

RITE: Rich Information Television

Roman Ganhör

Vienna University of Technology
Favoritenstrasse 9-11, 1040 Vienna
roman@media.tuwien.ac.at

ABSTRACT

When the Internet became more interactive it turned passive consumers of information into active providers of such. Over the time, volunteers built impressive databases filled with information for virtually every niche. In this paper we present RITE, an idea for augmenting films and TV serials with supplementary information that is freely available on the Internet. An easy, yet powerful interface and interaction design should encourage laid-back TV consumers to contribute. Thus, the system shall be optimized for different input devices such as tablets, smartphones or TV remotes. Besides, various automatism are intended to simplify the process of contribution even more.

Author Keywords

Interactive TV; Second Screen; User Experience; Social Interaction

ACM Classification Keywords

H5.1 [Information Interfaces and presentation]: Multimedia information systems – audio, video; H5.m [Information Interfaces and presentation (e.g., HCI)]: Miscellaneous

INTRODUCTION

By Web 2.0 we describe the transformation of the Internet into a more interactive tool, allowing users to provide information as well as consuming information. Blogs were a first widespread manifestation of user-generated content. Nowadays, Wikipedia is one of the biggest projects so far linked to the term Web 2.0 connecting tens of thousands of volunteers actively writing and editing articles [1].

While Wikipedia is a universal dictionary other online resources are more focused. The international movie database (IMDb.com), for example, is a single purpose database concentrating solely on *motion pictures*. The website collects and provides information about movies as well as TV serials. This information covers virtually every aspect of a given motion picture including actors, producers, dates, places, quotes and cross references to other motion pictures.

Whenever watching a motion picture on television or on the Internet, the odds are good that a plethora of additional information and metadata is available online. However, this

supplementary information is provided almost solely as text and omitting opportunities for rich and appropriate user experiences. Thus, retrieving additional information requires a contextual change for the user, switching from a *passive viewer* of a motion picture to an *active investigator* for text. This contextual change not only disturbs the viewing experience, the collected metadata is also short-lived as there is no defined way or place to store it or share it with other users.

To overcome these limitations we propose RITE, a system with an intuitive and efficient user interface and elaborated interaction design allowing people to process, collect, maintain and share metadata for any kind of film or TV serials. The metadata is collected automatically or manually from external online sources and put into relation to a given movie or TV serial.

BACKGROUND: TV AND INTERNET TECHNOLOGY

The habit of consuming television has widened from scheduled programs on TV sets to video on demand services displayed on TV sets, desktop computers and mobile devices. Consequently, new features enriching the TV experience have to consider the variations in means of media transportation and consumption.

Web techniques such as HTML and JavaScript can serve as a common denominator. Internet based television embeds HTML meta-information in the video stream or sends the meta-information as a separate data stream, whereas broadcast television (via satellite, cable, terrestrial) utilizes HbbTV [2] to embed HTML meta-information.

Permitting users *easy* access to semi-structured data on various websites like IMDb or Wikipedia the data has to be pre-processed and structured using API's provided by the websites and heuristics based on user behavior.

Easing the annotation process even more advanced techniques like face-recognition can be utilized. Plus, since the numbers of persons acting in a film is limited and due to external databases known to the algorithm the task of face recognition can be enhanced in quality.

RITE - RICH INFORMATION TELEVISION

In this section we describe the idea for a rich information television system, RITE, in detail. We envision an enhanced television experience based on additional in-situ information. The information is provided by various

external or third-party Internet resources and can be retrieved comfortably by a user while watching a movie or TV serial. That is, whenever a user picks an actor on the screen (with an appropriate device), RITE finds the name for this actor and provides links to further information. Or else, whenever a user queries information about a specific building he or she has seen on the film RITE provides its name and its location in-situ. Again, the information provides links to further more detailed information.

As users who participate in retrieving and linking information are crucial to the project, RITE has low entry barriers and easy-to-use interfaces allowing even casual users to contribute. The low entry barriers refer to the organizational structure and concepts like editing and contributing without prior registration. A transparent review and feedback mechanism ranks contributions according their quality and an undo-function reverts vandalism entries. Another important aspect is the interface and interaction design, addressing both the demands of novice users and claims of advanced users. The challenges for a feasible interface and interaction design are manifold, however, in a first step we focus on three crucial tasks: *information aggregation and linking*, *information maintenance* and *information invoking*.

