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Animated Presentation of the Story of The Nevlje Mammoth

ABSTRACT

In today's globalised world, rapidly evolving digital technologies increasingly shape our daily lives. Their continual development brings both challenges and opportunities, including new ways to preserve cultural and natural heritage Animation – with its many styles and subgenres – has become an essential part of modern media and everyday communication. Although originally created for entertainment, it is now widely used in marketing, advertising, and especially education. Animated storytelling can vividly bring the past to life, presenting traditions, heritage, and artefacts in ways that capture attention and help preserve knowledge for future generations. It is particularly valuable for presenting artefacts that, although well known, lack accessible professional or scientific material. One such example is the nearly complete skeleton of the Nevlje mammoth, one of Slovenia's most important palaeontological discoveries, dating back roughly 20,000 years. Public information about the find remains limited, especially in terms of visual material and reconstructions of the mammoth's life and the circumstances of its death. Existing presentations are further weakened by outdated interpretations that no longer align with current scientific understanding. A 2D animated presentation offers an engaging new way to explore this discovery. It is suitable for all generations and can be made accessible to visually and hearing-impaired audiences through sound design and subtitles. By introducing animation as an additional medium, we can enrich the scarce existing material and broaden public understanding of the mammoth's story.

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KEY WORDS
2D animation, Nevlje mammoth, palaeontology, natural heritage, cultural heritage

1. Introduction

In today's globally oriented world, rapidly evolving digital technologies increasingly affect our daily lives. Alongside negative effects, this constant development also brings positive opportunities that open up new methods and approaches for preserving both cultural and natural heritage. By introducing more engaging and appealing forms of heritage presentation, museum visitor numbers rise and interest in heritage itself grows, which in turn supports its preservation. 2D animation, as an example,once very time-consuming, is now much faster and easier. This allows animation to be used in areas where it was previously impossible or uneconomical, thereby not only enriching them visually but also giving them greater visibility and broader social recognition. With the help of animation, we can bring past stories, traditions, heritage and artefacts back to life in a way that attracts the attention of the masses and, consequently, they can be preserved for future generations (Connolly, 2025). We can particularly shed light on fields that, despite significant recognition, have only a small number of publicly accessible materials. An example of this is the Nevlje mammoth, which is one of the most important palaeontological discoveries in Slovenia, an almost fully preserved 20,000-year-old woolly mammoth skeleton (Bezek, 2015). The goal of the project was to create an educational 2D animation with original illustrations and audio narration telling the story of the Nevlje mammoth, to be posted on a local museum's website to educate people about this important piece of heritage. By highlighting these kinds of examples and presenting them

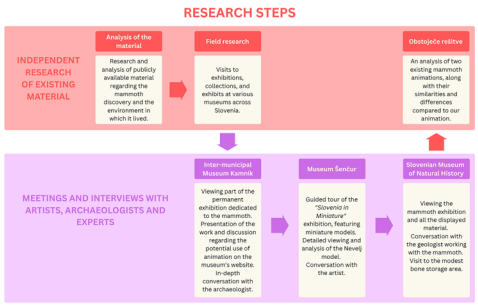
in a way that is appealing and educational, learning about heritage becomes fun and engaging for all audiences and keeps its cultural memory very much alive.

2. Methods

2.1. Research

The aim of the research was to obtain as much information as possible about the life of the Nevlje mammoth, the causes of its death, and the unexpected discovery of its skeleton. We wanted to find out what the environment of Nevlje was like during the last ice age and who the individuals were who played a key role in the story of this important palaeontological find. The research included visits to museums and exhibitions, documentation of material, interviews with archaeologists, experts and artists, as well as visits to locations related to the story of the mammoth in the Kamnik region. The information and expert guidance obtained had a key impact on the design of the storyboard content and contributed to the scientific basis of the project, which was continually upgraded in cooperation with institutions and individuals.

The research steps we undertook are graphically represented in the diagram in Figure 1.



» **Figure 1:** *Research steps*

2.1.1. Research on the discovery of the mammoth skeleton

Less than a kilometre from Kamnik towards the Tuhinjska Valley lies the town of Nevlje, through which the Nevljica River flows. Due to floods and subsidence of the banks, regulation works began in the winter of 1938 and ended with the construction of a reinforced concrete bridge over the Nevljica riverbed, which still bears the name for which it became famous – the Mammoth Bridge (Bezek, 2013, 2015).

On 14 March 1938, while digging the foundations for the bridge support, the workers encountered an unexpected obstacle in the form of a "stump", which they reported to Mayor Ferdinand Novak. He recognised it as a fossilised bone, stopped the work and asked the veterinary inspector of Kamnik, Josip Nikolaj Sadnikar, for advice. Sadnikar confirmed the mayor's assumption that they had come across the remains of a woolly mammoth. Once it was clear that this was more than just an isolated find, after Sadnikar's son uncovered a rib and tibia, as shown in Figure 2, they informed the Mining Administration in Ljubljana about the discovery (Bezek & Bezek, 1998; Bezek, 2013, 2015; Čebašek, 2018; Vulikić, 2005).



