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ARCHITECTURE WITHOUT MEMORY? AI-GENERATED IMAGES AND THE CRISIS OF AUTHENTIC SPATIAL EXPERIENCE

ARCHITEKTURA BEZ PAMIĘCI? OBRAZY GENEROWANE PRZEZ SI A KRYZYS AUTENTYCZNEGO DOŚWIADCZENIA PRZESTRZENI

Abstract

The rapid development of generative artificial intelligence tools is fundamentally transforming the ways in which architecture is represented and imagined. AI-generated images often employ the aesthetics of familiar forms, atmospheres, and spatial compositions, even though the architectural environments they depict have never existed. This paper examines the relationship between digitally generated imagery and the authentic experience of architecture. The central research question asks whether AI-generated images are capable of conveying the meanings and memory of place, or whether they merely simulate architectural experience through visual afterimages rooted in collective cultural memory. The aim of the paper is to provide a critical analysis of the impact of AI-generated imagery on contemporary understandings of architectural atmosphere, perception, and authenticity. The study is based on a comparative analysis of AI-generated architectural images and photographic documentation of selected architectural spaces.

Keywords: *architecture, artificial intelligence, generative images, spatial perception*

Streszczenie

Rozwój narzędzi generatywnej sztucznej inteligencji radykalnie zmienia sposób przedstawiania i wyobrażania architektury. Obrazy tworzone przez SI często operują estetyką znajomych form, atmosfer i kompozycji, mimo że zaprezentowane środowiska architektoniczne nigdy nie istniały. Artykuł podejmuje problem relacji między cyfrowo generowanym obrazem a autentycznym doświadczeniem architektury. Głównym problemem badawczym jest pytanie, czy obrazy SI są zdolne do przekazywania znaczeń i pamięci miejsca, czy jedynie symulują doświadczenie architektoniczne poprzez wizualne powidoki zakorzenione w zbiorowej pamięci kulturowej. Celem artykułu jest krytyczna analiza wpływu obrazów SI na współczesne rozumienie atmosfery, percepcji i autentyczności architektury. Badanie oparto na analizie porównawczej obrazów architektury wygenerowanych przez sztuczną inteligencję oraz dokumentacji fotograficznej wybranych przestrzeni architektonicznych.

Słowa kluczowe: *architektura, generatywne obrazy, percepcja przestrzeni, sztuczna inteligencja*

1. INTRODUCTION

Generative artificial intelligence (AI) is transforming the creation and interpretation of architectural images. Rather than reproducing reality, AI models reconstruct culturally familiar representations based on learned visual patterns. Consequently, AI-generated images reflect collective visual memory rather than the authentic experience of architecture[1].

This phenomenon raises important questions concerning the reliability of AI-generated representation and the relationship between authentic architectural heritage and its digital interpretation. Unlike photography, images generated by AI models tend to depict the most culturally recognisable archetype of an architectural object. As a result, traces of use, material ageing, and the incidental characteristics of the surrounding environment are systematically omitted[2].

This issue is particularly significant in the context of historic architecture, whose value derives, not only from its formal qualities, but also from the authenticity of its material, its spatial context, and its multilayered historical development. From a phenomenological perspective, architecture is experienced through all the senses, whereas AI models primarily prioritise visual appeal[3].

The aim of this article is to investigate how generative AI reconstructs images of historic architecture and to identify which characteristics of architectural objects are preserved and which are transformed during the generation process. To this end, the study presents a comparative analysis of photographic images and AI-generated visualisations of four widely recognised icons of European architecture: the Colosseum, the Eiffel Tower, the Basilica of the Sagrada Família, and the Wawel Royal Castle.

