of the users takes longer than stipulated to confirm presence, both users will be informed that the game has been canceled.

When the game begins, each participant is given an audio entry and both have to contribute words that describe it. Based on the descriptions entered by both participants, each must determine individually whether they are both listening to the same piece or not. If both participants choose the right answer, they obtain points. The goal of the game is to obtain as many points as possible.

B. Pair Selection

Participant's pairs are selected at the beginning of each game without the users knowing who is paired with them. Following is an explanation of the mechanism implemented for this purpose.

Players are picked together on the basis of similar amounts of points. For this purpose, it is necessary to limit scoring differences, for example, if a user obtains 500 points and the limit for a game is 100 points, this user will be able to play with others that have between 400 and 600 points. The main disadvantage of this system is the delay in finding a suitable match for a certain player, which is greater the more reduced the amount of users. To solve this problem, it was decided that the limit increased with time, which allows for a greater range and increases the possibility of forming pairs. A waiting time limit was also introduced – if the limit is reached and there are no matches, the player is assigned a partner no matter their score. If there are no other players waiting, a game is created exclusively for the user. To avoid pairing new users, which might discourage them because both might enter a small amount of tags, it was determined that inexperienced users should be paired with players that have a long history of games. This way, the chances of winning games, and therefore gaining interest in the game, are greatly increased.

C. Selection of Audio Fragments

One game consists of three identical rounds. In each one, players are given an audio file to listen to, which may or may not be the same in both cases. All fragments last 30 seconds. The length of the fragments serves more than one purpose. The first is merely technological – although the transfer speed of mobile devices has increased in the last few years, for the most part, it depends on the location of the user or the saturation of the antenna that handles their signal. Therefore, if users had to wait for an entire track to download before starting each round, most of them would soon be bored or annoyed due to the slow connection.

Another reason why the fragments are short is that the audio pieces may vary in length – while some may only be a few minutes long, others may be as lengthy as 20 minutes. This would cause the game to last for too long and the time between rounds could vary greatly, which could potentially annoy the players because they would not be able to estimate how long the game will last.

Lastly, shortening the clips to 30 seconds each makes users input tags that are more specific and related to the sound or melody they hear at that precise moment.

Following is a description of the process of selection of the clips users will be asked to label during each round of the game. The mechanism takes into account the motivation of the user to participate in the game as well as the quality and amount of the tags each audio file gets from each player. As regards the idea of motivating the user to continue participating, the rounds were set up with two alternating levels of difficulty, high and low, to give the player high chances of winning in certain rounds and pose intellectual challenges in others. Regarding the possibility of obtaining more and better tags for audio files, a pair of players will eventually contribute more and better tags when the clips they are given are highly similar. On the contrary, if the clips are not similar, the tags they contribute will be less and of a lower quality, due to the fact that fewer tags will be necessary for them to determine that they are listening to different audio clips.

The selection mechanism must first decide whether both players will get the same clip or not. This is done randomly for each round (independently from the others) with a 50% chance for each case. This strategy was adopted because of the large amount (thousands) of fragments in the database, otherwise, there would be a very low probability for the same fragment to be chosen twice. This situation would make it easy for participants to assume that the clips are different and this decision would bring along a high probability of winning, without even having to exchange data with other users.

If the clip selection determines that both players will be provided the same clip, the round begins. If the clip selection determines that each player will be given a different clip, the selection mechanism will go to a second stage in which it must decide the similarity between the clips. This decision will depend on the previous round, i.e., the clips in the last round in which both players participated were highly similar, then this round they will be less similar, and vice versa. If this is the first time these users are paired, the last round played by the participant with the most points will be taken as reference, giving some benefit to the most active players.

Clip selection also takes into consideration the amount of times a clip has been used, giving priority to those clips that have the least tags. This fulfills the main goal of the mGWAP game, which is tagging all the audio files in the repository.

The similarity of the clips is determined by the information entered by both players, both in ordinary rounds and the bonus round.

D. Description of a Game

First, the game waits for both users to download the audio file to their devices for two reasons: because both must discover whether they are listening to the same file at the same time, and because the length of the track determines the time the user is given to enter tags and decide whether it is the same fragment as their partner's.

Once each user has their file, the round begins. During the round, the player must enter words that represent what they hear. As they do, the words are sent to their partner and shown in a fraction of the screen, so both players have real-time access to the words entered by each. When the track ends, no more words can be added.

