

Multisensory Representations and Immersive Experiences for Inclusive Cultural Heritage: The Case of MuseIT

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Abstract:

The museum and cultural heritage fields, being the principal cultural and educational memory repositories of humanity, have exploited the digital transformation to embrace a more holistic approach to offer more emotional and personalised experiences [1]. The notion of digital transformation appears to take a shift from technology-centric concerns to one focused on a human resource approach. Creating a transparent, open, and inclusive digital heritage data landscape is more vital than ever. The *MuseIT* project aspires to co-design, develop, and co-evaluate a user-centred inclusion platform through multisensory representations of cultural heritage for enhancing engagement and providing equal opportunity for all as core principles. Centered mainly on democratisation and social inclusion, *MuseIT* enables digital transition to move beyond creating a knowledge repository capable of preserving the multisensory representations created within the project for interoperability, and interfacing with external systems. The multidisciplinary and transnational collaboration between humanities researchers and Cultural Heritage institutions brings valuable and complementary expertise to the project. This has allowed for a more comprehensive approach to the work as well as increased sharing and reuse of cultural heritage resources.

Immersive technologies such as virtual reality are capable of augmenting the cultural experience, including interaction, participation, and personalization, while ensuring accessibility for all [2]. Additionally, the embedding of gamification in the virtual experience triggers the user's curiosity, transforming the users from passive viewers into active participants. In this way, the foundation of the development of the immersive cultural heritage experiences in *MuseIT* has been based on data collected from various European cultural heritage organisations. Data of different material, date, context and culture of origin will harmonically co-exist to narrate their stories, and stimulate feelings through the multisensory interpretation approaches. Hence, an inclusive multisensory and multimodal metadata experience can be provided to a wider audience through the provision of data and the creation of a virtual environment. Additionally, in *MuseIT*, a variety of scientific domains of researchers, cultural heritage professionals, and computer, information, and data scientists have successfully collaborated to create a sustainable workflow for metamorphosing reusable, understandable, accessible, and sustainable data.

The proliferation of Machine Learning technologies in the Affective Computing area has raised new opportunities in the evaluation of cultural heritage experiences. The multisensory representations of

cultural artefacts in an immersive virtual reality environment provide a potent and highly influential stimulus to platform users, which drives their physiological responses. In addition, the digital methods for transformation enable humanities researchers along with data scientists to explore the nature of a virtual reality experience of cultural aspects, imitating real-life scenarios. Building on the inclusion principle, an Affective Computing framework is developed in pursuance of tracking and accessing the emotional state and engagement status of individuals who interact with the cultural heritage resources. Physiological signals, such as electroencephalography, galvanic skin response and heart rate, are employed to train and test Machine Learning algorithms, providing objective evaluation of the overall enhanced experience. This approach also proffers new means for inclusion, accessibility and personalization for all.

Keywords: Digital heritage, virtual reality, cultural heritage data, inclusion, multisensory representations.

Acknowledgements: The MuseIT¹ project “Multisensory, User-centered, Shared cultural Experiences through Interactive Technologies” is co-funded by the European Union under the Horizon Europe Framework Program² and the grant agreement N°101061441.

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¹ <https://www.muse-it.eu/>

² <https://cordis.europa.eu/project/id/101061441>