The redocumentation process of computer mediated activity traces: A general framework

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ABSTRACT
The digital world enables the creation of personalized documents. In this paper we are interested in describing a computer mediated activity by a person throughout a semi-automatic redocumentation process. This process uses traces generated automatically, during a user-system interaction, to assist a person in producing a personalized document describing the traced activity. To support that, a general framework for an authoring tool is proposed through two main phases. During the first phase, an automatic and parameterized transformation is applied on the input activity trace to generate a fragmented document. Each fragment describes one or many observed elements of the modeled trace and relations between fragments are deduced from relations between these elements. The second phase consists in interactive transformations on the intermediate produced document until getting the final hypermedia document. Our authoring tool uses composition of personalized document issues and RST principals to interpret user's choices and to maintain the coherence of the produced document.

Categories and Subject Descriptors
I.7.2 [**Document and Text Processing**]: Document Preparation – *Hypertext/Hypermedia;*

General Terms
Documentation, Design, Human Factors, Theory.

Keywords
Computer mediated activity, activity trace, redocumentation process, personalized document generation, hypermedia, RST.

1. INTRODUCTION
The interaction of a user with a computer system to carry out his activity can be automatically recorded by programming the used system. The product, called "activity trace", is defined as a set of observed elements time stamped, recorded on a digital media to document the activity (a log file ordering many actions for example). An activity trace is not always readable and understood by any person. Moreover, it doesn't describe completely the activity. Using a formal model (ontology) to describe the trace observed elements and their structure enhances traces readability and intelligibility, by offering a height level of abstraction and allowing an automatic processing of traces. However, the formalization imposed by modeling constrains the user, so it is necessary to go beyond traces modeling to really think about computer-mediated activity redocumentation. An automatic redocumentation of a traced activity is user friendly but constrains his freedom in customizing the form and content of the produced document; whereas a manual approach deprives him from any assistance. Therefore, we suggest a semi-automatic redocumentation process for the computer-mediated activity, based on helping the user in exploiting the automatically generated traces and rewriting them in a personalized way [1]. This includes reorganizing, filtering and editing traces content; as well as possibly adding information to this content to describe traces production context (explanations or justifications of the traced user about his actions for example). By choosing the hypermedia form for the produced document, all forms of traces (video recording, snapshot, log file…) can be expressed through the multimedia aspect and (the) relations within traces (between their observed elements) can be expressed through hypertext links. The product of the redocumentation process can be saved by the user to serve in a reflexive analysis of the traced activity, or in an exchange with other persons for an assistance in a similar activity. In this paper we present a general framework to support the redocumentation process by focusing on its phases and the technologies required) for its implementation.

2. THE REDOCUMENTATION PROCESS
We emphasis on the importance of rewriting activity traces content according to the user's reasoning by supplying him with an assistance through our authoring tool. The input of the process is an activity modeled trace (by an ontology) and the output is a personalized (hypermedia) document describing the traced activity. The general framework proposed for this process is based on two main phases as shown in Figure 1:

2.1 The automatic redocumentation Phase
We think that it is interesting to automate some particular user tasks, like generating relevant information segments from the input modeled trace. We consider each segment (Segi) as an information unit generated automatically from one or many trace observed elements (since an ontology is used for modeling the trace) and many tools are available for this purpose like Natural OWL [2] (to produce text spans descriptions from one or many objects described in an OWL-ontology). This transformation