Information Aggregation and Linking

An important task is finding relevant information and linking this information to a film or TV serial. The process of aggregating and linking additional metadata can be partly automatized. So can sources like IMDb.com, Wikipedia and other (not only film related) websites be crawled with specialized programs and crawlers to retrieve relevant information. As relevant information on various websites can be structured or unstructured, the information can either be gathered through specific API requests or must be retrieved through parsing and semantic matching.

A starting point for automatized information gathering can be online TV journals providing name and date of the current TV program. Based on this initial information further search queries can be conducted. Advanced recognition systems such as reverse pictures search can check results against the databases mentioned above and enhance the overall quality of the automatized output.

However, in a second step a user manually confirms or denies the automatically collected information. Depending on the users judgment the information is ranked as trustworthy or not trustworthy. The automatic process tries to provide highly accurate information, however, the user acts as a last instance. Thus, the interface design must be both easy to understand and able to encourage even laid-back users to contribute [3].

The lowest level of user contribution is confirming or denying information that was automatically retrieved and provided by the system. In contrast, the highest level of contribution is manually searching for information on the

Internet and linking this information to a specific scene in the film or TV serial. To support users at this level the user interface has to support video browsing and video annotation. As actors or buildings are not visible throughout the whole film, annotations start at some position in the film and end at another position. Furthermore, the annotated object's size can vary over time, due to zooming or movement of the object. Automatized object tracking can support users annotation tasks.

Information Maintenance

Maintaining the information is also an important aspect to keep metadata up to date and the system useful for the user. RITE has to take care of various dimensions of maintenance, such as keeping up-to-date with modifications on external sources and overhauling existing information.

When changes to the external sources affects only the data layer the changes can be incorporated automatically. Whenever external sources have changes on their technical base, such as the database layer, RITE must be adapted to the new technical conditions.

Overhauling existing information requires easy interfaces and interaction design to animate lean back television consumer to fix broken or false data.

Information Invoking - Watching with RITE

In contrast to information aggregation, linking and maintenance, *information invoking* is the unobtrusive and optional task to invoke information during watching a movie or TV serial. Depending on the device (tablet, smartphone, TV remote) the interaction design is tailored to their favorable affordances [4].

When using a tablet or smartphone the respective screen replicates the content of the main screen and the touch mechanism is utilized to provide a pleasant and easy user experience. The interaction design for a TV remote concentrates on the directional pad to allow slackened usage even during dark conditions.

USER INTERFACE

The user interface of RITE has to support two distinct use-cases. Whereas most of the time a user retrieves information from the system, sometimes a user likes to add information to the system.

Figure 1 depicts a potential user interface for retrieving information while a movie is running. The pink rectangles indicate persons or things RITE has already information stored about, like real name and film character name. The purple rectangle, in contrast, mark persons or things other user has marked as potentially interesting. In Figure 1 the actor in the scene is selected and the information about him is listed in the left section of the screen. With a remote control a user can "hop" from one rectangle to another utilizing the directional pad. When using a touch interface a

user touches within the boundaries of a rectangle to activate the information bar.

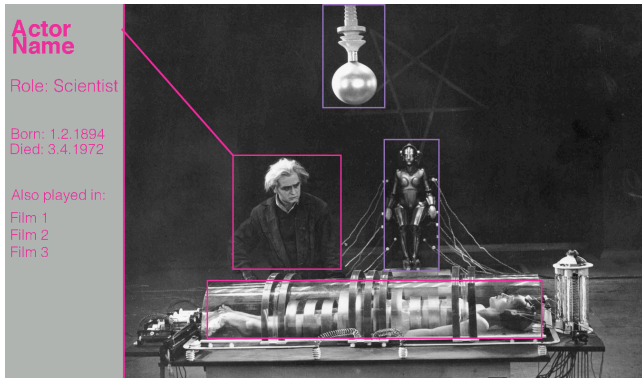


Figure 1: RITE screenshot showing overlays for (potential) persons and objects of interest.

The amount of information within the information bar is adapted to the screen size and can be adapted to the users preferences.

CONCLUSION

RITE should augment existing movies and TV serials with additional meta-information that is freely available on the Internet. To support user involvement, the interface and interaction design will be adjusted to laid-back consumers. In addition, advanced algorithms can be utilized to simplify the users' burden.

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