2. ARCHITECTURE, THE MEMORY OF PLACE, AND AI-GENERATED IMAGES

In its deepest existential dimension, architecture is not a collection of plans, sections, or idealised three-dimensional renderings; rather, it exists as a dynamic somatic process. The experience of architectural space occurs at a pre-conceptual, intuitive level, preceding any attempt to rationally categorise a building in aesthetic or functional terms. The resonance evoked by an interior's volume is deeply rooted in evolutionary mechanisms associated with seeking shelter, ensuring safety, and maintaining kinaesthetic orientation within a three-dimensional environment[4].

Architecture is not merely a material object but also a repository of memory, meaning, and lived experience. The perception of space extends beyond visual cognition and is grounded in the relationship between humans, place, and cultural context. From this

[1] L. Manovich, *AI Aesthetics*, Strelka Press, Moscow 2018, pp. 1–22.
[2] J. Berger, *Ways of Seeing*, Fundacja Aletheia, Warszawa 2008, pp. 7–11.
[3] J. Pallasmaa, *Oczy skóry. Architektura i zmysły*, Instytut Architektury, Kraków 2012, pp. 31–33, 44–48.
[4] M. Halbwachs, *On Collective Memory*, University of Chicago Press, Chicago 1992, pp. 37–52.

perspective, buildings preserve history and collective identity, becoming integral components of cultural memory.

A key concept describing this relationship is Ch. Norberg-Schulz's *genius loci*, according to which architecture reinforces the character of a place and enables people to identify with it[5].

Similarly, A. Rossi argued that the city functions as the collective memory of society, while architecture constitutes a permanent record of its history and accumulated experience[6].

The phenomenological understanding of architecture has also been emphasised by P. Zumthor and J. Pallasmaa. A place's atmosphere is shaped by light, materials, proportions, sounds, and the relationship between the built environment and its surroundings, while the experience of architecture is inherently multisensory. People perceive space through movement, touch, smell, temperature, and acoustics; consequently, the memory of place cannot be reduced to visual representation but emerges from embodied experience[7].

The rapid development of digital media and generative AI has, however, increasingly transformed architecture into a predominantly visual representation. Image generation models such as Midjourney, DALL·E, and Stable Diffusion generate images by learning statistical patterns from extensive datasets, reconstructing characteristic architectural forms and motifs. The resulting representation is not a reproduction of an existing building but a new configuration drawing upon collective visual memory[8].

Although contemporary AI models can convincingly simulate architectural atmosphere through light, composition, and material appearance, this atmosphere remains fundamentally a visual construct. AI-generated images cannot reproduce the materials, temporal variability, and multisensory experience of architecture that underpin the memory and identity of place. This tension between visual representation and authentic architectural experience provides the conceptual framework for this study[9].

3. ARCHITECTURE IN THE MEMORY OF GENERATIVE AI

Generative AI models do not possess memory in the human sense. Instead, they reconstruct the most probable visual patterns encoded within their training datasets, producing images that reflect collective conceptions of architecture. Consequently, when prompted with neutral textual descriptions, historic buildings are typically represented as aesthetically ordered compositions, devoid of signs of ageing, contemporary infrastructure, and the incidental features of their surroundings[10].

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[5] C. Norberg-Schulz, *Genius Loci: Towards a Phenomenology of Architecture*, Rizzoli, New York 1980, pp. 5–23.

[6] A. Rossi, *The Architecture of the City*, MIT Press, Cambridge, MA 1982, pp. 130–166.

[7] P. Zumthor, *Atmospheres: Architectural Environments – Surrounding Objects*, Birkhäuser, Basel 2006, pp. 11–29.

[8] I. Goodfellow, Y. Bengio, A. Courville, *Deep Learning*, MIT Press, Cambridge, MA 2016, pp. 521–540, 651–664.

[9] J. Pallasmaa, *Oczy skóry. Architektura i zmysły*, Instytut Architektury, Kraków 2012, pp. 38–43, 71–77.

[10] R. Rombach et al., *High-Resolution Image Synthesis with Latent Diffusion Models*, [in:] *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2022, pp. 10684–10688.

