CHAPTER 14

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APPLICATION OF ARTIFICIAL INTELLIGENCE IN CULTURAL HERITAGE

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Summary: In this research, we investigate the application of artificial intelligence (AI) in the preservation and research of cultural heritage. Cultural heritage is an invaluable asset of human history and creativity, but it faces challenges of preservation, interpretation and access. In the introduction, we explore the importance of cultural heritage and the need for innovative approaches. Through a review of the literature, we analyze previous works that have investigated various aspects of the application of VI in cultural heritage. The research methodology includes a detailed explanation of the artificial intelligence techniques used for the analysis and interpretation of cultural artifacts. Through concrete examples and case studies, we show the successful results of restoration, analysis of text and visual data with the help of AI. However, the research also considers challenges such as the accuracy of the analyses, ethical issues and the need for expert supervision. In conclusion, we highlight the importance of cooperation between experts in cultural heritage and experts in artificial intelligence in order to achieve optimal results in the preservation and research of cultural heritage.

Key words: artificial intelligence, cultural heritage, restoration, text analysis, computer, Vision
JEL classification**:** L86, L88, L96, Z32

1. Introduction

Digital transformation, which is well under way, affects all sectors of the economy and changes the way we live, communicate, work, and have fun. The key

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areas on which the digital transformation of the economy and society is based at least in the next ten years are: advanced computing and data management, cyber security and artificial intelligence (Stojanović, 2022).

These areas are interconnected because artificial intelligence needs cybersecurity to be reliable, cybersecurity needs high-performance computing to process the vast amount of data to be protected, and digital services to comply with future norms will need all listed above (EU Commission 2018:2).

Artificial intelligence has largely become an integral part of our lives. It no longer represents science fiction, but a reality with applications in all spheres of modern life, from a virtual personal assistant that helps us organize our working day, through traffic control, to autonomous vehicles whose use is a reality today, through inevitable use in medicine, education , agriculture... up to the application of mobile "smart" phones, without which we can hardly imagine the life of a modern man (Stojanović & Ševo, 2023).

Many of the printed texts and manuscripts we possess today, already greatly eroded by the ravages of time, may be lost forever within the next few generations. The solution is their digitization, which will enable easier storage and protection for a much longer period of time. Digitized data is more easily accessible to researchers, and the data obtained by digitizing a huge number of documents can be used to improve artificial intelligence methods and create functional models. According to (Neudecker, 2022: 1), artificial intelligence and machine learning have enormous potential in (semi)automatic selection, organization and preservation of cultural heritage in libraries, archives and museums, as well as in computer analysis of cultural heritage data. Some of the capabilities provided by artificial intelligence used in digital libraries are text recognition from historical written documents, even writing techniques

The application of artificial intelligence (AI) in cultural heritage is an area that brings numerous innovations and opportunities. Here are some ways in which artificial intelligence can be used in the preservation and research of cultural heritage:

Restoration and conservation: Artificial intelligence can help restore damaged art, monuments and other cultural artifacts. Using techniques such as deep learning and computer vision, it is possible to analyze images and reconstruct the lost parts.

Translation and interpretation: AI can facilitate the translation and interpretation of texts in different languages, thereby allowing greater access to books, documents and other cultural materials around the world.

Data analysis and organization: Large amounts of data related to cultural heritage, such as archives, images, audio and video, can be processed with artificial

intelligence to identify patterns, themes and trends. This makes it easier for researchers to better understand and interpret historical and cultural contexts.

Virtual Reality and Augmented Reality: AI can help create realistic virtual environments that allow visitors to explore archaeological sites, ancient cities, and other cultural sites in their original states.

Recognition of Authenticity: Artificial intelligence can help identify original works of art from fakes, using techniques such as analysis of style, pigment and other characteristics.

Personalized experiences: By combining visitor data with AI, museums and cultural institutions can create personalized experiences and recommendations for visitors, tailoring content to their interests.

2. Artificial intelligence tools for the promotion of cultural heritage

There are a number of artificial intelligence tools that can be used to promote cultural heritage. These tools enable better research, interpretation and access to cultural artifacts and information. Here are some examples (Stojanović & Ševo, 2023).

Digitization and Archiving:

High-resolution scanners and 3D scanners are used to create digital copies of works of art, monuments and other cultural artifacts. Artificial intelligence can analyze these digital copies to detect corruption and enable detailed analysis.

Text Analysis:

Natural Language Processing (NLP) tools are used to analyze text documents such as manuscripts, books, diaries and inscriptions.
These tools help in automatic translation and transcription of text, making it easier to access information in different languages.

Computer Vision:

Computer vision techniques are used to analyze images and videos of cultural artifacts. Recognizing patterns, styles and details facilitates the analysis and interpretation of works of art.

