SEMANTIC MODELING AND REASONING TO PROMOTE SERENDIPITY AND SITUATIONAL CURIOSITY IN DIGITAL CULTURAL HERITAGE EXPERIENCES

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MOTIVATION OF THE WORK

- The CROSSCULT EU project is conducting pilot experiences to investigate the potential of **situational curiosity** and **serendipity** to increase the retention of historical facts linked by cross-border associations or crosscutting topics.
- Semantic Web technologies can be used to promote both phenomena by exploiting direct or subtle connections between topics of interest of the potential museum visitors and heritage items.
- We are specifically interested in connections related to the meaning of dates, events and periods.

RESEARCH PLAN

2016-2017

- Analyze existing ontologies and other resources relevant to personalization and context awareness in cultural heritage.

- Analyze the CIDOC CRM reference model with specific attention to the modeling of temporal events.

- Systematize the mapping of constructs of YAGO, SUMO and DBpedia into CIDOC CRM.

- Start working on the data mining processes to create new compendia of facts not modelled thus far.

2017-2018

- Complete and run the data mining processes.

- Gain insight into which semantic associations can trigger situational curiosity and serendipity.

- Study the state-of-the-art in semantic reasoning for association discovery and recommendation.

- Develop new proposals for association discovery specifically devised for the area of cultural heritage.

2018-2019

- Develop and test a recommender system to support the work of cultural heritage experts in modeling and curating knowledge about heritage items and collections, and in developing interactive experiences for museum visitors.

- Develop and test a recommender system supporting an application intended to raise curiosity about cultural heritage connected in different ways to the users' context and preferences.

THESIS OBJECTIVES
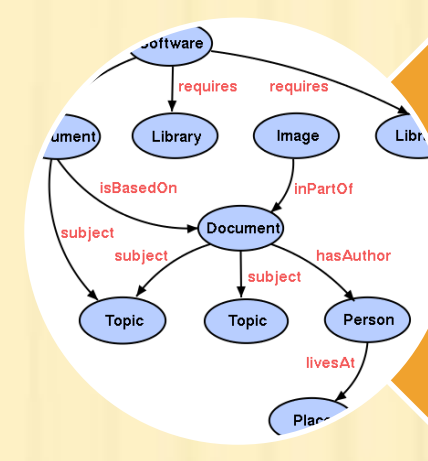
Contribute to the application of Semantic Web technologies in the area of cultural heritage.

Integrate existing Linked Data resources and newly-created ones to enable reasoning about heritage items, cultural venues/sites and the spatio-temporal context of ICT users.

Implement association discovery and recommendation systems to identify the most relevant connections among user profiles, cultural heritage knowledge bases and a semantic almanac of dates, events and periods.

Design and implement tools for cultural heritage experts to develop and curate semantic annotations of heritage items and collections.

RESULTS & DISCUSSION

- The documentation phase about relevant resources and tools is nearly complete.
- A prototype design of databases and logic needed to run the association discovery and recommendation systems has been produced and published:
  - *Dahroug, A., López Nores, M., Pazos Arias, J. J., González Soutelo, S., Reboreda Morillo, S. M. & Antoniou, A (2017). Exploiting relevant dates to promote serendipity and situational curiosity in cultural heritage experiences. In 12th International Workshop on Semantic and Social Media Adaptation and Personalization (SMAP). Bratislava, Slovakia.*
- Familiarization with tools to manipulate YAGO, DBpedia and CIDOC CRM artifacts, as well as word embeddings and graph databases, is ongoing.

NEXT YEAR PLANNING

1 Study different data mining techniques to extract knowledge from selected sites (Wikipedia, OnThisDay, …)

2 Bring together mined knowledge and relevant sections of YAGO, SUMO and DBpedia into an almanac based on CIDOC CRM..

3 Develop approaches to association discovery based on word embeddings (e.g. Conceptnet Numberbatch) and graph databases (Neo4j).

REFERENCES

[1] J. Ambach, C. Perrone, and A. Repenning, "Remote exploratoriums: Combining network media and design environments," Computers and Education, vol. 24, no. 3, pp. 163–176, 1995.

[2] L. Shahani, N. Nikonanou, and M. Economou, "Museums opening up to communities using web 2.0: Promise or reality?" International Journal of the Inclusive Museum, vol. 1, no. 4, pp. 57–66, 2008.

[3] L. Ardissono, T. Kuflik, and D. Petrelli, "Personalization in cultural heritage: The road travelled and the one ahead," User Modeling and User-Adapted Interaction, vol. 22, no. 1-2, pp. 73–99, 2012.

[4] D. Myers, A. Dalgity, and I. Avramides, "The arches heritage inventory and management system: a platform for the heritage field," Journal of Cultural Heritage Management and Sustainable Development, vol. 6, no. 2, pp. 213–224, 2016.

[5] T. Hanzal, "Modeling events on the Semantic Web," Ph.D. dissertation, University of Economics, Prague, Czech Republic, 2015.

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