Once the file has ended, players are given a few seconds to determine whether their fragment was the same as their partner's. Players will receive points each time both pick the right option.

Thus, if one or both get the wrong answer, non of them will receive points during that round. Figure 1 shows the screen players see during each round, which shows the tags both entered together with the file data and options.

It was decided that the player who got the right answer even though their partner did not would not receive points either because the goal of the game is to achieve cooperation and not competitiveness. This way, each player would have to concentrate on getting the right answer and in describing their file as well as possible to increase their chances of the other player getting the right answer as well.

A player might decide whether they are listening to the same file before the file ends, which may block out data entry and reduce the possibility of getting the same answer for both players. Although this option may make the player enter fewer words, notice that these cases add a new piece of information: the instant in which the choice was made.

Figure 1. Game in progress

In some cases, one player will enter tags that are completely opposite to the tags the other generates, in which case they will need no further proof to decide. Therefore, a later processing of the information could determine which words potentially express the opposite to the way in which the file is classified. At all times during the round, both players know whether their partner has decided.

Once both players have made their choice, the score they get this round is show on screen, as well as whether the answer each player gave was correct or incorrect. If one of the players chooses not provide an answer, the system will assume that they gave an incorrect answer and none of them will obtain points. mTagATune is a collaborative, non-competitive game in which players only receive points if both get the right answer. mTagATune gives a natural incentive for players to enter data that correctly describes the audio file. If it were a competitive game by, for example, granting points to the player who gets the right answer even if their partner does not, players would be motivated to win by harming their partner. This would cause them to enter wrong and malicious data to confuse their partner and make them pick the wrong answer, which would result in wrong data due to the implicit competitive nature of the game.

E. Scoring System

Players are given points in the following manner:

When both players answer correctly for the first time, each player gets 60 points. The second time, they get 70 points each and 80 if they answer correctly a third time. This way, two players that answer correctly three times during a game will obtain 210 points each. These correct answers do not necessarily have to be consecutive, that is, if a pair gets the first fragment right (and receives 60 points), fails to provide a correct answer for the second fragment and does so for the third one, both players will receive 70 points for the second correct answer in the game, earning a total of 130 points each.

The aim of this scoring system is to stimulate the attention of the user throughout the game, as a user that answers correctly in the three rounds of a game will receive more points than a user who answers correctly in three rounds from different games. In the first case, they will receive 210 points, while in the second, they will obtain 180 points. In this way, users to maintain a good performance throughout the game obtain more benefits.

F. Bonus Round

Another way of playing is what is known as bonus round. The bonus round is activated during a common game, when both players get the three rounds right, thus obtaining the maximum score for a game.

This round does not generate tags on the files given, but serves to create a relationship between them. When both players get the three rounds of a common game rights, they are automatically notified that they can take part in a bonus round (they can turn down the offer).

If both players agree to participate in the bonus round, the system will select three audio files that will be played for the users. When the files end, the users have 10 seconds to decide which of the three fragments is the most dissimilar, if both coincide in their choice, they get 50 points.

Figure 2 shows a screen in the bonus round, which shows the controls players can use to select answer.

G. Single-Player Mode

mTagATune has a single-player mode for when a player enters the game when there are no other players to pair them with, or the total number of players is even, making it impossible for the system to assign a partner for the player.

The single-player mode allows for a single user to start a game at any time, independently from the amount of users connected at the time. This mode is transparent to the user, as the place of the other player is occupied by a bot that reproduces a series of rounds that have already been played by real users. The bot is an algorithm that reproduces a player's behavior in a previous round.

If there is no available partner for the player upon entering the game, the player selects a saved game depending on the level of experience of the user. For rounds to be reproduced, it is a fundamental prerequisite that they resulted in a positive outcome, i.e., both players coincided in their choices for each round and that their choices were right. There has to have been a bonus round in the game as well. This is necessary for the system to be able to assume that the entered tags can be considered valid.

Figure 2. Screen of a bonus round

Once the rounds are assigned, the user is notified that they have a partner, a bot (the user will never know that they are actually playing with a bot). During the course of each round, the bot enters the tags in the same sequence in which they were entered by the emulated user. Once the audio fragment has been reproduced in its entirety, the game evaluates the tags entered by the real user and determines whether it is the same track in both. To do this, the bot analyzes the percentage of matches between the set of tags entered by their partner and the set of tags for the audio fragment they have.

The bonus round in a single-player game is also based on a game that was stored beforehand. The game will select a saved bonus round and the bot will choose the same options the original player chose.