This does not imply, however, that generative models are incapable of producing representation of architecture that appears damaged, weathered, or degraded. Such characteristics can be generated when they are explicitly specified in the input prompt. In the present study, however, the model consistently favoured representations that conformed to the dominant visual patterns encoded in its training data.

This mechanism may be described as 'architecture without memory', as the AI reconstructs primarily the cultural archetype of a building rather than its actual history.

4. METHODOLOGY

The study examined four iconic landmarks: the Colosseum in Rome, the Eiffel Tower in Paris, the Basilica of the Sagrada Família in Barcelona, and the Wawel Royal Castle in Cracow. These buildings were selected because of their high level of public recognition and significance within the collective cultural memory.

For each case study, a neutral architectural description was prepared based on the relevant literature. The descriptions deliberately excluded proper names and geographical references to ensure that the image generation process relied solely on the architectural characteristics contained in the prompts. These descriptions were subsequently used as input prompts for image generation using the Microsoft Copilot model.

5. CASE STUDY

5.1. THE COLOSSEUM IN ROME

The Colosseum (Amphitheatrum Flavium), constructed between 70 and 80 AD., is one of the most recognisable monuments of ancient architecture. This monumental structure, characterised by its elliptical plan and constructed of travertine, tuff, and brick, is distinguished by the rhythmic arrangement of its arcades and the clear composition of its façades, making it an integral component of the world's cultural heritage[11].

The AI model accurately reproduces (Ill. 1c–1d) the Colosseum's key formal characteristics, preserving its elliptical plan, arcaded façades, and overall proportions. However, it idealises the monument by reducing structural damage, weathering, and material variation, presenting it in a more complete and visually refined state. As a result, the generated images depict a recognisable visual archetype rather than the authentic condition of the historic structure.

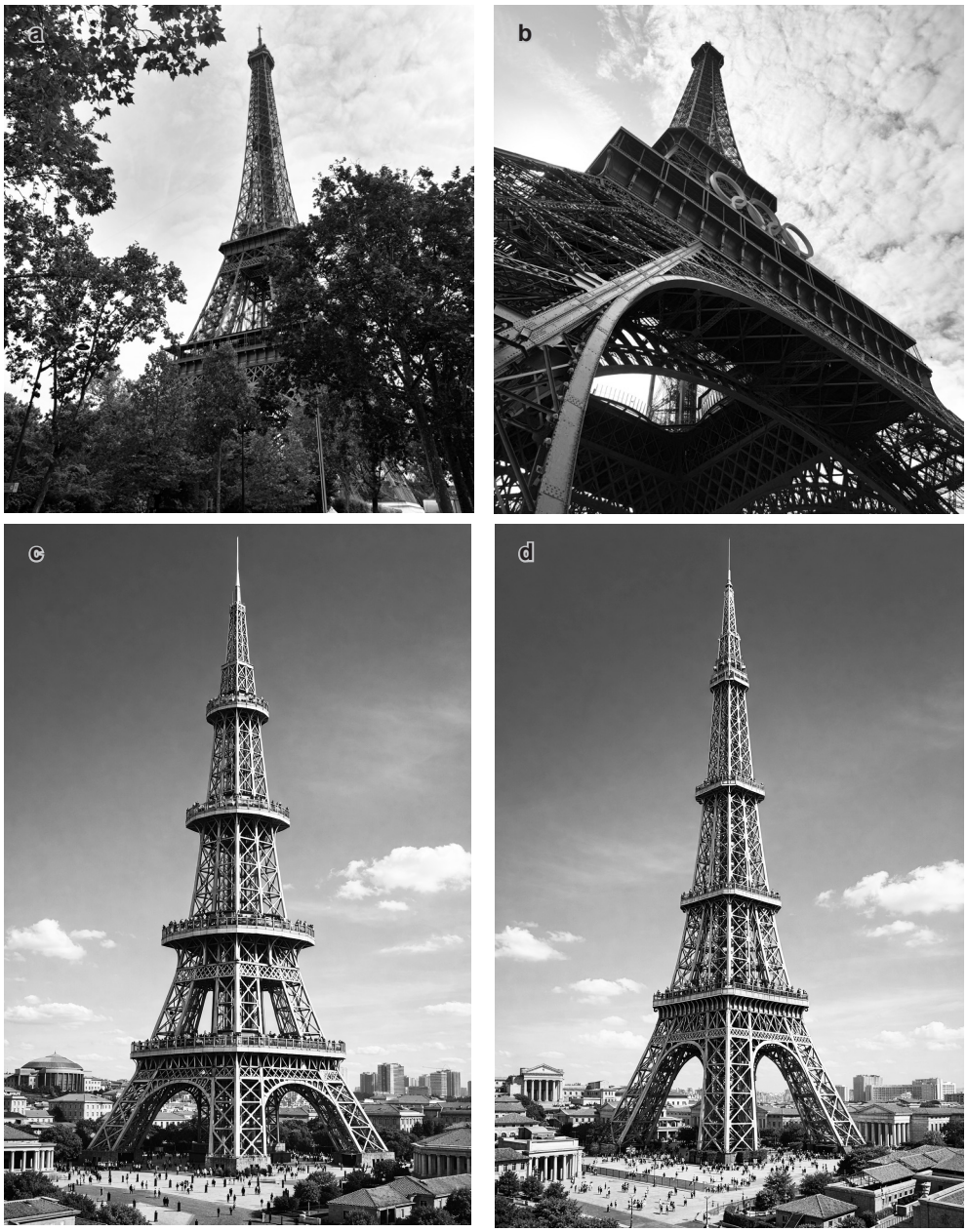
Comparable simplifications are also evident in the representation of the surrounding environment. Photographs of the actual monument (Ill. 1a–1b) include elements of contemporary tourist infrastructure, protective installations, and the present-day organisation of the public space. In contrast, these features are either eliminated or reduced to a minimum in the AI-generated images, resulting in a visually ordered and aesthetically refined composition. The model also consistently prefers favourable weather conditions and homogeneous illumination, further enhancing the visual appeal of the generated images.