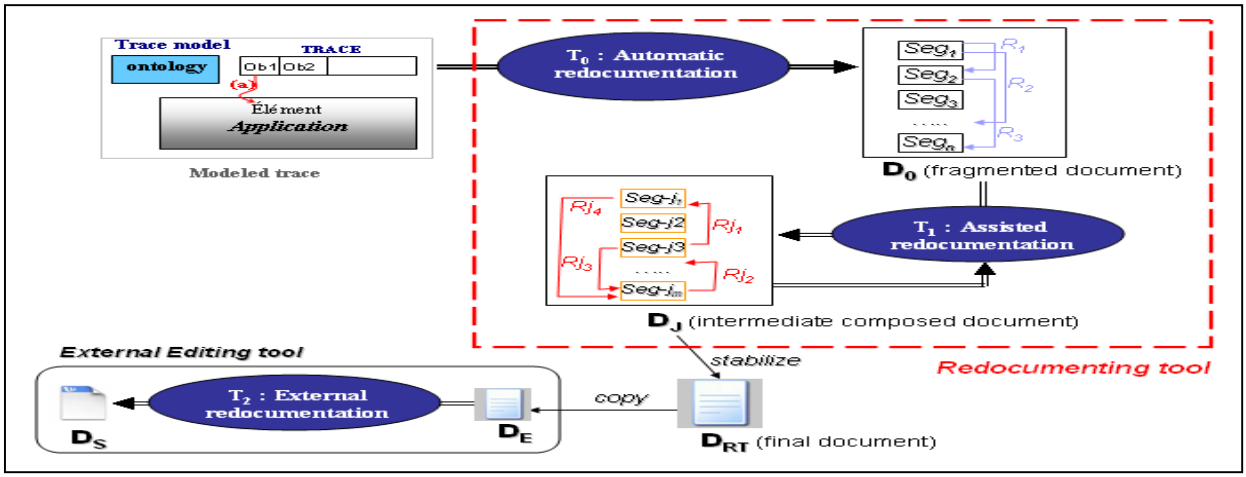

Figure 1. The redocumentation process framework

provides, in the produced segment, relevant information about an observed element and its relations to others elements in the trace. The segment's form depends on the user's choice (text, animation, image…). Moreover, the automatic transformation can accept user parameters to select only a set of observed elements from the trace (according to their temporal property values for instance). Finally, information fragments are mainly structured according to the time order of the underlying observed elements and possibly according to structural relations (Ri) between these elements (by using an annotation tool on segments). The product of this phase is a fragmented document D0, composed of a set of segments (*Seg$_i$ [content, properties, meta-data]*) linked together by two kinds of relations: structural relations reflecting relations between the underlying observed elements and rhetorical relations [3] to give a coherence for the produced document (the *sequence* relation is used to order fragments in D0 according to the time order of their elements).

2.2 The assisted redocumentation phase

The document D0 represents an initial information space to build our final hypermedia document. A personalized (semantic, logical and layout) composition is essential in this case, but without modeling the user as in adaptive hypermedia. The user is assisted by our authoring tool during an iterative process based on ideas and techniques inspired from personalized virtual documents composition [4]. For the semantic structure, the user can perform operations on D0 or on any intermediate document. Operations can involve one or many fragments, relations between fragments or the whole document as detailed in Figure 2. Each intermediate document DJ consists of a set of segments (a segment describes a trace's observed element, a relation between fragments or is added explicitly by the user) linked by relations (describing relations between observed elements, structural or rhetorical relations added explicitly by the user). For the logical and layout structures, predefined templates are supplied. Once the user is satisfied with an intermediate document, the assistant tool can stabilize it by applying a set of processing rules based-RST. An example of these rules is: $\forall F1$, *if* $\exists F2 \wedge$ *Restatement (F2, F1) then delete F1*. Finally, the document is organized according to the model chosen by the user (creating a page for each set of information segments and modeling relations between them by internal or external links) with the appropriate stylesheet to be applied (the user can change properties of a chosen model like typography, colors ...).

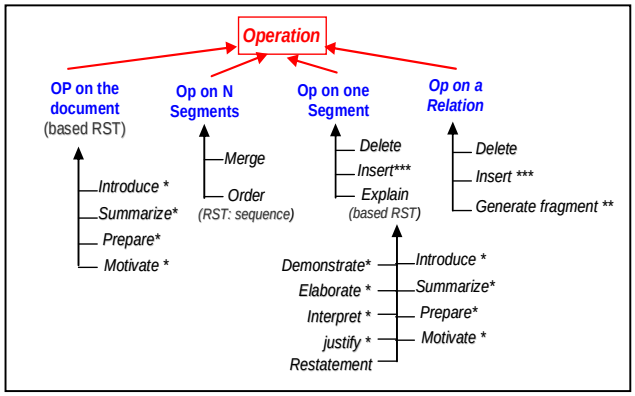

Figure 2. A classification of semantic operations

3. CONCLUSION

In this paper we have described the redocumentation of a computer mediated activity through a semi-automatic process, in witch a user is assisted by an authoring tool in order to transform a semantically modeled trace of the activity to an hypermedia document describing this activity in a personalized way. We are, actually, studying the reliability and performance of this framework for two contexts of application (using the Zotero tool and a particular application in the project CANU19).

4. REFERENCES

[1] Yahiaoui, L., Prié, Y. and Boufaïda, Z. 2008. Redocumentation des traces d'activité médiée informatiquement dans le cadre des transactions communicationnelles. In 19eme Journées francophones IC'2008, (Nancy, France, juin 01-06, 2008), 13 p.

[2] Galanis, D. and Androutsopoulos, I. 2007. The NaturalOWL System. In proceedings of the 11th European workshop on natural language generation ENLG 2007, (Germany, 2007).

[3] Mann, W. et Thompson, S. 1988. Rhetorical structure theory: Toward a functional theory of text organization. Text, 8(3), p.243-281.

[4] Garlatti, S. Iksal, S. 2003. Declarative Specifications for Adaptive Hypermedia Based on a Semantic Web Approach. In Proceedings of UM2003, (USA, Juin 22, 2003), p.81-85