How to semantically annotate 3D models of non-textual cultural heritage?

A new FOSS toolchain for the Digital Humanities

Lozana Rossenova
Open Science Lab
TIB – Leibniz Information Centre
for Science and Technology
Hannover, Germany
lozana.rossenova@tib.eu

Zoe Schubert
SPK – Stiftung Preussischer
Kulturbesitz
Berlin, Germany
Zoe.Schubert@sbb.spk-berlin.de

Richard Vock
Institute of Computer Science
University of Bonn
Bonn, Germany
vock@cs.uni-bonn.de

Lucia Sohmen
Open Science Lab
TIB – Leibniz Information Centre
for Science and Technology
Hannover, Germany
lucia.sohmen@tib.eu

Lukas Günther
Open Science Lab
TIB – Leibniz Information Centre
for Science and Technology
Hannover, Germany
lukas.guenther@tib.eu

Ina Blümel
Open Science Lab
TIB – Leibniz Information Centre
for Science and Technology
Hannover, Germany
ina.blumel@tib.eu

EXTENDED ABSTRACT

This workshop aims to help researchers, digital curators and data managers learn how to make datasets of 3D models available as linked open data within a collaborative annotation and presentation-ready environment. Participants will take part in practical demonstrations using an integrated toolchain that connects OpenRefine (for data reconciliation and batch upload), Wikibase (for linked open data storage), and Kompakkt (for rendering and annotating 3D models). This toolchain and associated workflow was developed in the context of NFDI4Culture, a German consortium of research and cultural institutions working towards a shared infrastructure for research data that meets the needs of 21st century data creators, maintainers and end users across the broad spectrum of the cultural heritage field and the Digital Humanities. The workshop will emphasize the possibility to combine geo locations and other geo data drawn from authority records in the LOD cloud to 3D architectural models and reconstructions.

The integrated toolchain for semantic annotations of 3D objects

Digital representations of cultural assets in the form of 3D models within disciplines such as architecture, art history, archaeology, and 3D reconstruction are particularly heterogeneous in formats and structure [1]. Therefore

standardized access and visualisation tools fail to meet new research objectives and institutional requirements, particularly in the context of interdisciplinary scholarship and the Digital Humanities. 3D datasets pose unique challenges to rendering software in terms of geometric complexity, memory and bandwidth requirements [2]. Existing tools that tackle these challenges often do so at the expense of other access priorities – such as rich metadata, collaborative environments, or standardized approaches to data exchange for annotations [3]. To address this knowledge gap, we have developed a suite of tools as part of a larger national effort which involves the partnership between several research, library and cultural institutions: NFDI4Culture aims to improve the infrastructure for research data in cultural research areas in Germany [4].

Our suite of tools aims to address the issue of enriching the metadata descriptions of 3D cultural objects with linked open data, while at the same time rendering and annotating these objects in a collaborative environment. The toolchain builds on several existing FOSS (Free and Open Source Software) products:

- OpenRefine, a data cleaning, reconciliation and batch upload tool with an accessible graphical user interface [5];

- Wikibase, a suite of services originally developed by Wikimedia Germany; which combine the ability to handle large volumes of data points with sophisticated data querying and access services, alongside native wiki-style collaboration features and complete version control system [6];

- Kompakkt, a browser-based 3D- and multimedia viewer with built-in collaborative annotation features [7].

Our integrated toolchain follows FAIR principles, and adopts common standards like PIDs and the W3C annotation model. It facilitates linking 3D objects and annotations, and their cultural context (including historical people and places, geo locations and 3D-capture-technology metadata), to the broader semantic web and various national and international authority records (Wikidata, GND, Getty's AAT, VIAF and more).

Audience

The audience who will benefit from this workshop includes researchers, digital curators and data managers who work closely with 3D models and reconstructions from architecture, art history, archaeology, as well as other fields of science and the humanities, and are also interested in the potential of leveraging the semantic web in enriching their datasets.

Learning objectives

In this workshop, we will use a specific architectural case study – reconstruction work and 3D modelling of Weikersheim Castle in Germany and its painted interiors – to showcase different features of the integrated toolchain in practice. The case study combines a wide range of heterogeneous data prepared by our research partners from the Corpus der barocken Deckenmaleri in Deutschland project (CbDD) [8]: from flat floor plans, mesh and point cloud files of 3D models of entire halls and sections of the castle buildings, photographs of paintings and interiors, video walkthroughs, to long-form art historical texts, alongside related historical persons and geo locations. A core learning objective will be to demonstrate the research value in this proof of concept case study, beyond the field of architecture towards other disciplines – especially when working with complex geometries, spatial data and non-textual cultural heritage objects.

We will guide participants through the steps needed to create annotated walkthrough narratives and a range of interactive data visualizations. By showcasing the potential for new research and data management approaches, we hope to gather additional user requirements towards further development of the toolchain and the open source tools it depends on.

Expected outcomes

After the workshop, participants will be able to use the collaborative annotation features of Kompakkt in order to annotate 3D and other media of their choice in a collaborative environment. They will also learn how to connect to different reconciliation services and take advantage of linked open data resources, including authority files, in order to increase interconnectedness of their own datasets. Lastly, they will learn how linked data can be written to and extracted from a Wikibase instance, and will gain practical experience with the SPARQL query service and its graphical user interface.

The session will also provide additional guidance and resources for participants to be able to join future discussions with the open source development communities of Wikibase and Kompakkt, as well as the NFDI4Culture community.

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