[11] D. Watkin, *A History of Western Architecture*, Laurence King Publishing, London 2015, pp. 88–95.



Ill. 1. The Colosseum – comparison of field photographs and AI-generated images. a: south-western view; b: pedestrian-level view; c: south-western view; d: pedestrian-level view. Sources: a–b: photos by G. Doktór; c–d: Microsoft Copilot[12], compiled by N. Kozłowska

[12] Prompt: "Monumentalna budowla o eliptycznym rzucie, zaprojektowana jako wielokondygnacyjna konstrukcja przeznaczona do organizacji widowisk z udziałem licznej publiczności. Elewację tworzą cztery poziomy rytmicznie rozmieszczonych arkad, których kompozycja oparta jest na klasycznych porządkach architektonicznych. Konstrukcję wykonano z kamienia, cegły oraz betonu, co pozwoliło uzyskać dużą rozpiętość przestrzeni przy zachowaniu znacznej trwałości. Centralną część budowli stanowi owalna arena otoczona koncentrycznym układem widowni, połączonych systemem korytarzy i schodów zapewniających sprawną komunikację. Charakterystycznym elementem są powtarzalne otwory arkadowe nadające elewacji rytm i lekkość pomimo monumentalnych rozmiarów. Obiekt dominuje w historycznej tkance miejskiej dzięki swojej skali oraz wyrazistej formie. Widoczne ubytki konstrukcji oraz ślady wielowiekowego użytkowania podkreślają jego historyczny charakter. Istotnym elementem odbioru architektury jest gra światła i cienia powstająca pomiędzy arkadami oraz zróżnicowana faktura kamiennych powierzchni."



