Cultural Heritage in the Age of the Web: How New Media Can Affect Art Fruition

Licia Calvi[*]

[*] Department of Computing Science, Eindhoven, The Netherlands
E-mail: l.calvi@tue.nl

ABSTRACT
Cultural heritage information and adaptive hypermedia have so far been pursuing completely different goals. Only recently, a research trend has emerged which has pointed out the potential advantages of exploiting adaptive methodologies to the delivery of cultural information. In this paper, we present an ongoing project that shows how these two research areas can come to terms.

KEYWORDS: adaptive hypermedia, cultural heritage, personalised content delivery

INTRODUCTION

The advent of new technologies has deeply influenced the way in which cultural heritage information is approached, accessed and fruited.

At a closer look, the contamination of art and technology is historically older than what the last years of Web explosion may seem to suggest: at the end of the nineteenth century, for instance, Rimbaud's fascination for photography was influencing his poetical style in determining which words to select, how to construct sentences, and how to juxtapose them in a visually effective way[1].

An analysis of how technology, and in particular the new media, can influence cultural heritage access and fruition, which ultimately entails an understanding of the philosophical underpinnings present in the relationship between art and technology, has therefore to be coupled with an attempt to develop *ad hoc* tools for the conservation and public use of such information (via, e.g., adaptive systems), not to mention its possible enhancement: "electronic argumentation" [16], the advent of new literary *genres*, "art mutations" [8], all this can indeed be seen as a way to enhance the effective use of the Web by exploiting its pragmatics and rhetoric.

According to the Musea Project [12], *Cultural Heritage* is an umbrella term under which different entities may be included (Fig. 1).

This paper deals with *documentary*[2] cultural heritage. It presents an ongoing project that aims at the digitalization and encoding of a corpus of (Italian) literary texts into a hypermedia system with the inherent goal of fostering their preservation, enhancement, and public access. Its basic assumption is that it

[1] See, for instance, in [8].

[2] *Documentary* objects are normally understood in a wide definition of the term, among which not just textual documents but also images and sound documents are included [12].

should be possible to integrate the knowledge about the users with respect to the information presented (see further), the knowledge about the application area and the processes playing in it, and the knowledge about the medium itself to deliver to users personalised information.

But no new artifact lives in the vacuum: it is always somehow related to the ones which have preceded it and which surrounds it. This is why it could be useful to review the history of this evolution to better understand how new media can impact on cultural heritage fruition.

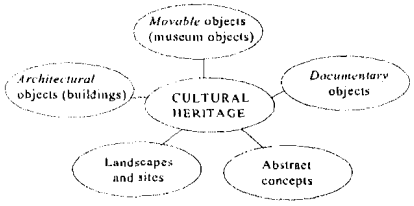

Figure 1:

Cultural heritage entities from [12]

ART AND NEW MEDIA: IS IT REALLY THE DEATH OF ART?

The transformations imposed on art by the advent of technology have ultimately annulled its distance from science to the extent that art has acquired a new epistemological status: "art has modified its own essence and has become the place for the *preventive domesticity of the possible existentials*" ([8]: 28).

Costa [8] indeed identifies four logical movements at the basis of such a modification. Such movements are:

1. *Fascination/imitation*: this is the first step in the transformation of art. Such a scenario comprises an artist who has to face and come to terms with his/her fascination for a technological domain. This was, for instance, the case of Rimbaud who was fascinated by photography, or by Calvino who was fascinated by combinatorial analysis (so, the "writing machine"). Because of such a fascination, the artist is urged to start imitating, to take over, some of the modes of functioning of the technology s/he is approaching;

2. *Change*: as a second step, the acquisition of some of the procedures of the technology has a first impact on the artistic product, but only at the more superficial level, i.e., the level of its content, whereas its essence, the medium itself, remains untouched. Calvino, for instance, during his OULIPO years, had transferred his fascination for the combinatorial calculus into his novels. But the novel remains a novel, and its recipient, the book, a book;

3. *Crisis*: it is only in this third phase that the modifications, which so far had remained at a mainly shallow level, start to impact the essence of the artistic product, to question its identity. Questions over the status of the book, in the case of Calvino, over a possibly new poetic agenda, in the case of Rimbaud, become pressingly unavoidable;

4. *Mutation*: ultimately, answering these questions does affect art in its own form: a book can no longer be a book to carry the newly emerged content; poetry has to find other forms to express the same artistic power. A mutation has taken place.

