The use of semantics in the CrossCult H2020 project

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Abstract. CrossCult is a newly started project that aims to make reflective history a reality in the European cultural context. In this paper we examine how the project aims to take advantage of advances in semantic technologies in order to achieve its goals. Specifically, we see what the quest for reflection is and, through practical examples from two of the project's flagship pilots, explain how semantics can assist in this direction.

Keywords: Semantics, reflection, cultural assets, history

1   Introduction

"CrossCult: Empowering reuse of digital cultural heritage in context-aware cross-cuts of European history" is a newly started project, supported by the European Union under the H2020-REFLECTIVE-6-2015 "Innovation ecosystems of digital

cultural assets" funding scheme. The project aims to make reflective history a reality in the European cultural context, by enabling the re-interpretation of European (hi)stories through cross-border interconnections among cultural digital resources, citizen viewpoints and physical venues.

CrossCult will use cutting-edge technology to connect existing digital cultural assets and to combine them with interactive experiences that all together are intended to increase retention, stimulate reflection and help European citizens appreciate their past and present in a holistic manner. Interactive experiences and their narratives are designed around four major principles:

- Raise consciousness about the importance of History
- Tackle the study of History from a multi-faceted perspective
- Approach History not only through the written texts from successive eras, but also through all the traces left by those societies (archaeological remains, iconography, epigraphy, numismatics, architecture, art, etc.)
- Reckon that there are no absolute truths in History, but various possible interpretations of the archaeological remains and contrasting viewpoints

In this work we take a closer look to CrossCult's plan to use semantics in order pursue to its goals. We start in section 2 by looking at the notion of reflection, which lies at the core of the project's goals. The triggering, support, evaluation and quantification of reflection are all wide open research directions, in which CrossCult aims to make a sound contribution over the next three years. In order to practically assess the progress made, the project will be implemented on 4 real-world flagship pilots. Herein, in sections 3 and 4, we examine how the consideration of semantics will support the reflection in two of the project's flagship pilots. We close in section 5 with our concluding remarks.

2 The quest for reflection

Living in Europe we are surrounded by history and culture. When it comes to physical items there are currently more than 19000 museums in Europe and even more archeological sites [9]. The majority of European larger cities and and even smaller towns and villages either have or are themselves historical landmarks. And as far as digitized items are concerned Europeana already connects more than 30 million objects from over 3 thousand institutions. In fact, the preservation of cultural heritage is at the very core of the foundations of the European Union; the Lisbon treaty, a constitutional basis of the European Union, states that the Union "shall respect its rich cultural and linguistic diversity, and shall ensure that Europe's cultural heritage is safeguarded and enhanced"[8].

As a result, in the period 2007-2013 alone the EU invested approximately 4.5 billion euros in cultural heritage and related research. Most of these funds were directed towards the preservation of heritage, and thus mainly to actions related to the conservation, digitization and related infrastructures. The aim, of course, has been to achieve long term preservation, and thus much emphasis has been given to the sustainable exploitation of cultural heritage assets [1, 2]. More

recently it has started to emerge that cultural heritage is not just a matter for sustainable, in other words financial, exploitation, but also a powerful social tool that can help strengthen the connections between European people [3].

In this scope, we are now starting to examine not just how cultural assets can be used to generate profit but also how then can help us understand more about ourselves; about our past, present and future; and about the way we are all alike and all connected. In order to achieve this, it is not enough that people visit museums and archaeological sites and pay a ticket. What is truly desired is that such visits make people think and talk about what they saw and how that relates to themselves, their lives and their closer and broader communities.

In other words, the goal is to use the cultural items and locations as mere triggers, through which more important issues can be raised, in both internal (reflective) and external (communicative) processes.

3 Non-typical transversal connections

It would take someone about three months of visiting the Louvre on a daily basis from morning to evening to see every item on display - and a few years if all 380.000 items where put on display. The British Museum is even larger than that and possesses an unimaginable collection of approximately 8 million objects. Yet, most of the museums in Europe do not come anywhere near that. In fact, it is quite common for small museums to put on display almost their entire collections and still not have enough to make for a meaningful visit that lasts for a whole hour. This makes it increasingly difficult for smaller museums to attract visitors and therefore to survive.

In CrossCult we aim to use the same objects in order to support multiple narratives; in this way a small collection will be able to sustain the operation of a museum by allowing the collection to be seen many times, each time from a different perspective. Moreover, inline with the project's overall goal, the identified narratives go beyond the typical level of history presentation (e.g. type of a statue, or its construction date), into deeper levels of reflection, over social aspects of life in antiquity, power structures, etc.

The project's third flagship pilot, focusing on exactly these notions, will run at the Archaeological Museum of Tripolis in Greece, where no more than 30 items are on display and not all are necessarily related to each other; the museum is typically visited in a duration of approximately 20 minutes.