Ill. 2. The Eiffel Tower – comparison of field photographs and AI-generated images. a: view from the Champ de Mars; b: view from the base of the structure; c: AI-generated image; d: alternative AI-generated visualisation. Sources: a–b: photos by G. Doktór; c–d: Microsoft Copilot[13], compiled by N. Kozłowska

[13] Prompt: "Wysoka, ażurowa konstrukcja o smukłej sylwetce i wyraźnie zwężającym się ku górze profilu. Budowla opiera się na czterech masywnych podporach rozstawionych na planie kwadra-

5.2. THE EIFFEL TOWER IN PARIS

The Eiffel Tower, designed by Gustave Eiffel and constructed between 1887 and 1889, is one of the most recognisable examples of nineteenth-century engineering architecture. Its openwork iron lattice structure and distinctive silhouette have established it as a lasting icon of a global visual culture[14].

AI-generated images (Ill. 2c–2d) accurately reproduce the Eiffel Tower's key formal features, making it easily recognisable. However, they simplify reality by regularising the structure, removing weathering, material texture, and elements of the contemporary setting. Compared with field photographs (Ill. 2a–2b), the AI visualisations present a more symmetrical and idealised image, reducing the authenticity conveyed by perspective, lighting, and everyday context.

The AI-generated images consistently favour symmetrical compositions and favourable weather conditions, making the architecture visually clearer while diminishing some of its authenticity that arises from the direct experience of the built environment.

5.3. THE SAGRADA FAMÍLIA IN BARCELONA

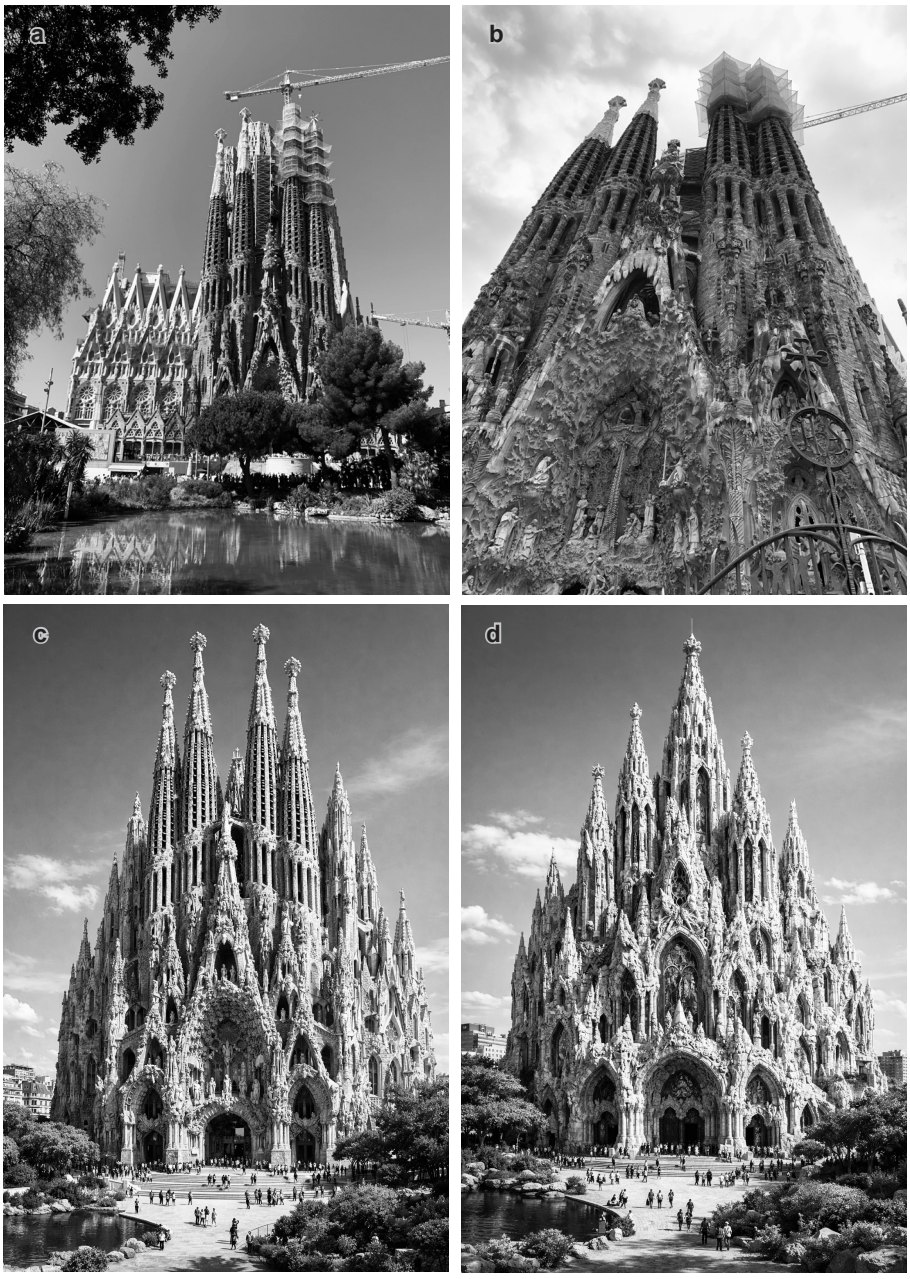
The Basilica of the Sagrada Família, whose construction began in 1882 based on a neo-Gothic design by Francisco de Paula del Villar and which was taken over by Antoni Gaudí in 1883, is one of the most recognisable works of modern architecture. Its distinctive organic forms, soaring towers, and richly ornamented façades have made it one of the most important symbols of Barcelona. An essential characteristic of the basilica is also its unfinished state, resulting from the ongoing construction process[15]. The AI model successfully reconstructs the culturally established image (Ill. 3c–3d) of the Sagrada Família, preserving its distinctive towers and organic form. However, it presents an idealised rather than contemporary representation (Ill. 3a–3b) by removing cranes, scaffolding, and other signs of ongoing construction. Architectural details, material textures, and tower geometry are simplified and regularised, producing a coherent but less authentic image. Consequently, the basilica's evolving identity is replaced by an aesthetically refined visual archetype.

