„Raise the Treasure!“ - Cultural Data and its potential for visualization & storytelling

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Abstract

This paper explores how to raise the cultural treasure of cultural exhibitions, collections, and data and how to make it available for experts, the broad public and education. The author addresses the challenge that at todays museums and cultural institutions a substantial part of collections remain unseen, limited by spatial constraints. It proposes digital technology as a solution to unlock the potential of these hidden treasures. The paper explores the effectiveness of digital visualization and storytelling in making collections more accessible and engaging to a varied audience. Three case studies are presented: the digitalization of the East-Asian porcelain collection of the Prussian Palaces and Gardens Foundation Berlin Brandenburg (SPSG), the innovative digital initiatives at Museum Rietberg, and the „InTaVia“ research and innovation project. Each illustrates how digital tools can manage, present, and interpret extensive information, improving visitor interaction, enhancing educational value, and preserving cultural heritage. The paper demonstrates how digital strategies can reshape the way museum collections are accessed and experienced, bringing a wider array of cultural artifacts and histories into public view.

Keywords

Cultural heritage data, Data visualization, Digital storytelling, Museum collections, Knowledge graphs, Extended/immersive reality (XR),

1. Introduction

In the context of todays museum practices, a critical issue emerges as a substantial portion of collections remain unseen by the public, stored away due to spatial and logistical constraints. This situation presents a significant limitation in terms of public access to cultural heritage and misses potential for educational and research opportunities. Addressing this challenge, the integration of digital technologies emerges as a viable solution. Museums on one hand already have been building up systems storing their collections digitally into internal collection management systems (CMSs), but on the other hand not yet have exploited these efforts towards an open access of their cultural treasures. Hence, by leveraging digital tools and platforms, museums have the opportunity to extend the reach of their collections, breaking free from the physical limitations of exhibition spaces. This paper explores the role of digital visualization and storytelling in enhancing the accessibility and engagement of museum collections for diverse audiences, including the general public, experts, and specialized groups.

2. Use Cases

To demonstrate the practicality and effectiveness of digital approaches, this paper outlines three specific use cases: (1) the digital representation of the East-Asian porcelain collection at Stiftung Preußische Schlösser und Gärten Berlin-Brandenburg, (2) the "InTaVia" EU-research and innovation project, (3) the digital initiatives at the Museum Rietberg. Each case study highlights the potential of digital tools to manage, present, and interpret the wealth of information contained in museum

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collections. These examples offer insights into how digital methodologies can support museums in improving visitor interaction, enhancing educational value, and ensuring the preservation of cultural heritage. The paper aims to present a comprehensive view of how digital strategies can reshape the accessibility and narrative surrounding museum collections, thereby making a broader array of cultural artifacts and histories available to a wider audience.

2.1. Use Case 1: Access the East-Asian porcelain collection of the Prussian Palaces and Gardens Foundation Berlin Brandenburg (SPSG)

The Prussian Palaces and Gardens Foundation Berlin Brandenburg (SPSG) holds a collection of approximately 3,500 East Asian porcelains, some of notable significance, predominantly showcased in the Charlottenburg, Oranienburg, and Caputh palaces. The collection presents a typical challenge for many cultural institutions: the limited capacity to display a significant portion of its collection. And though data and content has been available via collection management systems, no public access was possible to the large and valuable depot. In response, a project was developed to create a web platform, providing access to this extensive collection through multiple interactive layers - both for experts and public.

One of the primary features of this platform is the implementation of user-friendly visual exploration tools, such as typical search functions but also more experimental approaches e.g. using cluster set visualizations. These tools allow users to navigate the collection data based on various criteria, like origin, type or time period. The developed interactive collection exploration methods allow for creating complex visualizations of research work at the collection. It offers a practical and engaging way to explore and understand the diverse characteristics of the collections content.