Virtual Reality (VR) and Augmented Reality (AR):

VR and AR technologies allow visitors to explore virtual reconstructions of historical sites, museums and monuments. Visitors can have interactive experiences and a better understanding of cultural artifacts.

Generative Models:

Generative models, such as GANs (Generative Adversarial Networks), can create new works of art inspired by the styles of old masters or characteristics of certain periods. Automated *Guides and*

Recommendations:

Artificial intelligence can develop personalized tours and recommendations for visitors to museums and cultural sites, taking into account their interests.

Analysis of Style and Authenticity:

Style analysis tools are used to identify the characteristics of works of art and confirm authenticity or detect forgeries.

Restoring ancient languages using deep learning

Ancient History relies on disciplines such as Epigraphy, the study of ancient inscribed texts, for evidence of recorded past. However, these texts, „inscriptions" are often damaged over the countries, and illegible parts of the text must be restored (Asael at all, 2019).

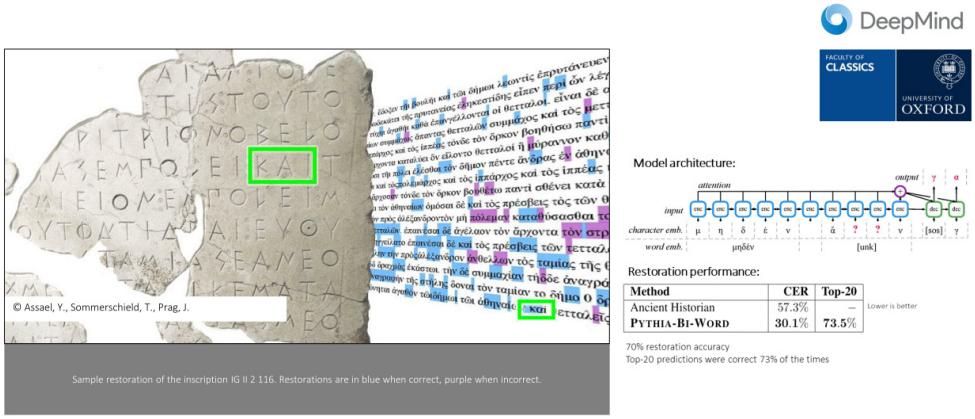
Interactive Educational Applications:

Development of interactive applications that provide educational content about cultural heritage with the help of artificial intelligence.

Deciphering ancient languages

Researchers are using artificial intelligence to quickly translate ancient texts and languages into English—including ancient Cuneiform and Egyptian hieroglyphs. In a new Oxford Academic report a group of AI developers details how they were able to use natural language processing (NLP) to translate cuneiform tablets from Akkadian into English (Travilgia, 2020).

Image 1. Restoring ancient languages with deep learning

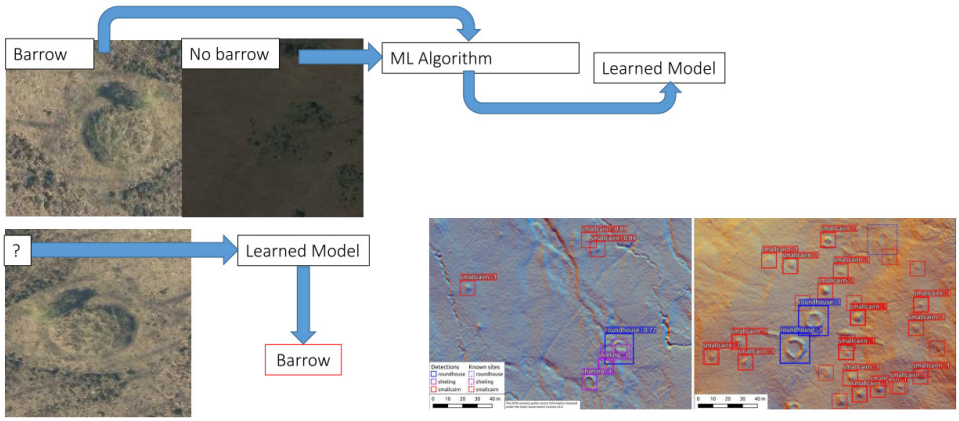


Source: Ariana Traviglia

Detecting unknown Cultural Heritage through AI

The AI will be able to recognize even minimal or imperceptible variations in vegetation or other particular signs of the surface that may indicate the presence of remains not yet discovered, (Travilgia, 2020).