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tu, które płynnie przechodzą w jedną pionową strukturę. Konstrukcję wykonano z elementów metalowych połączonych w system kratownic zapewniających jednocześnie lekkość wizualną i wysoką wytrzymałość. Forma obiektu jest całkowicie podporządkowana zasadom konstrukcyjnym. Rytmiczny układ elementów tworzy powtarzalny wzór geometryczny zmieniający się wraz z wysokością. Na kilku poziomach znajdują się platformy widokowe, stanowiące integralny element kompozycji. Budowla wyróżnia się na tle otaczającej zabudowy dzięki swojej wysokości oraz jednoznacznie rozpoznawalnemu profilowi. W zależności od pory dnia zmienia sposób odbioru poprzez oddziaływanie światła na metalową konstrukcję. Charakterystyczna ażurowość sprawia, że obiekt wydaje się jednocześnie monumentalny i lekki."

[14] B. Lemoine, *The Eiffel Tower (Architecture)*, Taschen, Köln 2021, pp. 18–39.

[15] G.R. Collins, *Antonio Gaudí*, George Braziller, New York 1960, pp. 126–153.



Ill. 3. The Sagrada Família – comparison of field photographs and AI-generated images. a: view of the main façade; b: façade detail; c: view of the main façade (AI); d: façade detail (AI). Sources: a–b: photos by G. Doktór; c–d: Microsoft Copilot[16], compiled by N. Kozłowska

[16] Prompt: "Monumentalna świątynia o silnie wertykalnej kompozycji, której bryłę tworzy zespół wysokich wież o zróżnicowanych wysokościach oraz bogato modelowanych elewacji. Charaktery-