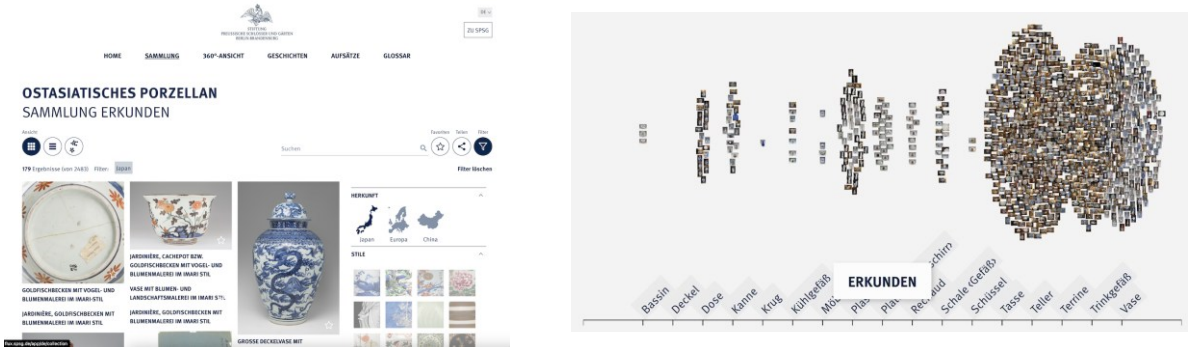


Figure 1: Modes of visualization & exploration of the East Asian porcelain collection

Digital storytelling forms another crucial component of the platform. Here, research findings on the platform can be used as „content chunks“ within whole interactive stories. This narrative branch of the platform enables users, particularly museum mediators, to construct stories around the collection’s objects, incorporating multimedia elements. Creators have the ability to seamlessly link objects from the collection and integrate visualizations crafted within the explorations tool, enhancing the ability to construct compelling narratives to engage remote learners and digital visitors, offering an enriched, story-based approach to the collection.

Another aspect of the developed platform is its connection to the physical exhibition space of the museum. By incorporating interactive 360° images of the exhibition rooms, particularly in the Porcelain Cabinet of Charlottenburg Palace, where users can explore the porcelain details on the walls, the platform virtually positions digital objects within these spaces, supplemented by pertinent

information.This approach offers users a unique experience that links the digital representations of the collection with their physical counterparts in the museum.

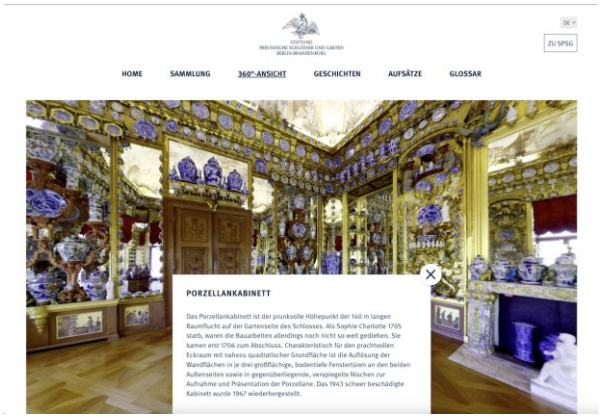


Figure 2: 360° explorer of the porcelain collection

Through these features, the web platform enhances the accessibility to the collection data, offering an innovative way for users to engage with and learn about the cultural heritage it represents, while respecting the balance between digital interactivity and the traditional museum experience.

2.2. Use Case 2: Extending Storytelling by data in the "InTaVia" Project

The second use case demonstrates the potential of using extended data spaces instead sticking only to the own collection. In the research project „InTaVia“ European universities, research institutions and companies have been working on how to integrate multiple data sources on cultural heritage, including also „intangible“ assets like biographies or events[2]. The project put together a complex and wide ranged „knowledge graph“ which stores and interconnects hundreds of thousands of persons, cultural artifacts, events, and locations of Europes cultural history. The project resulted in an openly accessible platform which can be used by experts for research and data curation, visual analysis and crafting stories for the interested public[3].

[2] InTaVia is a H2020 research and innovation action funded by the European Commission within the Call DT-TRANSFORMATIONS-12-2018-2020 “Curation of digital assets and advanced digitisation” (project ID: 101004825).