Image 2. Detecting Cultural Heritage through AI

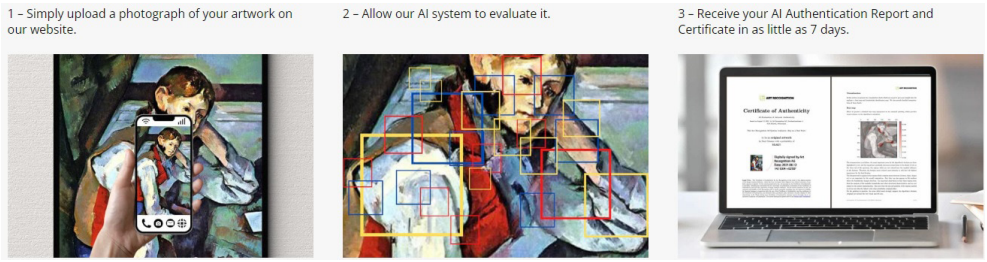


Source: Ariana Traviglia

Art crime detection

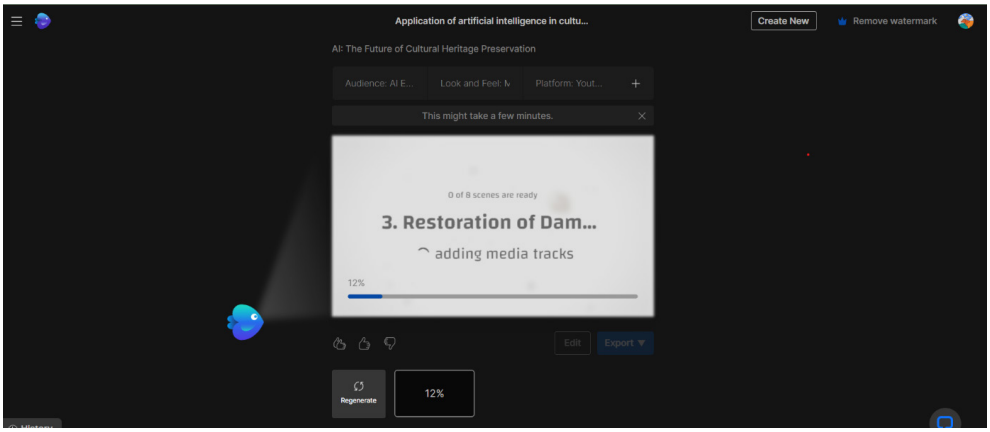
Today, AI is also used to authenticate works of art and detect attempted forgeries (Art recognation, 2023).

Image 3. Art crime detection with AI



Currently, there are several tools on the market that use artificial intelligence to create video presentations with the help of images and text.

Image 4. Video AI



Source: Adaptation by autor

These tools enable the automatic generation of video content based on predefined elements. Here are some examples of such tools:

Lumen5: Lumen5 is a tool that uses artificial intelligence to turn text content into a video presentation. It allows you to enter text and then generates a video with animated text, thumbnails and videos.

Vidnami: This tool uses AI to automatically create video content based on text. You can add images, select music and the tool will generate a video in sync with voice narration.

Rocketium: Rocketium is a video creation platform that uses artificial intelligence to transform text and images into dynamic video presentations. It allows personalization with effects, animations and music.

Animoto: Animoto uses AI to make the video content creation process easier.

It allows you to choose a template, add text, images and music, and then generate professional video presentations.

InVideo: InVideo is a video editing tool that uses AI to quickly create video content. You can enter text, images and video clips and the tool will generate dynamic video presentations.

Wave.video: This tool uses AI to facilitate the video content creation process. It allows you to combine text, images and video clips to generate video presentations.

Wibbitz: Wibbitz uses AI to transform text into video content with fast and efficient results. It provides the flexibility to add different visual and audio elements.

All of these tools offer varying levels of personalization and creative control, but use artificial intelligence to automate the process of creating video presentations. When choosing a tool, it is important to consider your specific needs and preferences regarding the content and style of your presentation.

In 2015, Google introduced a tool called Google Cloud Vision API that allows adding tags to images and classifying them into different categories. It also offers the possibility of recognizing the text within the image and possible inappropriate content.

A tourist tour of historical places in remote parts of the world is unattainable for most people. In order to bring the cultural goods of material heritage closer to the widest possible circle of people, several digital platforms have been developed that make extensive use of artificial intelligence, and this reflects the application of artificial intelligence in the promotion of the country's material cultural heritage. Now places like the pyramids in Egypt, numerous artifacts in museums and galleries around the world from different historical eras are no longer accessible only to a small circle of people.

One of the platforms that is already widely present in our area and that we will present here is Google Arts and Culture.

2.1. Google Arts & Culture platform

Google Arts and Culture (Google Arts & Culture, 2023) is a Google application that allows viewing works of art, artifacts and other cultural heritage located in over 2,000 museums, galleries, archives and organizations that have signed a contract with the Google Institute. Through this digital platform, more than 80 countries can get to know a large online community about their cultural assets and their own culture. The user accesses digitized content regardless of physical distance, and artworks are displayed in very high resolutions so that details can be seen.