Ill. 4. Wawel Royal Castle – comparison of field photographs and AI-generated images. a: panoramic view of the interior of the architectural complex; b: view of the arcaded courtyard of the Wawel Royal Castle; c: AI-generated image of the architectural complex; d: AI-generated visualisation of the courtyard of the Wawel Royal Castle. Sources: a–b: photos by G. Doktór; c–d: Microsoft Copilot, compiled by N. Kozłowska [17]

styczną cechą budowli są organiczne formy inspirowane strukturami występującymi w przyrodzie, pozbawione wyraźnych linii prostych i klasycznych podziałów kompozycyjnych. Elewacje pokrywa rozbudowany detal rzeźbiarski przedstawiający motywy roślinne, geometryczne oraz figuralne. Wnętrze oparto na systemie rozgałęziających się filarów przypominających pnie drzew, podtrzymujących sklepienia o skomplikowanej geometrii. Konstrukcja wykorzystuje kamień jako podstawowy materiał budowlany, uzupełniony współczesnymi rozwiązaniami konstrukcyjnymi. Budowla dominuje nad otoczeniem dzięki swojej wysokości oraz dynamicznej sylwecie. Znaczącą rolę odgrywa światło przenikające przez wielobarwne przeszklenia, tworzące zmienne efekty świetlne we wnętrzu. Architektura sprawia wrażenie płynnej, niemal organicznie wyrastającej z podłoża."

[17] Prompt: "złożony z budynków o zróżnicowanych funkcjach skupionych wokół wewnętrznych dziedzińców. Kompozycja łączy elementy architektury obronnej i reprezentacyjnej, zachowując wyraźną hierarchię przestrzeni charakterystyczną dla królewskiej rezydencji. Dominującym materiałem

5.4. THE WAWEL ROYAL CASTLE IN CRACOW

The Wawel Royal Castle is one of the most significant monuments of Polish cultural heritage. Its present form is the result of centuries of transformations that combine elements of Gothic, Renaissance, and Baroque architecture. The characteristic features of the complex include the arcaded courtyard, the diverse composition of architectural volumes, and its strong relationship with the historic landscape of the Wawel Hill[18].

The comparison of photographic documentation (Ill. 4a–4b) with images generated by the Microsoft Copilot model (Ill. 4c–4d) revealed a different type of error compared with the other analysed cases. While the Colosseum, the Eiffel Tower, and the Sagrada Família were correctly recognised, although represented in a simplified manner, the first generated image of the Wawel complex failed to reproduce the analysed architectural ensemble. Instead, the model generated a visualisation resembling an archetypal medieval castle, characterised by numerous towers, a high central tower, and a compact system of defensive walls.

A neutral architectural description proved insufficient for the AI model to identify the Wawel Royal Castle. The first generation resembled a generic medieval castle, while the second incorporated key features such as the arcaded courtyard but remained stylistically simplified. Compared with photographs, the AI images reduced the monument's historical complexity, material diversity, and contemporary context, replacing Wawel's multilayered identity with an idealised medieval archetype.

6. CONCLUSIONS

The obtained results confirm that generative AI can serve as a valuable tool supporting the design process, particularly at the stages of concept exploration. However, it does not replace the architect's experience or the understanding of the cultural and phenomenological dimensions of space. AI models do not experience architecture through movement, scale, light, sound, or materials; therefore, they are unable to fully recreate the *genius loci* or the memory of a place. They can support the design, research, and conservation processes, yet they cannot substitute for interpretations derived from human experience and expert knowledge.

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elewacyjnym jest kamień i cegła, uzupełnione wapiennym detalem o wysokiej jakości rzeźbiarskiej. Najbardziej charakterystycznym elementem założenia są renesansowe arkadowe krużganki otaczające główny dziedziniec oraz wieże o zróżnicowanych kształtach i wysokościach, w tym wieże katedry zwieńczone zielonymi, miedzianymi hełmami i złotymi akcentami. Budowle nakrywają strome dachy o ceramicznym pokryciu, wzbogacone kominami i dekoracyjnymi zwieńczeniami. Całość harmonijnie wpisuje się w ukształtowanie wapiennego wzgórza, tworząc wyraźną dominantę krajobrazową miasta. Istotną rolę odgrywa relacja obiektu z otaczającą zielenią i rzeką, a zróżnicowana kolorystyka materiałów, bogactwo detalu architektonicznego oraz ślady wielowiekowych przekształceń budują atmosferę miejsca o wyjątkowym historycznym i kulturowym znaczeniu - harmonijne połączenie gotyku, renesansu i baroku."

