

AI and chatbots as a storytelling tool to personalize the visitor experience.

The case of National Museum of Ravenna.*

Francesca Fabbri¹ and Federica Collina¹[0000-0002-5759-8109],
and Sebastian Barzaghi¹[0000-0002-0799-1527]

¹ University of Bologna, Ravenna RA 48121, Italy
{francesca.fabbri80, federica.collina5,
sebastian.barzaghi2}@unibo.it

Abstract. In the museum sector, interest in visitor engagement methods has been growing for several years. Among these, AI and machine learning have proven to be valid engagement and storytelling tools for museums, in particular for the creation of interactive chatbots and better customize visitor experience. This paper aims to reason about the possibilities of these existing tools, discussing their potential and limitations. The collection of visitor flow data within the museum and the interactive use of chatbots allow different levels of personalization of the visit. The real question is: how can an evolving AI tool be transformed into a storytelling tool that is in harmony with the museum's itinerary and allows for personalization but also respects the museum's own identity and peculiarities? These reflections are part of a research proposal for developing a chatbot to orient visitors within the museum, signaling works of potential interest. The application context is the National Museum of Ravenna, characterised by a vast and heterogeneous collection that is difficult to use.

Keywords: Artificial Intelligence, Machine learning, Chatbots, Museum.

1 Conversational Artificial Intelligence in museums

Italy boasts a widespread museum heritage throughout its territory. In 2018, ISTAT - National Institute of statistics identified 4,908 institutions open to the public, of which 46.1 percent of facilities are located in entities between 2 and 10 thousand inhabitants [1]. Italy's cultural heritage is one of the richest and attracts significant flows of visitors. The number of annual visitors reached 130 million in 2019 [2]. Their flow is not distributed proportionally but tends to gravitate around a few points of attraction, leaving smaller and more peripheral entities excluded from visitor routes. In 2019, 0.1 percent of the total number of museum institutions catalyzed 21% of the audience of the entire Italian cultural heritage [3].

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A true "oligopoly" where an institution takes on a brand identity and attracts visitors regardless of what it displays or preserves inside [4]. Despite the large number of Italian museums, most still have dated layouts and heterogeneous collections, often created by an undefined curatorial choice. Visitors to physical museums often meet a vast amount of information available in the space they are exploring, and this makes it arduous to select and enjoy the content. The selection process is complicated by the fact that exhibitions may be arranged in a way that does not respect visitors' interests, meaning that the interesting exhibits may be scattered throughout the museum [5].

The priorities that other museums should pursue to increase the enjoyment of their collections are undoubtedly communication and engagement. The task of the museum institution is to tell the story of its collections and their relationships. The museum should also provide visitors with multiple means to understand the meaning of the collection objects. Thus, the aim of this paper is to propose the investigation and development of a solution to better personalize the visitors' experience and, as a result, improve engagement with museums and their content.

In this respect, digital technologies provide important opportunities for museum institutions. In particular, technologies such as Artificial Intelligence (AI) and machine learning (ML) have been increasingly used for both leveraging visitors' data and interacting with them in order to personalize the museum experience, extend engagement to a wider audience, and ultimately transfer knowledge more effectively [6, 7].

A promising AI-based approach in museum contexts is represented by Conversational Artificial Intelligence (e.g. chatbots) that engage visitors through fine-grained conversations in order to provide them with domain knowledge about museums and their exhibits [8]. Chatbots may vary greatly in terms of conversational skills and techniques used to engage users, ranging from simple question-answering informational bots, to fully-fledged conversational agents that can act as guides for users [9, 10]. By integrating other approaches and tools, such as visitors' data collection and analysis through sensors and multimedia tools [11, 12, 13, 14], it is possible to create a conversational system that dynamically interacts with visitors, provide them with content based on their needs and behaviors [15], and function as a useful storytelling tool for increased visitor engagement [16, 17].

2 Future prospects

The degree of personalization of museum visiting has long been a central theme in museological debates. How much and to what degree is it right to personalize a visit and target audiences? Moreover, does not the personalization of a compulsory route risk causing visitors to miss exhibits that would potentially have been of interest to them? AI is a valid aid in understanding which works the visitor is most attracted to and, based on this data, recommend other content that might be interesting to them. The data collected regarding the visit trajectory have a double potential. On the one hand, they allow for enhancing and strengthening a playful and personalized logic of the museum visit in which one is oriented to see what may be of greatest interest; on the other hand, they could strengthen the educational character of the museum by pointing out or reintroducing works that the visitor has not considered.

Upstream, however, it is necessary to consider the reference context and the type of collection in which they will be used.

We suggest the development of an AI-based chatbot to better customize the visitor's museum experience and increase engagement and understanding of the heritage preserved within the museum. This technology could be employed within the National Museum of Ravenna, a reality having a heterogeneous heritage with collections that are not coherent with each other and still lacking visit functional technological apparatuses. By combining Conversational AI and visitors' data analysis, it is possible to create a tool that, by collecting and analyzing visitors' data, produces recommendations to guide them through an optimized, personalized experience within a collection that is otherwise difficult to explore and understand. The chatbot would be a storytelling tool with a characterization specifically related to the museum of reference: in the case of the National Museum of Ravenna, its first director Enrico Pazzi. In this way, it would actively interact with the visitor by signaling to him which of the works/finds he might be most interested in based on what he thinks are his interests.

Designing and implementing a service such as a chatbot that interacts with visitors and their data implies a series of challenges in terms of both design choices and their technical implementation. First of all, as formulated by [15], a chatbot should be designed with a set of characteristics, such as having a formal tone, providing precise information, asking follow-up questions and keeping conversations from coming to a dead end. Secondly, since visitors' data are leveraged to produce relevant recommendations, it is necessary to take other ethical concerns into consideration as well, such as inappropriate content, privacy, behavior manipulation, opacity, fairness, and other effects it may have on society [18]. In particular, visitors' data protection and privacy should be ensured by providing informed consent to visitors, using security protection technologies to manage their data, and imparting adequate data literacy and regulation training to museums' staff [19].

In light of this, it remains to determine what factors the chatbot should rely on to understand the visitor's interests.

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