On this digital platform (which is completely free) you can find information about the most famous works of art, but this platform offers much more. It is searchable by a given time period, allows virtual visits, has a built-in tool that helps to find out what the work of art is (when we point a smartphone camera at it), etc.

Google Arts and Culture is an online platform through which the public has the opportunity to access high-resolution content, images and video material of works of art and cultural heritage, collected by cultural institutions and collaborators around the world. The project allows anyone with Internet access to view collections and exhibitions in museums that they are unable to visit in person.

Collaboration between the British Museum and the Google Arts and Culture platform which resulted in the ability to display over two million years of human history and culture on the British Museum's website. More than six million visitors have an unforgettable experience visiting the world-famous collections every year.

Professors and students are able to organize virtual trips, as well as online discussions with museum experts from other organizations in the field of culture.

We have the possibility to start a sound recording and to hear a voice explanation, to see the exact location of the mentioned object on the map below, as well as a display of those objects that are connected to it.

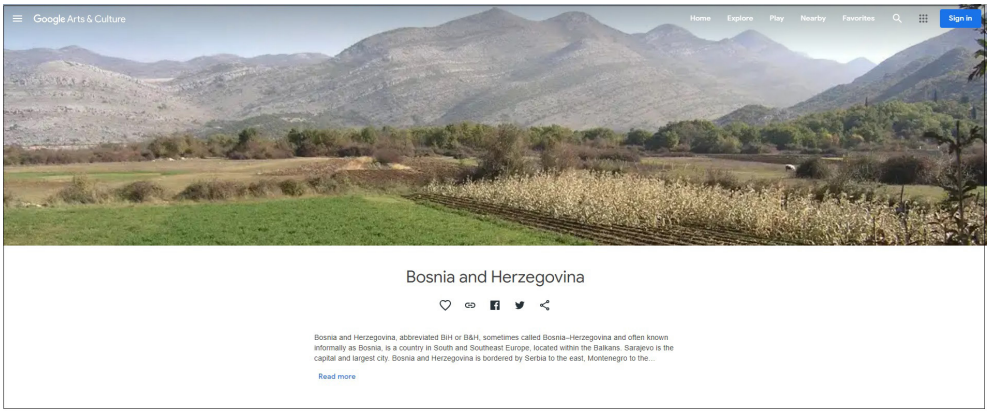
The Google Arts and Culture (Google Arts & Culture, 2023) platform seeks to attract the younger population and educate them through play. They launched their own video game "The Descent of the Serpent" through which we can get to know ancient civilizations and cultures.

Platorma adapted the previously created Google Street View technology, which enabled virtual movement through the streets of cities around the world, for movement inside the exhibition space of museums and galleries.

2.1.1. Bosnia and Herzegovina on the Google Arts & Culture platform

In BiH, the National Gallery in Sarajevo established the first collaboration with Google Arts & Culture platform in 2017. At the beginning, 99 works of art were presented on the platform, while today that number is 264.

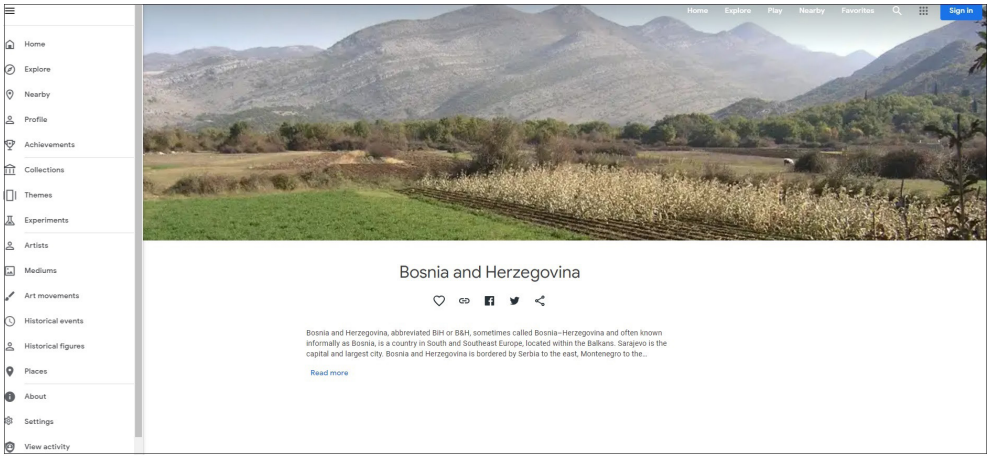
Image 5. BiH in the Google Arts & Culture



