Playful Tagging — Folksonomy Generation Using Online Games

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ABSTRACT

Collaborative Tagging is a powerful method to create folksonomies that can be used to grasp/filter user preferences or enhance web search. Recent research has shown that depending on the number of users and the quality of user-provided tags powerful community-driven semantics or "ontologies" can emerge – as it was evident analyzing user data from social web applications such as del.icio.us or Flickr. Unfortunately, most web pages do not contain tags and, thus, no vocabulary that describes the information provided. A common problem in web page annotation is to motivate users for constant participation, i.e. tagging. In this paper we describe our approach of a binary verification game that embeds collaborative tagging into on-line games in order to produce domain specific folksonomies.

Categories and Subject Descriptors

H.1.2 [**User/Machine Systems**]: *Human factors; Human information processing;* H.3.3 [Information Search and Retrieval]: *Information filtering; Relevance feedback;* H.5.3 [Group and Organization Interfaces]: *Asynchronous interaction, Collaborative computing.*

General Terms

Algorithms, Human Factors

Keywords

Social tagging, folksonomies, human-based computation, games with a purpose

1. INTRODUCTION

In popular social web applications such as Flickr, YouTube or del.icio.us tags are used to share and organize data in a social network of users. The user-provided tags form the basis for *semantic indexing* of the shared resources and can be used to re-organize or lookup single resources users are searching for. Since tagging is done independently no formal relations exist in folksonomies and, thus, have to be inferred by using semantic reasoning methods. As opposed to manual or supervised approaches of expert-like annotations that have high costs for generation and maintenance – in particular for frequently changing web content – social tagging can be regarded as a simple and easy to use tool to classify and describe relevant web content by human collective intelligence leading to daily meta-data generation. Social Tagging or folksonomy generation evolved as a practice and method leveraging the "Wisdom of Crowds" principle [5]. Folksonomies are examples of the Human-based Computation (HBC) paradigm. The basic idea of HBC is to "embed" humans into the computational process and make use of human intelligence for solving problems that are still too difficult for today's computers, like in natural language processing.

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The problem in HBC environments so in folksonomy generation is that a human needs to be constantly motivated for his or her contribution. Many different strategies evolved in HBC projects to solve this problem. A promising way to motivate people to participate in such a HBC grid is to integrate the HBC task into a computer game and let users solve a defined problem while playing the game.

2. RELATED WORK

Mika describes a tripartite model of actors, concepts and instances that is used to analyze ontology emergence by two case studies using a large-scale folksonomy system. The author shows a method for extracting community-based ontologies from Web pages [1]. The structure of collaborative tagging systems and their dynamical aspects have been researched by Golder and Hubermann [2]. Collaborative tagging was used for tag suggestion in recommender systems [3] or optimizing web search by exploiting social annotations [4]. Human-based computation has its origin in the early work on interactive evolutionary computation as described by Richard Dawkins in his book "The Blind Watchmaker". Luis van Ahn demonstrated in his doctoral thesis that computer games can be an adequate way to motivate People to participate in an HBC grid [6]. In his work he invents and tests different so called "verification games" – such as "ESP" – to let humans perform tasks that computers are not yet able to solve. ESP pairs two users over the Internet. It shows both players the same picture for tagging. If both players typed in an identical tag both players gain credit points and a new picture is shown [6]. A similar approach is "VideoTag" [7] where users tag videos by playing a game similar to ESP. Other examples of HBC games are the "Sentiment Quiz" from "Facebook" [9] and "Phrase Detectives" from the University of Essex [8].

3. BINARY VERIFICATION GAMES

In contrast to the approaches applied in the games we described previously we propose a method called binary verification. In a binary verification game the user does not give his or her personal opinion about an element but classifies it accordingly to a given object as relevant or non-relevant. This way, we expect to reach a faster tagging rate than in non-binary games. On the other hand a complete binary verification environment needs pre-generated objects and is therefore not suitable in all situations. How to generate objects and related elements may differ depending on the particular application. In our scenario – finding relevant tags for website elements – we may use the log of a web search engine to extract objects and elements from a web page. Entered search terms and related pages could be recycled to extract and generate the needed objects. Alternatively, other sources for generating the objects such as information extraction systems or any information retrieval system are imaginable.

Van Ahn points out, that minor changes in design can affect game quality significantly [6]. The first design element that might influence our game in this way is the number of elements shown to the player and how many elements the user is allowed to select.

Showing too many elements may confuse the user and lead to reduced interaction speed. If the number of elements that the user can select in one turn is too high, players might tend to just randomly select elements. We suggest using around ten up to twenty visible elements depending on the available game screen size and the size of each single element. The number of allowed selections should be approximately the half of this number.

Figure 1. „FastTag“ - Tag generation screen.

Another design aspect is the order of elements shown to the player. Using a random order may help to prevent cheating because less assumptions on the game can be made by the players. For instance, players can't agree on selecting always the first five elements because the order is likely to be different for each player.

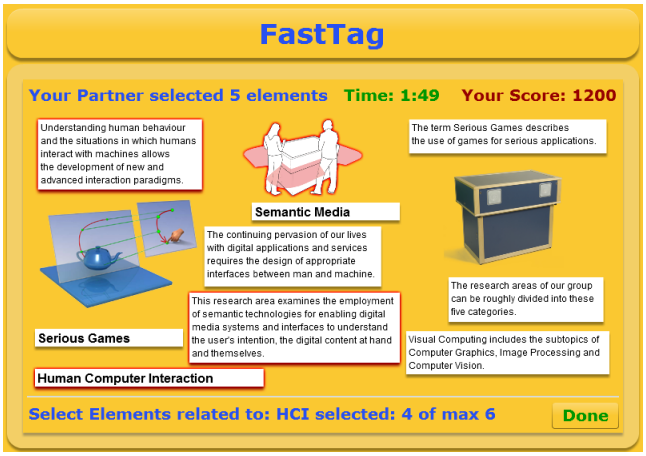

Figure 2. „FastTag“ – Agreement play screen.

A rather simple example design for the presented concept is "FastTag". In the beginning the starting player gets a randomly chosen web page fragment for which he enters a tag (Figure 1). Afterwards, a second player joins the game. Now both players proceed to the "Agreement Play Screen" (Figure 2) where a particular number of extracted [1] web page elements from the formerly shown fragment are shown. Both players select up to a defined (maximum) number of elements that are associated with the previously entered tag. The players indicate that they are finished by clicking on the "Done"-button. For each matching selection the players score credit points. Then, the game starts over where the second player becomes the start player. In each turn start players generate tags for web page fragments and both players associate this tag with a number of page elements. Beside this association we store the frequency for each tag and the frequencies of the selected elements. This way we aim to create emerging tag semantics that could be inferred from tag occurrences, tag frequency etc. The game is finished after a pre-defined period of time, e.g. 3 minutes.

[1] We suggest utilizing any suitable information extraction or page segmentation [10] method.

4. SUMMARY AND FUTURE WORK

In this paper, we described a new approach for folksonomy generation utilizing a HBC game. We propose to apply the described binary verification method for tagging or classification tasks outsourced to human players in online gaming scenarios in order to produce domain specific folksonomies in a short period of time. Further work will comprise an implementation of the described approach and testing against traditional HBC game designs to evaluate quality and speed of binary verification games for tag generation.

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