[18] St. Świerz-Zaleski, *Wawel. Katedra i Zamek Królewski*, S.A. Krzyżanowski, Kraków 1939, pp. 5–24.

Table 1. Summary of the analytical results

Analysis criterion	Colosseum	Eiffel Tower	Sagrada Família	Wawel Royal Castle
Identification	Very high	Very high	Very high	Low
Form	High	High	High	Low, partially distorted
Material	Homogenised, absence of ageing traces	Homogenised metal surface	Homogenised stone	Homogenised façade materials
Detail	Limited	Simplified lattice structure	Significantly simplified ornamentation	Limited historical detail
Traces of time and use	Removed	Removed	Omission of construction process	Limited historical stratification
Relationship with the surroundings	Simplified surroundings	Ordered urban landscape	Limited urban context	Removal of Wawel Hill setting, forest surroundings, and urban context
Atmospheric conditions	Idealised	Idealised	Idealised	Idealised
Dominant effect of AI generation	Reconstruction of the monument's archetype	Reconstruction of the architectural icon	Vision of a completed structure	Homogenised image
Final assessment	High formal consistency, low phenomenological consistency; reproduces the archetype but not the authentic state	High formal consistency; simplified context; organises reality by eliminating everyday elements	High formal consistency and idealisation; preserves style but reduces the construction process and historical complexity	Low formal consistency, poor identification accuracy; generates a historical reference image rather than an accurate representation

The findings demonstrate that generative models accurately reconstruct distinctive formal features of recognisable architecture but simplify materiality, erase traces of time, and reduce multisensory experience. Historical context, authenticity, and environmental relations are represented only when explicitly encoded in the prompt.

Table 2. Comparative analysis criteria and synthesis of the evaluation results for AI-generated images

Evaluation criterion	Observations regarding AI-generated images	Conclusions
Architectural form and proportions	Reconstructs the characteristic massing, composition, and proportions of the analysed objects with high accuracy.	The highest level of consistency concerns formal features that enable object identification.
Materiality and texture	Materials are visually realistic; however, they are homogenised and devoid of traces of ageing, damage, and conservation interventions.	AI reproduces the aesthetics of materials but not their authenticity.

Evaluation criterion	Observations regarding AI-generated images	Conclusions
Light	Idealised lighting conditions dominate, enhancing the visual attractiveness of the representation.	Light contributes to the atmosphere of the image but does not reflect the actual experience of a place.
Relationship with the surroundings	The surrounding context is ordered and simplified; infrastructural elements, randomness, and contemporary uses are removed.	AI creates an idealised spatial context.
Atmosphere of place	The atmosphere is constructed primarily through lighting, colour palette, and composition.	The atmosphere is predominantly visual and does not encompass multisensory experiences.
History and use of the object	Traces of time, patina, modifications, and signs of everyday use are removed.	AI eliminates elements that contribute to the memory of place and the authenticity of architecture.
Overall assessment	Generated images accurately reconstruct formal characteristics while simplifying materiality, context, and the historical dimension of architectural objects.	Images present a culturally established and idealised representation of architecture rather than a complete reconstruction of the authentic experience of a place.

The study is exploratory and serves as a starting point for further research on the relationship between generative artificial intelligence and architectural perception. As the analysis was based on Microsoft Copilot, the findings cannot be generalised to all generative models. Future studies should compare different AI tools to evaluate how model architecture influences the reconstruction of form, atmosphere, and place memory.

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