Abstract

There are many research papers describing the implementation of algorithms or functionalities. Their aim is to enable other people to share knowledge of these functionalities with the purpose of using them for themselves. It is often convenient to demonstrate the described function by a living example. Interactive journals are the well suited framework to combine the abstract documentation of research results with an applicational or implementational demonstration.

ART+COM's main activities are in the application research field in various domains, preferably coming along an interdisciplinary approach. Current projects may be named by Medical Visualization, New Media in Town Planning, Weather Visualization. Each of the projects produces complex applications and infrastructural mechanisms to be used in the respective field. Results involve presentations of prototypical implementation of new concepts.

The research results are therefore often not well suited to classical documentation and demonstration by paperwritten articles. Therefore we foster the use of electronically published journals to use for documentation. Doing that we want to head not only to interactive access of multimedia documentation, but we want also to make the *documentation of a research result an interface to an example application* of it. Articles in interactive journals shall exhibit active behaviour.

This paper collects some arguments concerning the publication of active documents.

Active articles in interactive journals

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1 Electronic publishing of interactive journals

The possibility to deliver journals online[1] with interactive mechanisms directly to the reader creates some entirely new properties of the publication.

- For the reader, the journal doesn't *appear* anymore in a regular time interval, but instead is *present*. The access to the journal delivers at any time the current state of the journal as an entity, which may be structured where necessary by some time marks which then create virtual issues.
- The author may keep his article at home. The artcile is accessed directly at the author's site. In respect of the active articles, the authoring process has to consist of new work steps resembling more to programming than to article writing.
- In the editor's view onto publication, the frontier between reviewed and published articles vanishes. The publication of a reviewed and accepted article consists merely in a changement of the article's GET[2] limitations. Print doesn't happen anymore.

2 Active articles

With the interactive features of an online published journal at hand, it is conceivable to give up the mere function of serving static documents to the reader by providing interactive mechanisms of navigation. Instead the articles themselves may exhibit dynamical behaviour and permit the user some interaction with them.

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[1] I ignore here the way to deliver documents in an eletronically readable, but classically distributed form, e.g. by CD-ROM.

[2] to say it in http's words

Cases of such activable functions within articles may be

- Classical hyperactivity, i.e. the option to look up references by following hypertext links.
- Demonstration of a mechanism which is described in the article by an example or even a real world implementation.
- Metadata providing, whereby the article becomes an interface to a large data space.
- Updating of news. Instead of regularly rewriting news articles such as weather news, stock market reports etc. they may simply by up to date at any time they are accessed by the reader.

In turn, the activable function may represented in the document by encapsulation in classical text components, as e.g.:

- In the *text* appear preferably hypertext links.
- *Tables* may implement the interface to statistical analysis.
- *Pictures* may show dynamical representations of large sized data as well as they may serve as live demonstration of either rendering or modelling algorithms (in Computer Graphics concerned articles) or simulations.

All article's components mentioned may serve as news monitors and updated according to their content.

2.1 Classical hyperactivity

References may point to libraries containing further articles, or glossaries giving further explanations. The lookup of hyperlinks may involve computational search activity, thus lays at the frontier of actual active behaviour.

2.2 Demonstration

The use and function of Algorithms of increased complexity is often not well suited for textual description. A living example clarifies the description of concepts. As an example, the Interactive Volume Renderer[1] attempts to realize a description of the functionality of a volume rendering tool by providing an interface to its parameter space.

2.3 Metadata providing

In every occasion where numerical results are presented there is a need to proove the origin of these numbers and their correctness. A tool to achieve this may be the reproduction by the reader. Thus an active document describing a simulation or a statistical analysis may provide the functionality performing that simulation or statistical analysis along with an interface to tune their parameters[3]. The use of such opportunity is:

[3] Remember: Don't trust any statistics you didn't forge yourself.

- The reader may convince himself of the correctness of given numeric results, either by exploring the behaviour of a simulation dependent of tuning of its parameters or by recalculating the statistics or investigating the source code of the statistics function[4].
- In the case of simulations, the reader may take the active simulation as a tool for better understanding by actively exploring the described matter.
- In the case of statistical analysis, it is possible to reuse the data independent of a once applied analysis method. Comparison of results of different authors using different statistical methods becomes possible[5].
- The subjectivity/objectivity dichotomy of information dissolves by enabling the reader to choose the considered aspects of complex subjects by himself. Thus the concete view provided by the article is always representing the subjectivity of the reader whereas the whole of the information provided by the article is as objective as the author permits it to be by formulating the dynamics of its active components.

3 Real world considerations

3.1 Infrastructural Requirements

Online serving of documents requires fast and ubiquitous network infrastructure. Furthermore the activity of the documents requires computing power available at the serving site as well as larger memory space than passive documents would do. This last point I prefer to regard in another way: Active documents permitting the access to large amounts of raw data instead of descibing one single analysis of them won't create huge amounts of data lounging about in document servers; instead active documents are one tool to manage the huge archives of data evolving anyway at all edges of the informationally dominated society.

3.2 Perspective

In view of increasing bandwith of networks and performance of the computing machinery the development of interactive electronic publishing of active documents appears to converge towards interactive television. Both media as they emerge today seem to merge as the physical boundaries between them vanish and they become integrated in a single network.

[4]Where, of course, the accessibility of the source code of the active article or parts of it has to be granted explicitly.

[5]Here I have in mind especially sociological and psychological research, where the raw data is in general of much higher dimensionality than in natural sciences.

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