An important advantage is that the results of a game of this modality are just as productive as the results of ordinary games. The player will choose whether they are listening to the same fragment as their partner based on the tags entered by the bot, which is in turn based on the actions of a real user. On the other hand, the bot will take their decision based on a comparison of the tags entered by a real user and those provided earlier by another real user.

H. Cheating Control

There are two points to take into consideration: first, that the fundamental reason that would lead a player to cheat is the possibility of increasing their chances of getting more points or damaging their opponents, and second, that the goal of the game is to collect tags, thus, cheating can be detrimental, especially using methods that generate wrong tags.

Both points cleared, we see that a player cannot obtain advantages by intentionally entering tags that are not considered correct. This has a very simple reason – during a game (the only time at which a player can enter tags) both players can collaborate with each other to obtain the greatest amount of points possible. Thus, if a player enters false tags to try to induce the other player to make a mistake, they are indirectly damaging themselves, because then neither will get points. This way, each time, both payers will try to describe their files as best they can to ensure that their partner gets all the information they need to make their choice.

It must be noted that, although both players will enter the most accurate tags they can in order to increase their chances of obtaining points, the fact that both can see what the other player is writing generates a means of communication between them. This leaves open the possibility of them agreeing on their choice. As each word they enter is a new tag, the ones they use to indicate and negotiate their choice will also be included as tags. Even though this may have a negative effect on the game, later processing of the information involved will make it easy to identify most of these false tags and rule them out due to the fact that the set of words needed is very reduced and, consequently, easy to find.

V. MTAGATUNE ARCHITECTURE

Following, we describe the architecture of the mTagATune application and the technologies used in its development. mTagATune is a mobile application written in Java for Android phones that consists of a client and a server. The full development is based on open, free use technologies. mTagATune uses Tomcat to contain the Java servlets in charge of handling the logic and data storage. PostgreSQL was used to store data and Hibernate was used to map objects to the relational database.

For the purpose of communication between the server and its clients, mTagATune uses a Server Push mechanism called Comet [14] that allows for information to be sent asynchronously from the server to the clients. The Comet implementation was CometD, developed by the Dojo Foundation, which implements the Comet mechanism with Jetty Continuations. To handle the messages, CometD uses the Bayeux protocol, which sends the messages through named channels. These messages can be sent from the server to the client, from the client to the server or among servers, using these channels.

For the serialization of the Bayeux messages and the domain objects, mTagATune uses JSON. This is a light data exchange format, easy to read and write for humans, and easy to interpret and generate for machines.

The client was developed using Java for the Android operating system for many reasons, the first being its free license as well as that of the tools used for the development, and also because of the wide acceptance it has gained during the past year. The architecture used allows for the development of clients for other

operating systems, such as iOS, and for users of different devices and operating systems to interact in a game. Figure 3 shows a scheme of the architecture used, marking the part in which each technology is used.