Of course it is not possible to support whichever narrative using the limited set of items available at the museum. Thus, in order to see what is possible, a the semantic map of figure 1 has been developed. In this figure yellow ovals correspond to items in the museum whilst the green and purple rectangles correspond to narrower and broader concepts. Each one of these concepts can be the objective of a museum narrative and an experience can be designed in which a visitor is guided through the museum and shown selected items while the concept is discussed. For example, the visitor could be shown items related to social
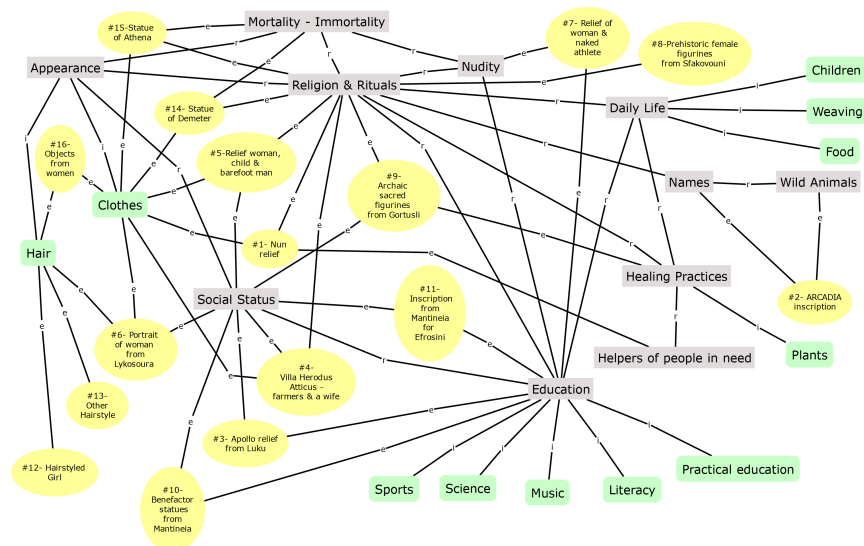
Fig. 1. Semantic map for Archaeological Museum of Tripolis items.

status while asked to consider whether it would have been possible in that era to have a woman running for a major public office as Hilary Clinton is now.

This map has been developed manually, as a proof of concept and because the size of the museum's collection permits it. Within the project we aim to explore the possibility to generate such maps automatically based on the items' already existing non semantic annotations; in this way a semantic engine will be able to examine a museum's collection and come up with suggestions of interesting narratives that can be designed.

4 Connecting the past and the present

It has often been been said that museums are not appealing, particularly to the younger generation, because they are boring [4]. In the last decade museums and venues have started to turn to technology to make their presentations more appealing, using tools such as virtual and augmented reality [5]. This approach is great for sustainability, as more visitors are attracted, but it does not foster reflection as the visitors pay more attention to the graphics and the technology than to the content itself. Moreover, as VR and AR becore present in increasingly more aspects of everyday life, their presence at a cultural venue is no longer the strong pole of attraction it once was.

In CrossCult we hope to stimulate interest by focusing on the content making it relevant to the visitor's life and reality. Of course this cannot be achieved by static presentations of collections; dynamic, rapidly adaptive presentation

methodologies and systems need to be developed, that can be tailored to fit not only each visitor but also each particular day.

To achieve this - i.e. the connection of the venues, the collections and the historical facts to what might stimulate visitors on a particular day - we have made a preliminary implementation of a component that tracks trending topics on social media and identifies random links between those and the concepts we wish to present. The main question in such an approach is whether these random links do indeed stimulate people or they are overlooked as uninteresting or puzzling. We have some extremely positive early indication.

Specifically, one of the authors has been using the component's identified random links to design interesting ways to present content to students in a school classroom. For example, when recently the topic to present was the human skeleton, the search for a (hi)story linked to the human skeleton went (roughly) as follows:

- "Leicester F.C." just won the Premier League (it was a worldwide popular happening on that week).
- "Leicester F.C." plays in "Leicester" (obvious link).
- "Leicester" has been known recently for the discovery of the remains of "Richard III of England" (many news in the media between 2012 and 2015). The Wikipedia article about the "Exhumation and reburial of Richard III of England" has an very high word count for "Leicester", and points repeatedly to the evidence provided by the severe "scoliosis" of the mans skeleton, to techniques of "DNA analysis" for proper identification and to other archeological/historical evidence.

One can debate whether these links are truly meaningful or not. But the actual classroom experience was clear: the story was planned to be presented in just 10 minutes, but the pupils curiosity kept them talking about poor Richard for the whole hour, even though they had never cared about the history of England before.

Thus, through the connection with current events, further discussion has been stimulated. This is a feature that plays very well into CrossCult's goal for the stimulation of reflection. In the scope of the project's second flagship pilot we aim to further explore how a user specific interesting topics - for example topics mined from their recent social media activity - can be used to provide for even more personalized reflection stimuli.

5   Conclusions

In this paper we presented the CrossCult H2020 project and discussed how it will use semantics in order to enhance visitors' reflection on European history and other cross-era, cross-border, cross-culture and cross-gender issues.

We attempted a presentation by example. Through flaghsip pilot 2 we saw how semantics can the provide the discovery of previously unnoticed connections between current events and the bodies of cultural heritage of the presented sites.

We also saw how this can spark discussions and stimulate reflection. Through flaghsip pilot 3 we saw how semantics can help build stimulating presentations of multiple and fundamentally different topics based on only a handful of physical items. Overall, we can see CrossCult as a turning point in the way semantic technologies are used to support not only the exploitation of cultural content but mainly the maximization of its impact through augmented and deeper reflection.

One should of course not oversee the fact that CrossCult is still at its beginning. At the time of writing this text the project kick-off meeting has just taken place and numerous details regarding the project's architecture, methodologies, content, use cases and implementation are still open. Therefore, the specifics mentioned herein should be taken with a grain of salt. Most will turn out as described in the paper, but some will unavoidably be altered as the project's work and research progress.

Acknowledgments

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