A NOVEL USER INTERFACE FOR ONLINE LITERARY DOCUMENTS

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ABSTRACT

Documents produced in the past usually exist in multiple versions. There is an inherent difficulty in recording and visualising variation between different versions, which is inhibiting efforts to make literature available online. This paper describes a novel document structure, which accurately records variations and facilitates their visualisation.

KEYWORDS: online literature, version variation, visualisation.

1. INTRODUCTION

The hierarchical nature of digital markup languages inhibits the display of relevant information, such as multiple variations of the same text, which have been recorded at different times, by different authors, or both. The object of the research described here is to derive a method for displaying such variations in a single glance. Existing systems such as Schreibman’s Versioning Machine (Schreibman, Kumar and McDonald 2003) tend to rely on the user’s cognition to recognise differences between versions represented by multiple screen-views. In contrast, the system outlined in this paper allows the display of any amount of variation within a single view. The need to shift focus in document interpretation from a cognitive process to a perceptual one is well-known from studies of Human-Computer Interaction (Schneiderman, 1987). The digital recording of historical literary texts has been going on across the world since the mid-seventies. For example, the Text Encoding Initiative (TEI) website lists 81 digital archives, many of them universities, libraries or nationally funded projects, mostly in the United States, with whom they cooperate (Text Encoding Initiative, 2005). There is a similar list on the Digital Variants website (Digital Variants, 2005). More recently Google (2004) and the European Union (France, 2005) have announced their intentions to make the major libraries of the US and Europe available online, in an effort to promote and preserve their cultural identities in an increasingly online world. The problem is that most literary documents typically exist in multiple versions. The system outlined here describes a method for recording the versions of a digital work, and representing them within a single window in a readable form.

1.1. Attempts to record variation

The first printed books resembled manuscripts because Gutenberg and his immediate successors did not fully understand how to use the new medium (McLuhan, 1967, p.153). Cooper and Reiman describe a similar case – the failure of early attempts to digitise the mechanical model of a paper calendar. By too faithfully recording the structure of the original, the designer of the software made it difficult for the user to make an appointment that spanned the end of one month and the start of the next (Cooper and Reiman, 2003, p.30). Human assimilation of new technologies is characterised by an initial tendency to imitate pre-existing ones (McLuhan and Fiore, 1962).

This tendency also appears to show itself in the development by the TEI of markup for textual variation in around 1990 (Sperberg-McQueen and Burnard, 2002). Early contributors to this part of the TEI Guidelines (Burnard 1990, Robinson 1994) seem to have had in mind the reproduction of text in book form, for they named their markup tags after structures found only in printed editions. Indeed, the very idea of using tags
(e.g. `<p>` for paragraph-start in HTML) to mark up text, evolved from the early practice of using formatting codes to produce printed books (Goldfarb, 1996). This has resulted in a fundamental problem, pointed out by Smith (1999), who realised that if you tried to use tags to describe variation of a document whose content was also described by tags, these two structures would overlap and make it impossible to record the variation correctly. A growing number of researchers are now reporting that TEI markup for variation does not work well (Vetter and McDonald, 2003; Cover and Robinson, 1995) and the TEI has itself created a Special Interest Group to study the problem (Schreibman, Pierazzo and Vanhoutte, 2003).

1.2. A new model for variation

A fundamental difficulty in using markup languages in this context is the fact that they are hierarchical, because they are based on context-free grammars (Chomsky, 1965). On the other hand, the structure of textual variation cannot be efficiently represented by a hierarchy, nor even by a set of overlapping hierarchies (Renear, Mylonas and Durand 1993).

For example, in the following four variations of a simple sentence, labelled ‘A’ to ‘D’, most of the text is repeated:

A The quick brown fox jumps over the lazy dog.
B The quick white ferret jumps over the lazy dog.
C The quick brown otter leaps over the lazy dog.
D The quick brown otter runs across the lazy dog.

There are four instances of ‘The quick’ and three of ‘over’. If redundant copies of text are merged, and a record kept of which versions each fragment came from, the four versions, as given above, coalesce into the following graph (see figure 1).

![Figure 1: A Textgraph](image)

The structure is clearly not hierarchical, nor can it be represented by a set of overlapping hierarchies. This type of graph – hereafter called a textgraph – is easily defined: it has unique start and end vertices. It is directed, and each edge is labelled with a fragment of text, possibly empty, and a set of versions to which the fragment belongs. Its primary characteristic is its traversability – it is always possible to travel from the start to the end by following edges labelled with a particular version. For example, to read version ‘C’ one need only follow the edges ‘The quick’, ‘brown’, ‘otter’, ‘leaps’, ‘over’, ‘the lazy dog.’. Insertions and deletions can be represented by empty edges. A transposition, where the same words are reordered, or whole paragraphs moved from one place to another, can be represented as a paired deletion and insertion.

A multi-version document based on this model could conceivably contain thousands of versions of a single work, and it has been used successfully by the authors to record the small fragment of the New Testament Letter to James published by Wachtel (2000).

A Java applet has also been developed to display multi-version documents based on this model. The example shown below records four writer’s drafts of ‘La donna serpente’ by Vincenzo Cerami. Each of the four typewritten drafts are labelled ‘A’ to ‘D’. They each contain further layers of correction by the author as manual alterations numbered 1 to 3. With highlighting turned on, insertions are shown in blue and cancellations in red. When these are added, the total number of versions rises to eight (see figure 2).
Figure 2: A Multi-Version Document Displayed in a Java Applet

By comparison, the same texts have been recorded in Schreibman’s ‘Versioning Machine’ using the TEI encoding scheme (Fiormonte, 2005; Schreibman, Kumar and McDonald, 2003). The most apparent difference between the two techniques is the simplicity of the multi-version document applet described here – it displays in one window the same information as that which requires four frames in the Versioning Machine. Also, because there are really eight versions, each of the frames has to represent the author’s corrections directly as crossed-out text. This may confuse the user, who is prevented from reading one clear version at a time.

The technique for representing variation outlined here removes variation from the text and manages it externally in a multi-version document. Such a document can contain many types of information, including mathematics, pictures, tables, XML markup, among others, or combinations thereof.

1.3. Conclusion

The approach described here – of providing a digital representation for variation which is not based on hierarchical structures inherited from printed editions – assists in efforts to make literature available online. It achieves this by representing different versions in a single view rather than, as in existing systems, by switching between separate screens. This shifts the focus in document interpretation from a cognitive process to a perceptual one assisting more rapid assimilation of intended meanings. The need for such a technique is clear from the recent efforts of various organisations to preserve their countries’ literary heritage in an increasingly online world. The system described here goes some way towards achieving that goal.

2. REFERENCES