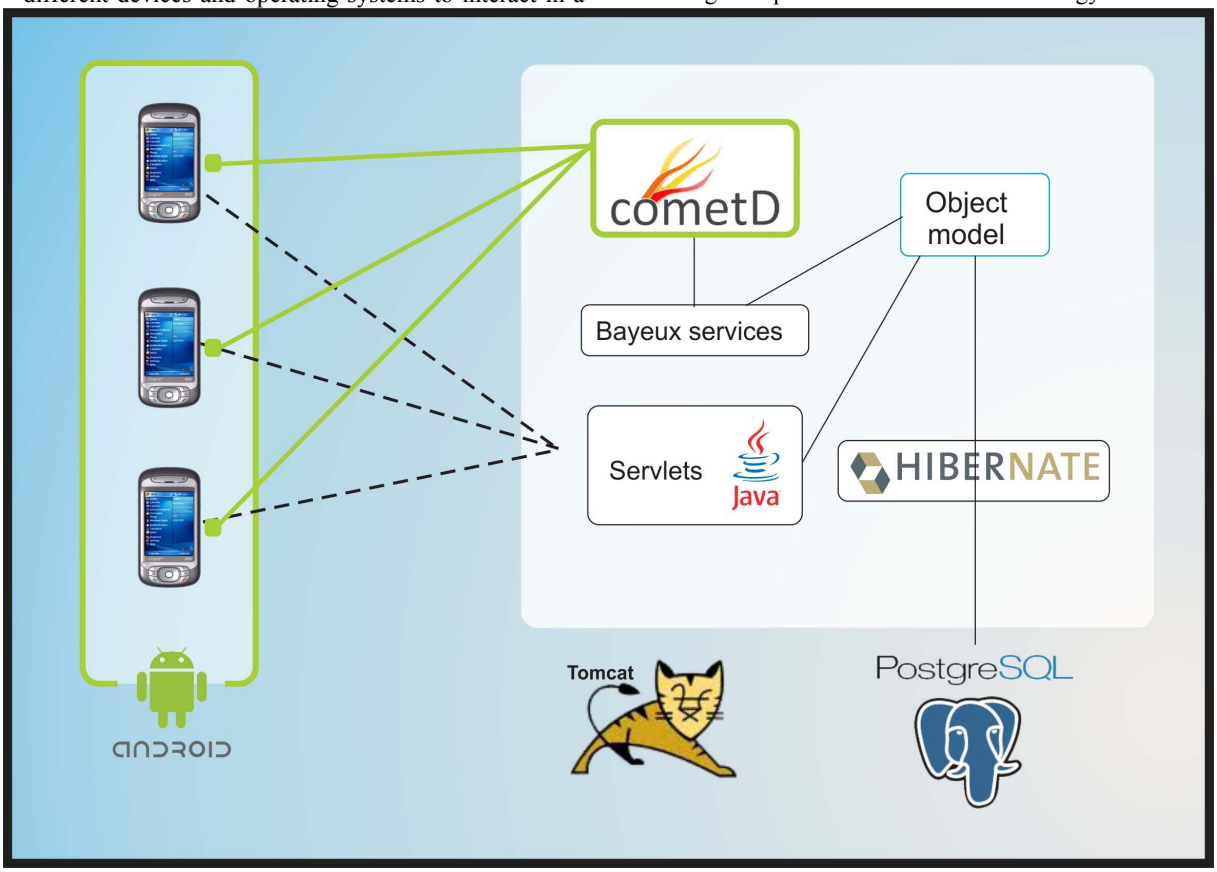

Figure 3. mTagATune Architecture and Technologies

VI. MTAGATUNE: TAGATUNE FOR MOBILES

mTagATune is an adaptation of TagATune for mobile devices. mTagATune introduced some modifications to TagATune that allow it to improve the gaming experience and its performance in mobile devices. Following, we will describe the characteristics of TagATune, with special emphasis on the aspects that were modified for mTagATune.

In each round of a TagATune game, two players receive an audio file that may or may not be the same for both. They are provided with a simple screen to play the file, stop it and adjust the volume. In mTagATune such controls are not provided, the files play automatically so that players can concentrate on writing the tags. They were also discarded because of the space limitations present in mobile phone screens.

Each TagATune participant describes the file by writing words that can be visualized by their partner. Based on their descriptions, each player must decide whether their files are the same or not. This choice must be made during the time the file is playing, if the file stops and the players have not taken a decision, the round will be considered lost. In mTagATune, the players have an extra period of time to vote after the file has ended. This is related to the typing speed in mobile devices, which is much lower and complex than in a desktop computer. mTagATune places emphasis on generating tags without pressure, both during the time the file is played and later during the extra seconds given for this purpose. Once the voting ends, the game shows the results and moves to the next round.

In TagATune, the files are chosen at random, while in our version there is a selection process to improve user experience. The same happens with pair selection. A game in TagATune lasts three minutes, while mTagATune there are three rounds and the results of these rounds is of no consequence. mTagATune players have enough time to play a full game at any point without bothering about the amount of correct answers or technical matters that may reduce the amount of rounds the users have access to in a limited period of time.

TagATune is a cooperative game, as evidenced by the scoring system. This mechanism awards points to users

if both answer correctly in the same round, which means that if one chooses the wrong answer, none will obtain points. This provides a natural incentive for users to collaborate with each other and generate the best tags possible. This notion is kept in TagATune, as well as the increase in the score as players get the correct answer in successive rounds.

TagATune provides its users with a bonus round in which they must choose the file that is the most different in a set of three. This feature is kept in mTagATune. The difference is in the way the bonus round is triggered – while in TagATune it activates when a pair reaches 1000 points, in mTagATune it does when they answer correctly in the three rounds of a game.

