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# Cartographie des connaissances dans les humanités numériques par l'Îles de mémoires – une démonstration

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## RÉSUMÉ

Dans cet article, nous discutons la façon dont la technique des « îles des mémoires » pourrait aider les chercheurs dans des domaines de recherche tels que les humanités numériques et les bibliothèques numériques où l'on travaille sur des contenus numérisés. Le terme « îles des mémoires » a été inspiré par l'ancien « Art de la mémoire », qui décrit comment dans l'antiquité et au Moyen Age la spatialisation était utilisée pour augmenter la capacité de mémorisation des lecteurs. Notre approche consiste à créer une carte virtuelle et à associer chaque portion de contenu et chaque item à des zones de la carte. Nous allons exposer les raisons pour lesquelles l'approche cartographique que nous développons est utile pour les chercheurs en sciences humaines numériques, en montrant certains résultats que nous avons obtenus dans le cadre de Projet OBVIL et LOCUPLETO.

## Mots Clés

Visualisation d'information; Memory Islands; Humanités numériques.

## ACM Classification Keywords

H.5.2. User Interfaces (D.2.2, H.1.2, I.3.6).

## INTRODUCTION

Recently, emerging scientific research areas such as Digital Humanities and Digital Libraries have shown needs in visualization techniques that could help to share and facilitate access to knowledge between experts of different domains. These visualizations will become useful when they will fit the requirements of users.

Knowledge maps was a promotes tools for sharing and showing knowledge, which can be preferred by both its creators and users, they could also help the users to access and navigate through that knowledge. A well designed knowledge map could not only visualize the structure that may the users already knew, but also provide some surprises (insights) for the users, that means showing some meanings that the creator would like to be given, and normally they will be difficult find with clas-

sical visualization tools like lists or a graphs.

Many researchers in information science have used knowledge maps for long times to facilitate the achievement of their information tasks. However most of those knowledge maps were infographics. Experts of specific fields of knowledge created them for making their work easier. However, this empirical method is challenging in the digital humanities when the data become large enough.

In this paper, we show how we could use our cartographic visualization technique called Memory Islands to automatically create visualizations (knowledge maps) with the data of Digital Humanities. We will briefly introduce our idea of Memory Islands, then we discuss why we want to create a map, some examples made with data of Digital Humanities will be shown in the end of this paper.

## MEMORY ISLANDS TECHNIQUE

Memory Islands is our on working cartographic visualization technique which attempts to generate knowledge maps from the given knowledge likes ontologies or from some data by using a culturing technique or a text mining technique.

### Memory Islands' idea -- Map based cartographic visualization

The basic idea behind our technique was inspired by the method of "loci" (plural of Latin "locus" for place or location) in the "Art of Memory" technique, which described how people in the antiquity and the Middle Ages used spatialization to increase their memory capacity. We transform structured knowledge (e.g. tree or ontology) into a 2D cartographic representation. The preliminary prototype of our memory Islands is described in [5].

### Geographic metaphors

Maps (or landscapes) metaphors are often used [1] in situations where huge numbers of data items have to be displayed. Maps have many advantages, because as a picture they reside in the memory like any image or physical mapping [4]. Many of the advantages of maps for visualizing knowledge are so evident that they fall under common sense. For example, with an interactive knowledge map generated from an ontology, the users can navigate through the contents of the ontology and

finding their interesting concepts themselves or explore the contents of a query's results.

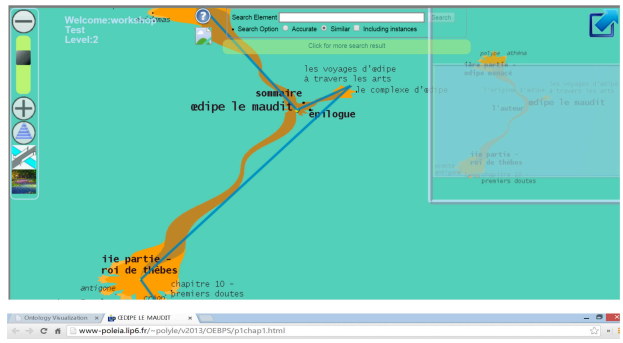
Beside the landscape metaphors, we also bring together some geographical metaphors to express the hidden meanings inside the knowledge, likes proportions, distances, centrality, etc. Location's labels font and their size, location's point types, and the colors make our technique different from many existing map-based visualizations or graph drawing (spatialization) algorithms [3]. These cartographic metaphors will be shown in the examples we did with the data of Digital Humanities.