This is a sort of "death of the art", where "technical simulation resolves the problem of truth and reality with an uncontrolled production of images where not much to be seen remains" ([9]: 181). Or, to cite Baudrillard, "we live in a world where the supreme function of the sign is to make reality disappear and, at the same time, to disguise this disappearance" ([1]: 9, as quoted in [9]: 181).

This paper places itself at the level of the third logical movement in art transformation, i.e., the level of crisis described above. The overcoming of such a crisis will require the adoption of a new artistic agenda, i.e., one that exploits the rhetoric and pragmatics of the new media.

PERSONALISED CONTENT DELIVERY OF DOCUMENTARY OBJECTS

In [4], we introduced our long-term project to investigate how documentary objects could be made publicly accessible through adaptive hypertext. This project entails two ultimate goals: in the first place, to encode a corpus of literary works into an online archive; in the second place, to develop an adaptive tool to write hyperfiction. Encoding text ultimately requires a redefinition of what its status is [5] and developing a tool to deliver personalised literary content presupposes an understanding of the dynamics operating in electronic reading and writing, as well as in knowledge representation and content extraction.

This project started with the development of an online adaptive course where the convergence between hypertext theory and practice was investigated. This course was intended to highlight the processes in hyper-reading and writing and was considered as a test bed for using adaptive methods to deliver cultural material. As additional feature (and as a preliminary attempt at creating such a wide documentary repository), a pointer to an online archive of contemporary literary works where such a convergence is expressed would be added. The course, called Postmodern Web[3], is split into two modules, i.e., a propaedeutic module and the core module [4]. In the propaedeutic module, the basic principles of hypertext as a tool are introduced, whereas the core module shows how such principles can be derived from the theory of literature on the basis of real examples drawn from existing paper-based and electronic novels. The separation into these two modules is not only functional, but also design-related: the propaedeutic module is structured hierarchically, i.e., it has a starting and an ending point and a guiding principle to determine navigation that exploits one of the well-known adaptation techniques, i.e., link removal, disabling or annotation [2]. The core module, instead, is intended to be structured horizontally, in the sense that the absence of starting or ending points as well as of guiding principles and of reading priorities would make it strictly flexible. Flexibility would imply here the necessity of adapting the content to the user's reading history: the content material would be accessed as a result of the actions performed, i.e., on the nodes read, by the individual reader and their content changed accordingly.

Michael [13], as B.Sc. final year project, contributed to the further development of the Postmodern Web, mainly by augmenting the propaedeutic module

[3] The system is currently available at the following URL: *http://wwwis.win.tue.nl/~calvi/pmw_project.*

with specific functionalities (see further). Initially, however, he conceived two different navigation scenarios: whereas the original Postmodern Web site was supposed to present only adaptive link visibility, Michael [13] introduced, along with an adaptive pathway based on the basic principles described above, a strictly linear scenario for those readers who are not too at ease with the use of hypertextual tools. This linear option is offered on every adaptive page, so that the user who finds him/herself in difficulty can always resort to this solution. However, the linear navigation still results in an updating of the user model by the addition of knowledge values (see below), although it does not really modify the presentation of content information. But the simple provision of these two alternatives, which ultimately refines the readers' profiles entailed in the adaptive version of the system, mirrors a more fundamental distinction among readers based on their learning/reading style, and results in a separation between more experimental users, who would choose for the adaptive version of the system and who would undergo a progressive learning development from novice to expert users [7], and the less experimental ones, who would follow the linear alternative and would not profit from such a personalised content delivery.

Once the user has registered, s/he can access the information. The first operation s/he is required to do is actually to read an instruction page, where guidelines are given on how to use the system and explanations on how it has been conceived. This is particularly relevant for the readers who decide to follow the adaptive version. After this operation has been accomplished, indeed, two options opened up for the readers: to access the information in a linear fashion or to opt for the personalised content delivery (see above). This last one presupposes a fundamental learning assumption: if readers access information in the order foreseen by the designer, then their knowledge can increment and they themselves evolve with respect to it, from the level of having no knowledge on that topic to the level of mastering it [7]. This modelling makes sense because the system is in the first place a didactical course. We will see below how it can also make up for a more general framework to deliver personalised information.

