Applications of Semantic Web Technologies to Improve the Comprehension of Temporo-Spatial Interrelations Among Cultural Heritage Resources and Contexts

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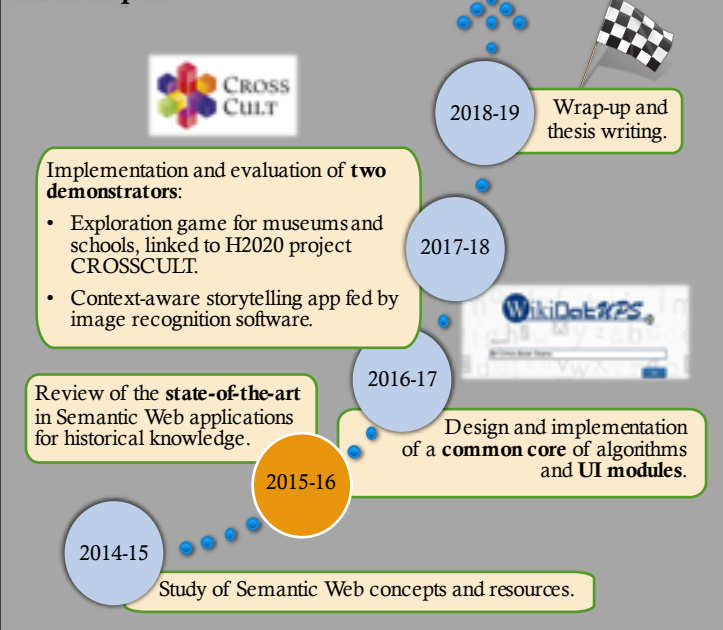
Motivation of the work

- The teaching of History in primary/secondary education attains low levels of learning and understanding, which has **major societal implications**.
- Experiences in **serious games** have highlighted the potential of **situational curiosity** and **serendipity** to increase the retention of historical facts.
- Technology brings in possibilities to overcome this situation:
  - **Semantic Web** technologies and the availability of **huge, open knowledge bases** allow discovering interrelations among concepts and contents.
  - Widespread **mobile devices** make it possible to deliver **personalized and context-aware information** to users.

Thesis objectives

- **Global goal:** enable new interactive experiences to promote learning and retention of historical facts using mobile and Semantic Web technologies.
- **Specific goals:**
  - Develop **algorithms to discover semantic links** among topics of interest, historical facts and features of context.
  - Develop **tools for experts to visualize and edit graphs of semantic concepts and properties**, as input to **novel storytelling mechanisms**.
  - Develop **personalization and recommendation algorithms** to discover relevant multimedia contents to deliver the narratives.
  - Develop **crowdsourcing models** to enrich existing knowledge bases from the input provided by experts and users.

Research plan

CROSSCULT

- **2018-19** Wrap-up and thesis writing.
- Implementation and evaluation of **two demonstrators**:
  - Exploration game for museums and schools, linked to H2020 project CROSSCULT.
  - Context-aware storytelling app fed by image recognition software.
- **2017-18**
- **WikiDatUPS**
- **2016-17** Design and implementation of a **common core** of algorithms and **UI modules**.
- Review of the **state-of-the-art** in Semantic Web applications for historical knowledge.
- **2015-16**
- **2014-15** Study of Semantic Web concepts and resources.

Next year planning

- **[September 2016 – February 2017]** Finalize development of the common core tool and UI modules for experts' tools and mobile apps.
- **[March 2017]** Prepare and submit one journal article.
- **[April 2017 – June 2017]** Start development of the exploration game for museums and schools.

References

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Results and discussions

- The **state-of-the-art has been reviewed** and interesting semantic tools and resources have been identified and analyzed.

- The implementation of the common core of algorithms has started, embedded in the **WikiDatUPS** tool.
  - The discovery algorithms can already <u>discover more relevant links than RelFinder</u>.
  - <u>Early recommendation capabilities</u> have been put into a prototype of the storytelling app.
- The design of the exploration game for museums and schools is practically finished.
- A prototype version of the graph visualization and manipulation modules is under development for the HTML5 platform.
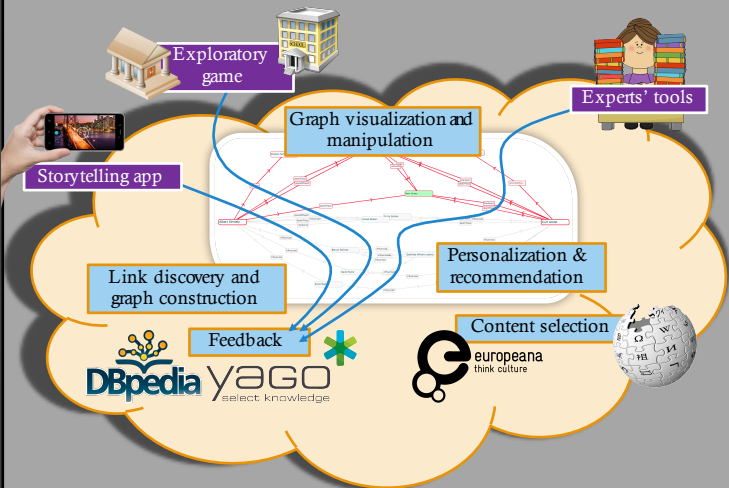
- **Two conference papers have been published:**
  - "*Building context-aware customized stories based on uncovering indirect associations from semantic knowledge bases*", in 10th IEEE International Conference on Semantic Computing (ICSC), Laguna Hills, CA, USA.
  - "*An exploratory game based on semantics to improve History learning*", in 9th International Conference on Game and Entertainment Technologies (GET), Funchal, Portugal.

- Semantic Web technologies can be applied in a number of situations, environments, applications of historical computing and historical information science. In particular, it seems feasible that they are **mature enough** to effectively support new models of History teaching and learning.