Source: Adaptation by autor

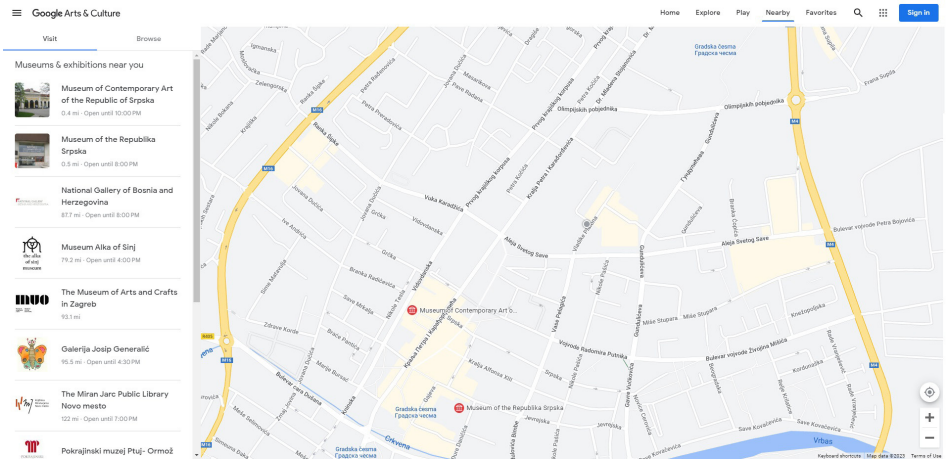
As soon as we accessed the platform, our exact location was already determined and we were offered the option to click on "Nearby" to get an overview of the museums and galleries that are geographically closest to us.

Image 6. BiH in the Google Arts & Culture



Source: Adaptation by autor

Image 7. BiH in the Google Arts & Culture

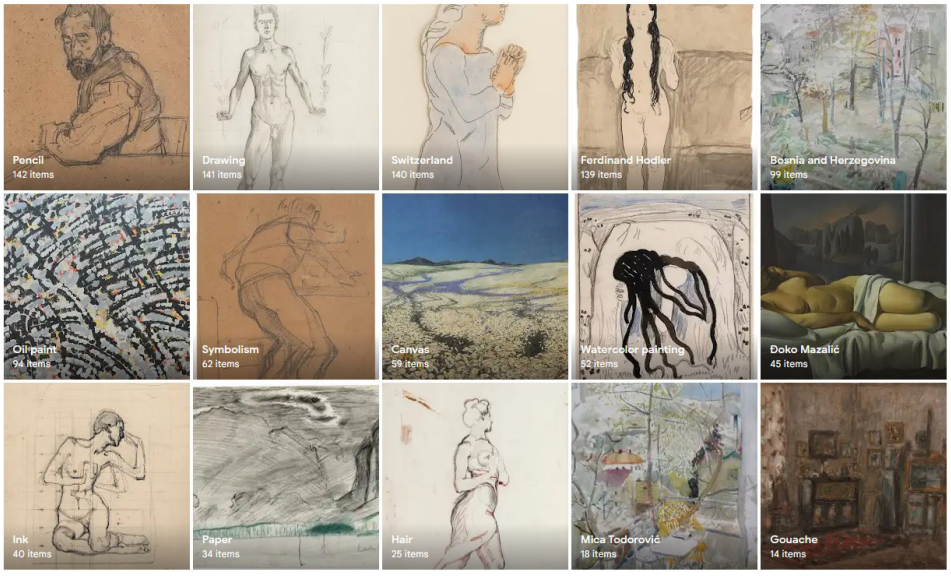


Source: Adaptation by autor

In the menu on the left, you will find a list of the nearest cultural destinations, and on the right, a map on how to get to the chosen destination.

In Bosnia and Herzegovina, the first institution that signed a contract with the platform was the National Gallery of Bosnia and Herzegovina.

Image 8. National Gallery of Bosnia and Herzegovina



Source: Adaptation by autor

3. Using Lumen5 to present the Cultural Heritage of Bosnia and Herzegovina

Lumen5 will use artificial intelligence to automatically generate a video presentation using the entered text and images (Lumen 5, 2023).

Steps to uses Lumen 5:

1. Preparation:Visit the given URL page (https://www.mvp.gov.ba/dobro_dosli_u_bih/kultura/kulturno_nasljedje/?id=245) to see information about cultural heritage.
2. Manual Text and Image Extraction:
3. Copy and extract the relevant textual content about the cultural heritage of Bosnia and Herzegovina from the website.
4. Download the images you want to use as visuals for the video.
5. Entering Text and Images in Lumen5:
6. Log in to your Lumen5 account.
7. Select the option to create a new video.
8. Enter the previously extracted text into Lumen5 and add the images you downloaded.
9. Automatic Video Generation: The tool will automatically add text animations, image transitions and other visual effects.
10. Personalization and Finalization:
11. Preview the generated video and personalize it by adding effects, music or additional images.
12. Make sure the video is consistent and the information conveyed accurately.
13. Download and Share:
14. When you're done editing, download the video from Lumen5 and share it on the appropriate platforms.