Michael's contribution to the long-term Postmodern Web project [13] consists in adjusting the navigation procedures of the AHA architecture [10] according to the guidelines sketched above by introducing thresholds. Thresholds are approximations on a continuous interval of the value assigned to the knowledge. The knowledge is represented in the domain model of the system and can be defined at either the concept level or the document level. A document is really the smallest operative knowledge entity and corresponds to a node. But documents can ultimately be further decomposed into fragments, which are the smallest theoretical knowledge unit, the atom of knowledge. More documents normally contribute to the definition of a concept, which is therefore a higher-level entity. So, for instance, the documents *art*, *comics*, and *hypertext* in the Postmodern Web project generate the concept *culture*. Concepts in the system often correspond to a structural section. The system is conceived in such a way that reading a node, i.e., a document, augments the knowledge attained by the user and stored in his/her user model. Reading is

taken in this context as a very broad notion: no estimate of the actual time the user has "spent" on the page is computed; rather, the simple fact that a user has selected a certain link and accessed the corresponding page is considered enough to update the knowledge in his/her user model. The thresholds assigned at document level determine the hierarchical access to information in this guided fashion (see above). The combination of more documents determines the threshold that is necessary to access the subsequent concept, much like in [15]. Whereas not all the documents composing the precedent concept need to be "read" before accessing the following concept, a minimum threshold is set to navigate the concept hierarchy bottom-up. This value consists of the highest document threshold augmented by a unit, normally 10, to ensure that at least more that one document is accessed before progressing further. Propagating knowledge between documents occurs similarly, in a straightforward fashion. Such thresholds are specified in the document list (i.e., the *requirement list*) of the AHA architecture [10], where the dependencies between documents and concepts are specified. Moreover, they also appear in the user model, together with the thresholds assigned to the documents. The advantage of this solution compared to the existing implementation of AHA presented in [10] consists in freeing document access from a straightforward navigation, where the link removal technique shows the documents to access in a "linear" fashion, depending on the one preceding and the one following each of them. The introduction of thresholds, instead, makes document access really dependent on what the user has read, rather than on what is structurally (and conceptually) just before each document from a design point of view.

All pages still start with two HTML comments (see also in [10]), which indicate whether concepts are *required* or *forbidden* for accessing that page. All pages other than the index page are normally specifying a condition for accessibility. This can take the form of

<!-- requires 20 -->

[13]. According to the requirement list in the Postmodern Web, this statement indicates that this particular threshold (20) must be true for the corresponding page (i.e., the document *introduction*) to be accessed [13]. Such a value must ultimately appear in the user model as well.
The second HTML comment at the beginning of the page indicates which concepts are *generated* after visiting that page. So, for instance, the statement

<!-- generates 30, intro -->

indicates the threshold that becomes known and will contribute to the propagation of knowledge in the user model, so as to make other documents within the same concept potentially available [13]. The page being generated is again the introduction page. Generated concepts are however added to the student's knowledge only after their corresponding pages have been read.

The importance of this technique will become more evident once the core module of the Postmodern Web will be finalized in the flexible way described above, where thresholds and knowledge propagation will make document access strictly dependent on the user's reading history.

USERS' PROTOTYPING AND ACTIONS

In an attempt at augmenting the existing AHA architecture [10], the Postmodern Web project described so far aims at developing an adaptive system to deliver personalised cultural information that presents the following features:

1. It supports users' diversity;

2. It promotes users' interactivity.

The distinction discussed above between the two alternative navigation scenarios and which we explained as determined by the possible learning/reading styles performed by the users can also be seen as accounting for different users' profiling based on their tasks. We cannot talk properly of a task model, as in [14], for instance, because in our case the choice of one of the two options is not justified by an analysis of the tasks each target group may wish to undertake with the system. In our case, however, we could still assume a distinction between students and occasional readers: the former are given an information presentation which is more structured and satisfies certain pedagogical assumptions [7]; the latter, instead, are not concerned with issues such as knowledge acquisition and updating. The interface differs in these two cases only in the way information is presented to readers, in how far the knowledge level attained by the users is taken into account, which results in a varying link functionality and in providing local guidance[4] [2], whereas the occasional reader receives no local supports at all. Global navigation support is however offered to both kinds of readers by a conceptual map of the site that distinguishes between pages already accessed and pages still to access.