[3] https://intavia.acdh-dev.oeaw.ac.at

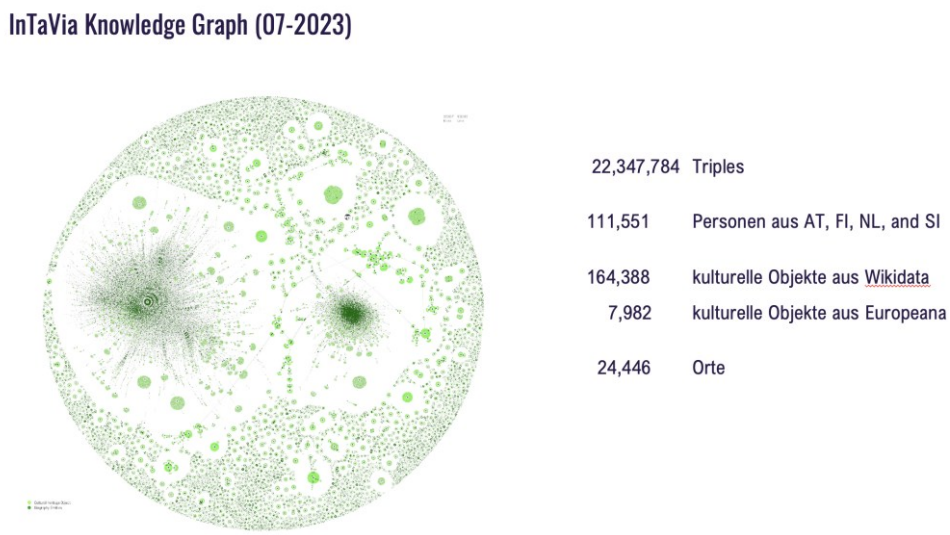


Figure 3: Copyright: Mag. Dr. Florian Windhager, Zentrum für Kulturen und Technologien des Sammelns, Department für Kunst- und Kulturwissenschaften, Donauuniversität Krems

The project team built a platform layer „Visualization & Analysis“ which introduces new attempts to handle complex cultural data structures and to transform them into temporal and spatial understandable visualizations. In the next platform layer „Storytelling & Presentation“ these results are compiled and authored towards interactive narratives that weave together diverse aspects of culture, history, biographies, personalities, and museum artifacts.

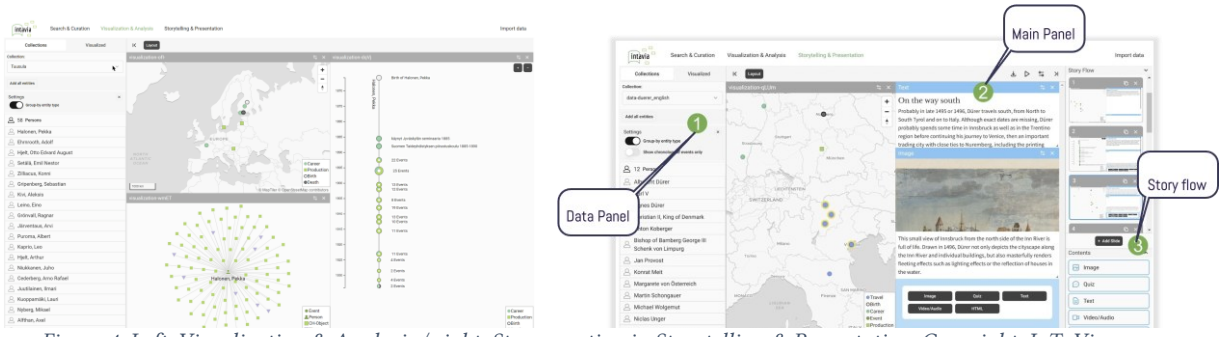


Figure 4: Left: Visualization & Analysis / right: Story creation in Storytelling & Presentation, Copyright: InTaVia

The story creation tool of the platform was created by our project partners University of Southern Denmark, Danube University Krems and University of Stuttgart. Fluxguide had the lead in the development of the story viewer, the application for consuming the interactive stories.The storytelling tool allows to easily author interactive stories which can be consumed on several end device platform like web browsers, mobile phones or tablets.

The storytelling design allows for the import of intricate data, facilitating the creation of multidimensional and engaging stories. These narratives are accessible through both mobile and desktop platforms through the story viewer application, ensuring wide reach and user convenience. This feature is particularly beneficial for the general public, experts, and educational groups like school classes, allowing for a diverse range of applications.

We also integrated Extended Reality (XR) technologies which allows the inclusion of immersive 3D content, offering users a more dynamic and tangible experience with cultural artifacts and narratives.