Result, example: https://www.youtube.com/watch?v=NYCkESuCSpg.

3.1. Advantages and disadvantages of using Lumen 5 in the promotion of the cultural heritage of BiH

Lumen 5 is a video content creation tool that enables the conversion of text into animated video clips. When it comes to promoting the cultural heritage of Bosnia and Herzegovina (BiH), Lumen5 can have certain advantages and disadvantages (Lumen 5, 2023).

Advantages of using Lumen 5 in the promotion of the cultural heritage of Bosnia and Herzegovina:

- Visual appeal: Lumen5 enables the creation of engaging video content that can quickly capture the attention of viewers on social media and other platforms.
- Ease of use: The tool is quite intuitive and user-friendly, which means that it can be easily used even by those who have no experience in creating video content.
- Speed of creation: Lumen5 enables fast creation of video content. This is especially useful if you want to react quickly to current events or dates related to cultural heritage.
- Social sharing: Ready-made video creations can be easily shared on different social networks and platforms, thus achieving a greater audience reach.

Disadvantages of using Lumen5 in the promotion of the cultural heritage of Bosnia and Herzegovina:

- Limitation of personalization: Lumen5 uses templates and automatically generates animations, which may limit the possibility of personalizing video content to better fit the specific cultural heritage of BiH.
- Reduced depth of content: Video content created through this tool often relies on quick visuals, which can lead to a superficial treatment of complex cultural concepts or historical events.
- Quality of audiovisual elements: The quality of audio and visual elements in videos will depend on the available resources and materials you have at your disposal.
- Free Version Limitations: The free version of Lumen5 may have restrictions on video duration, available templates, and resolution.

In the context of promoting the cultural heritage of BiH, it is important to balance carefully between a quick and attractive presentation through Lumen5 and providing a deeper understanding of complex cultural aspects. The tool can be useful for creating attractive visual content, but it is also important that a deeper research and analysis of the cultural heritage is carried out to ensure an accurate and rich presentation. Basic terms related to the promotion of cultural heritage:

- Cultural heritage includes past elements passed down from generation to generation.
- Promotion is a targeted strategy for raising awareness of cultural values.
- Visual content includes images, photos, illustrations and videos.
- Multimedia tools combine different media for dynamic content.

How tools like Lumen5 work:

- Automation transforms text into visuals and animations.
- Templates offer predefined designs and animations.
- Visual elements such as images and graphics complement the content.
- Text becomes spoken content along with visual elements.
- Customizability allows customization of colors, fonts and speed of animations.
- Export allows video sharing on different platforms.
- Creation speed is useful for quick reactions.

It is important to balance the speed of creation with the accuracy and depth of research for the integrity of cultural heritage.

4. Using artificial intelligence to promote the cultural heritage of the Republic of Srpska

Promoting the cultural heritage of the Republic of Srpska using artificial intelligence and tools like Clipchamp can be a creative and engaging way to showcase the rich history and heritage, (Clipchamp, 2023). Here are the steps you can follow to create a promotional video using Clipchamp:

1. Gather Content: Collect images, videos, and text that represent the cultural heritage of the Republic of Srpska. This can include historical landmarks, cultural events, traditional crafts, and more.
2. Create a Script: Develop a script or storyboard that outlines the flow of your video. Decide on the order of the content, the text overlays, and the narrative you want to convey.
3. Sign Up for Clipchamp: If you haven't already, sign up for an account on the Clipchamp platform. You can use their free version or explore their subscription plans for more advanced features.
4. Open Clipchamp Editor: Once logged in, open the Clipchamp video editor.
5. Create a New Project: Start a new project and choose the aspect ratio and resolution for your video. For social media promotion, you might want to select a common aspect ratio like 16:9.
6. Import Media: Upload the images and videos you gathered earlier to the Clipchamp editor. Arrange them in the order you planned in your script.
7. Add Text Overlays: Use Clipchamp's text overlay tools to add captions, titles, and descriptions to your images and videos. This text will provide context and information about the cultural heritage being showcased.

8. Add Transitions and Effects: Clipchamp offers various transitions, filters, and effects that you can apply to your content to make the video visually engaging. Experiment with these options to enhance the storytelling.
9. Include Background Music: Choose a background music track that complements the theme of your video. Clipchamp has a library of royalty-free music you can use.
10. Voiceover (Optional): If you want to add a voiceover, you can record and add it using Clipchamp's voice recording feature.
11. Preview and Adjust: Preview your video and make any necessary adjustments to the timing, visuals, and effects.
12. Export the Video: Once you're satisfied with the video, export it using Clipchamp's export options. You can choose the resolution and format that suits your needs.
13. Share and Promote: Once the video is exported, share it on social media platforms, your website, or any other channels you're using to promote the cultural heritage of the Republic of Srpska.