As for what concerns the second aspect, there is essentially one way for users to interact with the present version of the system, i.e., by writing an essay in hypertextual form. Each essay is stored into a central repository and made available for consultation to other users once they reach the core module. Essays can cover a set of predefined topics, four in total, each of which is associated to a unique page to compose and post essays and to view them. Such an opportunity is also adaptively determined by the system. Each document points to one only topic for essay composition and consultation, whereas only the beginning, index page points to all four topics but only as the user has reached the core module [13]. Such essays would achieve the twofold goal of verifying the extent to which the course topic has been understood in a learning-by-doing way and would at the same time allow students to access each other's essays, which would, in its turn, further extend one's proficiency in the subject [4].

Another form of interactivity is the contact with the tutor who supervises the entire learning process and who can intervene at any moment during its progression. According to the form of help or request asked by one reader, the tutor can decide to keep the other

[4] This was achieved by Michael by introducing the JavaScript ONMOUSEOVER function [13]. This facility informs the reader in the window status bar about the name of the node that will be accessed by selecting that link, about the section of the node s/he will be pointed to, and about its status just by positioning the cursor on the link itself.

readers posted and organise a sort of forum or discussion group on the matter.

DOES THIS MODEL ACCOUNT FOR THE PERSONALISED DELIVERY OF CULTURAL INFORMATION?

The prototype described in the paper exploits the notion of *knowledge* to provide readers with adequate support in navigation and in information extraction. The term knowledge is used in this context to include readers' learning styles, their level of mastery of the information and experience in the domain content. Although it directly addresses the well-defined field of education and ultimately accounts for its specific requirements, the enhancements in knowledge delivery achieved by means of adaptive techniques can be generalized and extended to other domains, like, for instance, information publication and diffusion in the cultural and public sphere.

Indeed, from the experience described in the paper, despite its, to a certain extent, restricted character, there are at least two lessons that can be drawn:

1. Knowledge delivery should rely on user's profiling in order to be effective [3, 11];

2. Adaptivity in knowledge delivery can improve task performance (see also in [6] for more experimental results).

Our system is indeed relatively user-friendly for readers: once they have understood how the presentation is changed adaptively, they mostly follow the guidelines suggested by the system and seem to rely on its interface design [6]. It is nevertheless not as user-friendly for authors, especially if they do not possess a thorough understanding of programming and of computer in general: this is why it would be necessary to develop an authoring environment to facilitate all possible authors in writing their own application using this framework.

Clearly, a generalization and extension of this model cannot be performed without a prior analysis of the specific mechanisms and processes present in other fields. This is how the study on hypertext rhetoric and practice carried on in the online course has contributed to a better understanding of the dynamics enacted in hyperfiction by readers and writers. An analysis, among other things, of users' reactions at using the system with its present functionalities and adaptivity features will become necessary. This knowledge will constitute the backbone for the creation of an online archive for documentary literary objects.

CONCLUSION

In [10], we have announced the possibility of extending the then existing AHA architecture to include numeric ratings (thresholds) assigned to concepts and to allow for knowledge propagation. In this paper, we have presented such a possibility within the framework of an ongoing project aiming at the effective delivery of personalised cultural information. The project has now undergone a preliminary phase where the dynamics present in electronic reading and writing, as well as in knowledge representation and content extraction were investigated. This was achieved by developing an adaptive course that was seen as a test bed for using adaptive methods to deliver cultural material. Next, it will evolve towards the creation of an online hypermedia archive of cultural information and in a system to author cultural, mainly literary, documents.

ACKNOWLEDGMENTS
The author would like to thank Ramy Michael for his implementation efforts during his B.Sc. thesis.

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ABOUT THE AUTHORS

Licia Calvi is Assistant Professor at the Department of Computing Science at the Eindhoven University of Technology. Her research interests include multimedia for cultural heritage and education, adaptive hypermedia systems for distant learning, philosophy of culture and digital media and art, AI and philosophy of science.
Contact address: Dept. of Computing Science, Eindhoven University of Technology, P.O. Box 513, 5600 MB Eindhoven, The Netherlands
E-mail: *l.calvi@tue.nl*