By employing XR, the storytelling platform not only deepens user engagement but also expands the educational possibilities, allowing for interactive, virtual explorations of cultural heritage.

The project rolled out 5 prototypical case studies showcasing the different applications of the

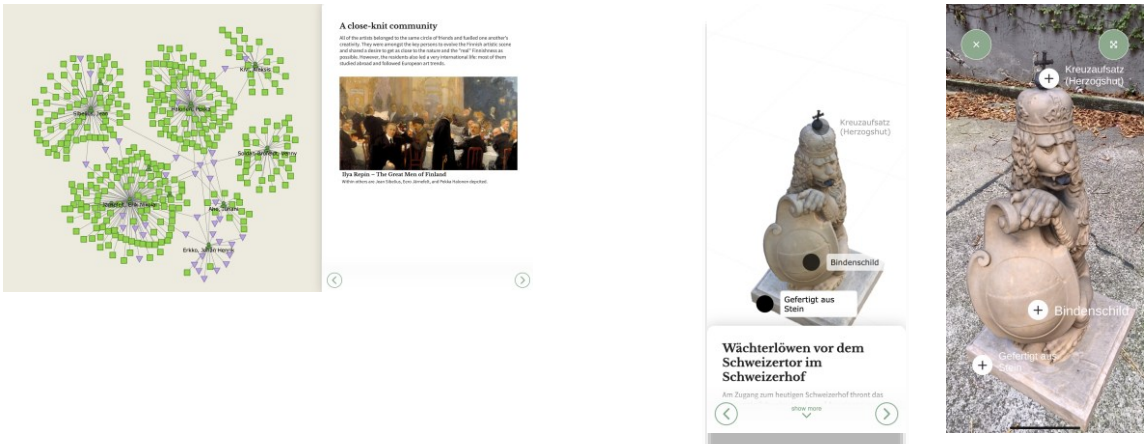


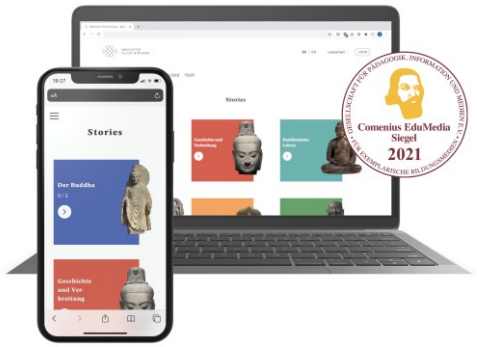
Figure 5: Network Visualization and Extended Reality Viewer

developed storytelling tools and focus on different types like object biographies, construction history of a building, single person biographies with related objects, prosopographic sets (combining multiple actors from the InTaVia Knowledge Graph)[4]. These proof of concepts show the potential to transform traditional cultural and historical data into interactive, engaging experiences where users can navigate through layered stories, gaining a deeper understanding of the interconnectedness of historical events, cultural influences, and notable figures.

The data storytelling toolset developed within the „InTaVia" project exemplifies the potential of digital tools in rethinking the dissemination and exploration of cultural heritage data. By providing a platform for dynamic storytelling and broad accessibility, it opens up new avenues for engaging with and understanding the rich tapestry of human history and culture.

2.3. Use Case 3: Interactive E-Learning Platform at Museum Rietberg, Zurich

In the third use case, a collaboration with Museum Rietberg in Zurich led to the creation of a comprehensive e-learning platform, transforming the museum's exhibitions into a dynamic digital learning experience. This platform was designed to extend the reach and lifespan of exhibition content, making it accessible even after the physical exhibition had concluded. It features a variety of educational tools, including structured learning courses, interactive challenges, quizzes, and a component for user-generated content, such as creating simple collages from exhibition objects.



The primary focus of this platform was on enhancing the learning experience, offering an immersive and interactive way to explore the museum's collections. Users could engage with the material through various educational formats, tailored to suit different learning styles and interests. The platform's adaptability to both mobile and desktop devices further increased its accessibility and convenience, allowing users to engage with the museum's content from anywhere.