Clipchamp is a video editing platform that enables creative expression through dynamic video clips. Promotion of cultural heritage through this tool requires a creative approach and careful selection of content from the naslijedje.org page in order to properly convey the message and attract the target audience. Promotion of cultural heritage means bringing historical, artistic and cultural value closer to a wider audience. Through video content, you can bring the past to life and bring it closer to viewers in an interactive way. For example, taking old photos and videos from naslijedje.org can make it possible to create video clips depicting historical moments. Virtual tours are another powerful tool. By combining photos and 360-degree video, you can allow visitors to "walk" through cultural sites and explore them from the comfort of their own home. A short documentary can delve deeper into the stories of significant figures, events or traditions. Using footage and interviews, you can bring those stories closer to viewers.

Alternatively, podcast-style videos allow audio content to be combined with images or illustrations. This is a great way to convey stories and information in a unique way. Through quick video clips with text and graphic elements, you can provide interesting facts and information. These clips quickly attract attention and can be shared on social media for greater reach. It is important that your videos communicate the essential values and messages of the cultural heritage in a way that will interest and engage the audience. The Clipchamp tool provides options for adding effects, text and music to achieve the desired effect.

Advantages:

Using a tool like Clipchamp to promote cultural heritage has several advantages:

- Creativity and Appeal: Video editing tools allow you to creatively combine different media such as images, sound and text to create visually appealing and dynamic content.
- Interactivity: Video content is more interactive and engaging than static text or images. Through video, you can bring cultural heritage closer to the audience in a dynamic way.
- Availability and Sharing: Video content is easily shared through various platforms such as social networks, websites and YouTube, allowing you to reach a wider audience.
- Emotional Connection: Video can convey emotions and stories in a deeper way than text can. This is particularly important for the promotion of cultural heritage, where stories have a rich emotional component.

Disadvantages:

However, there are also some disadvantages:

- Time and Resources: Creating quality video content takes time and resources, including materials, editing time and quality equipment.
- Technical Complexity: Using video editing tools can be technically challenging for those new to editing.
- Responsive Audience: Not everyone is equally open to video content, so there is a possibility that some potential visitors will not engage in video promotion.

Result, example: https://www.youtube.com/watch?v=hR9xwjkzDys&t=174s.

The sample you provided (https://www.youtube.com/watch?v=hR9xwjkzDys&t=174s) can illustrate exactly these pros and cons. The video uses a variety of visual elements such as images, illustrations and text to present the cultural heritage of Bosnia and Herzegovina. The dynamism of the video and the music contribute to the emotional experience. This is a great way to inform and inspire the audience, but at the same time it requires effort and time to create and edit this kind of content.

5. Comparison of the situation in BiH with nearby countries regarding of the key indicators of the development of artificial intelligence

According to (Oxford Insights: 56) on readiness for artificial intelligence from the year 2022, Bosnia and Herzegovina is in 112th place (out of 181 analyzed countries), which is the worst position in relation to neighboring countries. According to the authors of this report, the lack of a strategy, the lack of an innovation ecosystem that is needed for the development of artificial intelligence, the stagnation of economic growth and brain drain are responsible for such a bad position. No strategy has been adopted at the level of Bosnia and Herzegovina for the development of artificial intelligence. In the Federation of Bosnia and Herzegovina, in the FBiH Development Strategy for the period from 2012-2027, artificial intelligence development plans were presented (Stojanović & Ševo, 2023).

Table 1. Comparison of countries in the region according to readiness for artificial intelligence

Country	Total Score	Government Pillar	Technology Sector Pillar	Data and Infrastructure Pillar
Croatia	41	61.45	71.15	41.62
Slovenia	59	52.96	68.7	35.44
Monte Negro	66	48.59	40.7	36.12
Serbia	71	46.11	50.66	32.05
North Macedonia	76	45.12	39.26	33.13
Bosnia and Herzegovina	112	35.17	26.7	27.98

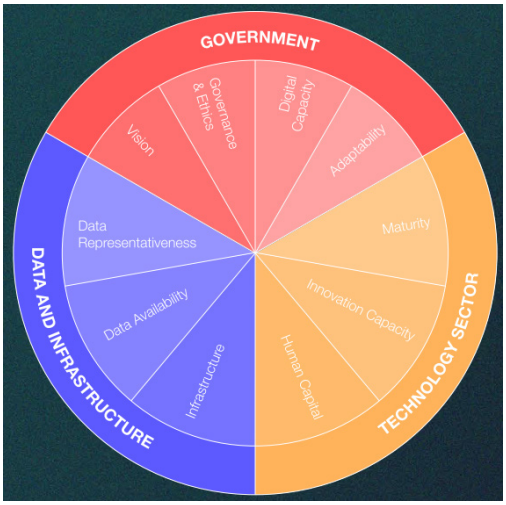
Source: Adaptation by autor

The total score is based on three pillars.