**VISUALIZATIONS OF DIGITAL HUMANITIES BY MEMORY ISLANDS**

In this section, some results obtained within the project LOCUPLETO, the Labex OBVIL and the visualization of a large table of contents will be demonstrated, while some others knowledge maps that illustrate our technique could be found in [6].

**Project LOCUPLETO --- Children's Books**

The project LOCUPLETO is an ambitious R&D project on digital publishing challenges for educating young children, which aims to develop media-rich children eBooks. Visualization of the contents of a book can help the children to learn from their book, and even they could share their visiting traces with others.



La langue fut son plus. Amour des nombreuses tables, les coïncidences ont repris. C'est que Polébe, le roi de Corinthe, en gîte dans le maillage offert aux dieux et les victimes... (Text continues with a detailed description of the book's content and structure.)

**Trace of visiting**

ID	Element Visited	Type	User Name	Element ID
65	11e partie - Œdipe menacé	Concept	workshop Test	12
66	Œdipe le maudit	Concept	workshop Test	8
67	Les voyages d'Édipe à travers les arts	Concept	workshop Test	78
68	11e partie - Roi de Thèbes	Concept	workshop Test	2
69	Œdipe	Concept	workshop Test	12

**Figure 1** A Memory Island for the book “Œdipe le maudit”

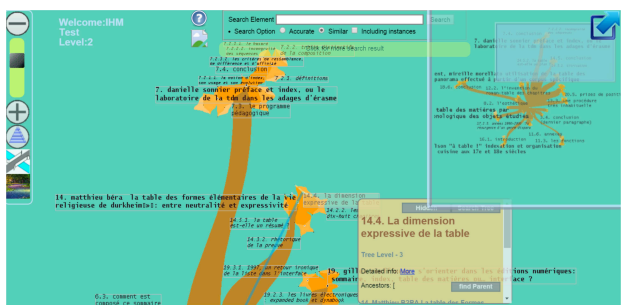
For instance, with the visualization given in figure 1, (An old version of this example could be found in [6]) the

users can access to the content of the book by the visualization. The People identified from each chapter are showing in the map with the chapters. The visiting trace of a user is shown in the map directly by click show-my-visiting trace button.

To build this figure, we apply an unsupervised approach for Named Entity Recognition and Disambiguation (UNERD) [2] with a French knowledge-base and a statistical contextual disambiguation technique. It helps us visualize some children books for such entities as People, Locations or Organizations. The result is shown in Fig.1.

**Table of contents of 20 books**

The second example we want to discuss is a large table of contents of a collection of books (20 tables of contents). The distant in the map between one chapter to its subchapters be can be measured by the number of subchapters of each subchapter (the one used for Fig.2) or number of pages in each sub-chapter.



**Figure 2** The Memory Island for a large Table of Contents created for École supérieure d'art et design Grenoble-Valence.



**Figure 3** The Memory Islands for the Le Mercure Galant journals. The top image show the islands for all the documents in the website of OBVIL and we can access to the

journal by this visualization. The second island is visualization of an ontology created by Paris-Sorbonne University with the topics (nearly 1000 topics) of *Le Mercure Galant Journals*.

#### Project OBVIL --- Children's Books

The project Labex OBVIL (l'Observatoire de la vie littéraire) intends to develop all the resources offered by computer applications to examine both the French literature of the past as more contemporary. It promotes scientific research in the field of Digital Humanities. In this paper we will illustrate some examples we did with the *Le Mercure Galant journals* (Fig.3).

#### CONCLUSION AND DISCUSSION

In this proposition paper, we have demonstrated some examples we did within Digital Humanities by using Memory Islands. Our technique is taking advantage of the users' familiarity with interactive map (such as the Google Maps) to help them achieve complex visualization tasks. The geographic metaphors we designed enabled users to have in-depth insight into the given knowledge.

These gave researchers in Digital Humanities seeking for a visualization technique to apply to their work a preliminary overview of our technique. We have done a series of users experiments with different techniques applied to different ontologies; we found that our technique gives some advantages for the users without experience in visualization to navigate and remember their ontologies. We hope it would be a worthwhile topic for both information visualization researchers and scholars in Digital Humanities.

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