

# A MUSIC SIMILARITY GAME PROTOTYPE USING THE CASIMIR API

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## ABSTRACT

We present a prototype of "Spot the Odd Song Out" online game, which collects relative similarity judgements of users on triplets of clips. The game is based on the CASimIR API, which we currently develop, that supports the collection of other annotations the use of different client platforms, as well as the selection of music clips for presentation and user data storage. The API backend is extensible to multiple question types and scenarios and combines data from different applications. The current music database contains clips from *MagnaTagATune* and the *Million Song Dataset*.

The game front-end is implemented as an HTML5 web application runnable on most of today's desktop PCs, tablets and smartphones. A version as a Facebook app is under development. The web application is built on a modular architecture, so that new modules for tasks such as tagging or tempo tapping can be easily integrated into the existing application.

## 1. MOTIVATION

Similarity estimation is a key topic in Music Information Retrieval with relevance for many applications. In scenarios such as music exploration or recommendation, user satisfaction is influenced on the agreement between the user and the system on which music is more and which is less similar. The perceived similarity is specific to the individual user and influenced by a number of factors such as cultural background, age and education. Our goal is to adapt similarity models to user data, as presented in [4], but there are few similarity datasets openly available at this point, and none contains information on user background.

Music annotations, particularly similarity data are traditionally gathered in costly surveys. Here, games with a purpose (GWAP) provide an alternative: nowadays, web-browser based games are getting very popular and many people spend a significant amount of time playing them. Through modern portable computing devices, these games are accessible almost anywhere. For the players, motivation is given by fun in game play, as well as social cues and virtual rewards.

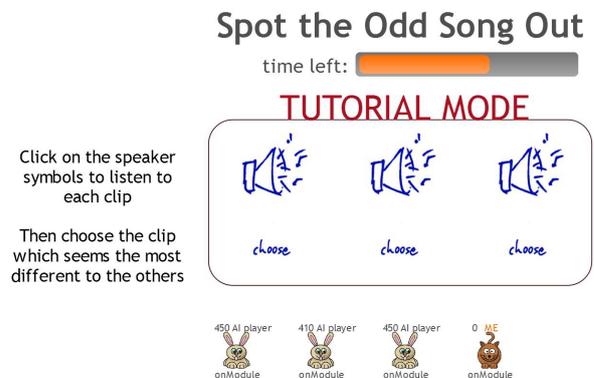
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Today such user-input data is collected by many research groups in more or less isolated surveys and games [3]. Implementation of the data collection applications is therefore often started from scratch, leaving it to the MIR researcher to design and implement the complete data collection infrastructure. Resulting from the multitude of such contexts and underlying music datasets, collected data is difficult to access for other related research projects.

The SOAP-based CASimIR API can be used by almost any internet-connected application, and it provides an easily accessible program interface to predefined data collection tasks. Definition of tasks and input-output behaviour of the client applications also facilitates the comparison and joined usage of different applications for the same data collection task. The CASimIR API provides an open source solution to the task of back-end development for similarity data collection. It also supports collaboration, as at any time during collection the data can be used and extended by other researchers.

## 2. COLLECTION INTERFACE: THE GAME



**Figure 1.** The main interface of the "Spot the Odd Song Out" game. Three clips can be listened to by clicking the speaker symbols. The buttons labeled "choose" are used to select the "odd song out". The remaining time (max: 45 seconds) for a round is displayed below the game title. The animal symbols on the bottom represent player avatars, with their names and earned points displayed.

The "Spot the Odd Song Out" game, available as prototype on the web<sup>1</sup>, collects relative similarity judgements of users on triplets of songs, where they are asked to choose one song as the "odd song out". This is a scenario that has been used in other surveys and games such as Tag A Tune

<sup>1</sup> <http://mi.soi.city.ac.uk/camir/game/>

or [2]. A full game round consists of four triplets, but the player can play any number of rounds. The triplets (A,B,C) are selected and provided by the CASimIR API in form of urls to the clips' audio content and additional metadata.

The game itself is implemented as modular HTML5 application. Communication with CASimIR is achieved through the SOAP remote procedure control protocol. We plan to add further data collection modules in the future, allowing for collaboration with other research groups.

Motivation of the players to provide meaningful entries is achieved by rewarding input-agreement of multiple players taking part in the same round, which is a common approach in GWAP [1]. To optimize the success of a GWAP, and get the highest number of user data, it is essential to attract many users and allow them to enjoy the game as long as possible. We hope to achieve this with the following features:

- Game look and feel: The user interface is made with animated and smart graphics, allowing for the data entry task to be considered as leisure activity.
- Multiplayer: The game feels like a real-time social activity amongst the players, as agreement of them is key to reward.
- Competitiveness: Players are rewarded points during the game, allowing competition amongst them on a high score table.
- Hop on - hop off: A triplet is presented for 45 seconds, followed by an immediate result display. Players can enter and exit at any time.
- Ubiquity: The game interface is compatible with any device featuring a HTML5-ready browser (e.g. Android, iOS, Firefox, Chrome, IE).
- Peer-to-peer advertising and inclusion in the Facebook social network.

As we are interested in developing culture-aware MIR applications, the similarity data is associated with user attributes such as age, location, language, education and music taste. These data are either collected in a pre-game survey, or from a social network profile which the user authorises before the start of the game. The collected data is then passed to the CASimIR API for storage and taken into account when selecting new triplets for presentation.

### 3. GENERIC BACKEND: THE CASIMIR API

The architecture of our system implements a strict separation between game interface on one side and the CASimIR API for sample selection and data storage on the other side. The API could be used by any GUI for the collection of user data, as only the generic tasks are implemented in the API.

At this point, the "Odd Song Out" triplet similarity task is the first one implemented. The main API methods for this task are defined as follows:

- triplet *GetOSOTriplet*(userData, [opt\_genre])
- boolean *SendOSOVote*(chosenClipID, userID)
- clipID *GetOSOAVote*(triplet)

*GetOSOTriplet* is used to get the clips for all players in a round of the match. *SendOSOVote* stores a vote linked to user information. *GetOSOAVote* returns a vote usable for artificial players when not enough human players are online.

The simplicity of the interface makes the implementation of further clients easy. The SOAP protocol used here is an industry standard for web-based API's, and implementations exist for most common programming languages. SOAP also supports end-to-end encryption and error handling.

Internally, besides user management, the CASimIR API takes care of the selection of clips presented to the player. This is based on the triplets answered by previous players or annotated by other applications. It maintains a growing subset of the music clips in the database with corresponding triplets. By a controlled reappearance of triplets and their permutations we support counterbalancing or combinations and permutations in the evaluation, while new clips and triplets are introduced in proportion to the total number of annotations. In contrast to traditional surveys and experiments, it is worth noting that the final number of players is not necessarily determined in a web-based game or survey. Plenty of data to be annotated are available in the *Million Song Dataset*.

Finally, the server-centric structure of the API music database allows for the extension of existing annotations. This includes both the addition of annotations to the existing dataset, increasing the number of clips annotated, as well as the complementing with new types of annotations, such as tags or beat positions, for the subset of clips already annotated with other data.

## 4. FUTURE WORK

We presented the open source CASimIR API with the prototype "Spot the Odd Song Out" game. Finally, we would like to invite other researchers to use and contribute to this project with experiments and the implementation of new tasks in CASimIR or new game modules.

## 5. REFERENCES

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