Those are:

1. Government: vision, digital capacity, governance and ethics are evaluated here,
2. Data and infrastructure: availability of data, representativeness of data and infrastructure,
3. Technological sector: innovative capacity, human potential and maturity.

Image 9. The Government AI Readiness Index



Source: Oxford Insights

Why is the position of Bosnia and Herzegovina so bad according to these indicators, especially considering that it has a solid ICT (Information and Communication Technology) infrastructure (Stojanović, 2022)?

Perhaps the reason for this is the absence of a state strategy in the development of artificial intelligence. This could probably be helped by the establishment of an artificial intelligence institute that will deal with research related to the application of artificial intelligence in various fields with a multidisciplinary approach in cooperation with scientific research institutions, the economy and the public sector.

Conclusion

Advances in artificial intelligence are significantly transforming the ways in which we promote cultural heritage. Through automatic generation of video content, personalization according to the target audience and interactive elements, artificial intelligence enables effective promotion. This technology provides a wide reach and quick sharing of content on different platforms, thus achieving greater visibility of cultural values. However, challenges related to authenticity, copyright and ethical issues remain. The further development of artificial intelli-

gence opens new perspectives for the future of cultural promotion, bringing the promise of creating exceptional and innovative experiences for a wider audience.

Some of the key points in using of artificial intelligence for the promotion of cultural heritage contain are:

- Innovation in Cultural Promotion: Artificial intelligence brings innovative opportunities for the promotion of cultural heritage. Through the automatic generation of video content, personalization and interactive elements, artificial intelligence improves the way we present a rich cultural heritage.
- Efficiency and Scalability: Using artificial intelligence, the video content creation process becomes more efficient and scalable. Automated techniques enable faster generation of high-quality video clips with less time and resources.
- Personalization and Interaction: Artificial intelligence enables the personalization of content according to the target audience. Audience preference analysis tools allow content to be tailored to better connect with viewers. Interactive elements add depth to the experience, engaging viewers on a deeper level.
- Wide Reach: Digital content generated with the help of artificial intelligence can be easily shared on different platforms and social networks. This enables a wide reach and greater visibility of cultural heritage, attracting the attention of a wider audience.
- Challenges and Obstacles: Despite the benefits, there are challenges related to authenticity, copyright and ethical aspects of using artificial intelligence to create content. Also, it is necessary to continuously improve the algorithms in order to achieve the greatest possible precision and aesthetic value of the created contents.
- The Future of Cultural Promotion: Artificial intelligence is likely to continue to transform the way we promote cultural heritage. The further development of technologies such as deep learning, generative models and augmented reality opens up new possibilities for creating extraordinary and interactive experiences for viewers.

In the conclusion of the research on the integration of artificial intelligence in the promotion of cultural and historical heritage, it is emphasized that technological tools such as automated content generation, personalization and analytics played a key role in expanding the reach and reaching a wider audience. These tools enable the creation of visually appealing and relevant content that is tailored to the interests of individual users. However, the need for careful selection of

technological solutions is also emphasized in order to preserve the authenticity and integrity of the cultural heritage.

The insights gained from this research indicate that artificial intelligence enables innovative ways to captivate audiences and actively participate in the discovery of cultural riches. The integration of artificial intelligence in the promotion of cultural heritage is a step forward towards creating a holistic and interactive experience for the audience. However, it is important to point out that this technological evolution requires a thoughtful balance between technological innovation and the preservation of the deep authenticity and value of the cultural past.

Through various digital platforms, one of which is described in the paper, Google Arts and Culture, virtual visits to museums, galleries, and archaeological sites can be enabled for the general population, which certainly contributes to the popularization of such content. With the current enormous popularity of social networks, experiences of virtual visits are shared via the Internet, which further increases the popularity of the displayed content, and brings the cultural heritage of a country closer to millions of Internet users around the world. Since it is a relatively new concept, it is necessary to investigate how the trend of presenting cultural heritage in a digital format will be reflected in live visits to the cultural institutions of a country.

Through the proper management and implementation of artificial intelligence, long-term enrichment and increased awareness of cultural heritage can be achieved. Given the rapid evolution of technology, continuous research and careful direction are key to achieving the optimal blend between artificial intelligence and cultural promotion.

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