VII. Uses of the Data Generated by mTagATune

Some of the possible searches these data could contribute to are the following:

I. Song Search Based on a Single Tag

The simplest algorithm could be the following: search and retrieve all the songs that contain a certain tag. To do this, we have to retrieve all the fragments that contain the tag. From this set of fragments, we can know what songs contain the said tag because, as we mentioned earlier, songs are made up of fragments presented as individual files.

J. Song Search Based on More than One Tag

From the previous point emerges a wider algorithm that allows for search and retrieval of songs that match at least one of the tags in the set. The difference is in considering many tags instead of just one, i.e., searching through the fragments for those that match at least one element in the set of tags.

K. Search for Songs that Contain all Tags in a Given Set

To obtain all the songs that contain a given set of tags, it is necessary to look for all the fragments that contain at least one tag of the set and then group them using as a criterion the song they belong to. Once grouped, the fragments must be tested for the amount of tags of the set in each one. The songs of each group that contain all the tags in a set will fulfill the criteria.

L. Search for Songs that Contain a Given Amount of Tags

This algorithm is a slight variation of the former one, which allows us to obtain all the songs that contain a certain number of the tags in the set. For this, the procedure described earlier is still valid, but instead of looking for groups that contain all the tags, we must look for groups that contain at least the amount of tags established as minimum.

M. Search for Songs Indicating the Moment the Tag is Entered for the Song

We will now suppose that we want to know what songs match the criterion to carry a certain tag, but also when in the song this occurs. The information registered with the fragments serves this purpose. One possible solution would be to search all the files that contain the specified tag and then list all the tags with the start time of the fragment associated with each and the moment in which the tag was entered. This would give us the song that contain the tag and the moment in which the user entered the tag.

N. Providing Suggestions Based on a Given Song

As a first option, what can be easily solved is suggesting other songs based on the one given. To obtain similar songs, we can used the information generated by means of bonus rounds. To obtain the said result, we must look through all the bonus rounds in which a fragment of the song took part and was not chosen as the most different. Afterwards, it will be necessary to reconstruct the songs that matched our fragments by similarity, thus resulting in an approximation of similar songs.

This algorithm can be improved so that it gives more exact results by searching for coincidences in the tags of the fragments. To do this, we will use the last query of the previous point that allows us to indicate the amount of tags that have to coincide. The query is applied on the files that matched the bonus query and the set of tags will be the one assigned to the original file.

O. Authors that Composed Songs that are Similar to a Given Song

Obtaining authors that composed songs that are similar to our song is a good way of issuing recommendations. This search could be implemented by means of the previous algorithm, but also retrieving the authors of the songs among the results.

VIII. Repertoire

The audio repertoire used by mTagATune is a fraction of that used by TagATune. The sounds used currently by TagATune consist of 56.670 30-second music files obtained from magnatune.com and 28.715 sound files obtained from the database in FreeSound (http://freesound.org). All freesound.org files are distributed under the Creative Commons License.

Due to the nature of the system, we could deduce that it is applicable to any type of music; it could even be used to label music from different regions of the world and different cultures. Of course, the precision and the quality of the resulting tags will depend directly on how familiar these types of music are to the players.

For this reason, it would be interesting to think of using this game on regional music that has not undergone such techniques and consists of vast collections that have not been catalogued under any criterion.

Using the global positioning technology that comes with today's smartphones, we can locate the region in which the player is located and have them analyze the fragments that come from their region.

IX. CONCLUSIONS

This paper exhibits a technique that provides us with audio files tags that are automatically validated by the agreement of the players involved. This simplifies and improves the manual mechanism generally used for tasks such as tagging audio files. mTagATune demonstrates that this concept can be applied to architectures developed for mobile devices, without the risk of losing any of the benefits that desktop versions offer. The modifications applied to the original architecture of TagATune have no impact on the performance of the game or its results.

mTagTune had to be adapted to a mobile device screen without losing its interaction features. The interface controls were redistributed, and other features of the game were altered. As regards its architecture, it has been proved that there are no limitations in comparison with the original, TagATune.

The modifications incorporated make it easier to adapt the game to mobile devices, and to promote its interoperability in many mobile platforms.

Adapting TagATune to mobile devices will notoriously raise the amount of time that people spend playing these kinds of games, taking into account the fact that mobiles are presented as 'the new desktop' and people carry these devices with them all the time. Having access to a game through a mobile device makes it feasible to play during idle time, something that used to be impossible due to the development of games being exclusive to desktop computers.

Another important point is that mTagATune can be used to generate information about other data, such as image, video or books in a library, and not only audio files.

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