[4] https://intavia.eu/category/case-studies/

By integrating these digital learning tools, Museum Rietberg effectively turned the exhibition into an ongoing educational resource. This approach not only broadened the scope of the museum's educational impact but also showcased the potential of digital platforms in reshaping how museum exhibitions and collections are accessed and experienced. Through this e-learning platform, the museum successfully leveraged digital technology to create a more interactive, engaging, and accessible learning environment.

3. Human Complexity: Competencies for interdisciplinary digital cultural data development

The endeavor to create innovative digital solutions for the exploration of cultural data is situated within an intricate and interdisciplinary domain, necessitating a collaboration that transcends traditional boundaries. The development of these digital platforms and tools requires a synergistic integration of expertise from both the technical and cultural spheres. On the one hand, technical experts such as software architects, digital platform specialists, software developers, database experts, and UI/UX professionals bring essential skills in technology development, data management, and user experience design. Their expertise is crucial in building robust, user-friendly, and efficient digital solutions capable of handling complex cultural data.

Conversely, the cultural domain contributes equally vital insights, with art historians, archaeologists, museum professionals, collection managers, and cultural educators providing the necessary contextual understanding and content expertise. Their knowledge ensures that the digital solutions are not only technically proficient but also culturally relevant and meaningful. This includes considerations of how cultural artifacts are presented, interpreted, and integrated into educational narratives, ensuring that digital platforms are not just repositories of information but also effective tools for cultural education and engagement.

The collaboration between these diverse yet complementary domains is pivotal in addressing the multifaceted challenges inherent in digital cultural data solutions. Such interdisciplinary cooperation facilitates a more holistic approach, ensuring that the digital innovations are not only technologically advanced but also culturally informed and resonant.

4. Technological Complexity: Frontend and Backend

The development of digital solutions for cultural data exploration is also marked by significant technological complexity, both in back-end and front-end development. This complexity is a critical aspect of the interdisciplinary collaboration required in this field.

On the back-end side, the challenge stems from the diverse array of existing systems within museums. These institutions often operate with multiple backend systems, databases, collection management systems, and legacy systems, each containing valuable but fragmented information. The integration of these disparate systems poses a significant technical hurdle. This complexity is further amplified when external data sources are incorporated, requiring sophisticated data integration and management strategies. Successfully navigating this back-end complexity necessitates technical expertise not only in software and database integration but also in the harmonization and synchronization of varied data formats and structures, ensuring a cohesive and accessible data repository.

Conversely, the front-end development of interactive digital applications introduces a different set of challenges. Applications need to be developed with platform independence in mind, ensuring compatibility across a wide range of devices such as mobile phones, tablets, desktops, laptops, and interactive screens. This requirement demands a versatile approach to design and functionality, prioritizing responsiveness, user-friendliness, and accessibility. The development process must take into account varying screen sizes, operating systems, and user interaction modes, creating a seamless and engaging user experience across all platforms.

5. Conclusion

This paper has presented a series of innovative use cases demonstrating the evolving relationship between cultural data, digital technology, and museum collections. From the digital visualization of the East-Asian porcelain collection of the Prussian Palaces and Gardens Foundation Berlin Brandenburg (SPSG), to the expansive cultural knowledge graph in the "InTaVia" project, and the interactive e-learning platform at Museum Rietberg, each case study illustrates the transformative impact of digital technologies in enhancing the accessibility, engagement, and educational value of museum collections.

Looking ahead, our endeavors continue to evolve as we explore future solutions for further exploiting cultural data and digital collections. In collaboration with partners like e.g. the Louvre Abu Dhabi, Fluxguides research is delving into advanced ways of digitally visualizing cultural data. We are particularly focused on temporal and spatial representation levels and the integration of these dimensions to offer a more comprehensive understanding of cultural heritage. Additionally, we are exploring methods for automatically connecting data, aiming to link digital objects in networks through the use of semantic metadata and AI mechanisms. These initiatives are geared towards enabling new and innovative ways of cultural exploration, leveraging the power of technology to uncover deeper insights and connections within the vast realm of cultural data.

As we continue to push the boundaries of what is possible in the digital presentation and exploration of cultural heritage, our goal remains to create more immersive, interactive, and accessible experiences. By harnessing the potential of digital technologies, we aim to unlock new perspectives and understandings of cultural artifacts, making them more relevant and engaging for diverse audiences worldwide.