» **Figure 2:** *Discovery of the mammoth skeleton (Bezek, 2015)*

On 16 March 1938, at the initiative of the Mining Administration, the naturalist and zoologist Dr Fran Kos and the taxidermist Viktor Herfort, from the Natural History Department of the National Museum in Ljubljana, came to Nevlje. Dr Kos carried out his excavations with precision, systematically and in an organised manner. He filled the shafts where the first bones were discovered and protected them from decay caused by exposure to air. He systematically excavated along stratigraphic layers to a depth of 250 cm (Bezek, 2015; Jeršek & Križnar, 2001; Kos, 1939a, 1939b; Križnar, 2021). Due to a lack of financial resources, the forecast of bad weather and disputes with the locals, the bones were transported to Ljubljana on 4 May 1938 by several carriages to the Natural History Department of the National Museum (Bezek, 2015; Jeršek & Križnar, 2001; Kos, 1939b).

Archival documents of the Museum of Natural History show that, due to various problems, including financial ones, the procedures for preserving the bones and assembling the mammoth skeleton did not begin until April 1939, followed by the conservation of the ox in May 1940 (Križnar, 2014). Researchers established that the remains belonged to a male mammoth of extraordinary size, measuring 574 cm in length and 361 cm in height, who died at about 40 years of age and lived around 20,000 years ago. So far, science has not identified the cause of his death, nor has it been able to prove that a human was directly involved in it (Bezek, 2015; Jamnik and Križnar, 2024; Železnikar, 2008).

The preparation of the skeleton was carried out in accordance with the methods of the time. The skeleton was attached to a metal structure that supported it and, at the same time, indicated the missing parts. The complete reconstruction of the mammoth skeleton was first presented to the public at the end of 1941, during World War II. Because of the war, the bones were dismantled and stored in crates, and after the end of the war they were reassembled. Since then, the mammoth has been the central exhibit of the Natural History Museum of Slovenia. Today visitors can view the replica on display, shown in Figure 3, as the original bones have been conserved because of degradation (Bezek, 2015; Jeršek & Križnar, 2001; Križnar, 2014).



» **Figure 3:** *The replica on display*

The first memorial in the Kamnik region, dedicated to the mammoth, is the bridge over the regulated riverbed of the Nevljica River, which was named the Mammoth Bridge when it was opened in 1938 The most recent commemoration was erected to mark the 85th anniversary of the discovery: a life-size bronze sculpture of a mammoth by sculptor Miha Kač, installed in Kamnik in the immediate vicinity of the confluence of the Nevljica and Kamniška Bistrica rivers and shown in Figure 4 (Občina kamnik, n.d.).



» **Figure 4:** *Life-size bronze sculpture of the mammoth by sculptor Miha Kač*

2.1.2. Field research

The first institution we visited after defining the project topic was the Inter-Municipal Museum Kamnik, where we viewed the permanent exhibition dedicated to the mammoth. During the visit, we met the director of the museum, Mrs Zora Torkar, and the archaeologist, Mrs Janja Železnikar. They expressed interest in and openness to including animation in the museum's online content and in its possible use to supplement the exhibition. This was followed by an expert meeting with Mrs Janja Železnikar, at which we presented the then current version of the storyboard and asked her for further guidance. Drawing on the scientific findings of paleobotanist Ana Budnar-Lipoglavšek, we also talked with the archaeologist about a possible visual reconstruction of the Ice Age environment around Nevlje. She suggested that we visit the exhibition Slovenia in Miniature at the Museum of the Municipality of Šenčur, where the artist Igor Grabnar was exhibiting a model presenting his interpretation of the environment of that time.

In the Museum of the Municipality of Šenčur, we visited an exhibition called Slovenia in Miniature, which is partly still in progress. The exhibition consists of models through which the artist Igor Grabnar presents key events in Slovenia and important milestones in the history of the Republic of Slovenia. After the tour, we met the artist, who said that he created the model of the Ice Age Nevlje on the basis of consultations with experts, including archaeologist Janja Železnikar. He presented in detail a model that illustrates his interpretation of the environment of Nevlje in the last Ice Age with mammoths. Information about the depicted environment is summarised on the information board next to the model, which he prepared in cooperation with Mr Matija Križnar from the Natural History Museum in Ljubljana. Mr Grabnar told us that he is in contact with the Šporar family, who keep part of the photographic archive from the excavations of the mammoth in 1938. With his consent, we obtained contacts from both sources for further research.

This was followed by a meeting with geologist Mr Matija Križnar from the Natural History Museum of Slovenia, the author of several scientific papers in the field of palaeontology, which were an important source in the development and production of this project. The visit also included a behind-the-scenes tour of the museum, including a modest depot with some mammoth bone fragments. We provided him with an updated version of the mammoth storyboard, which he found pleasant. In order to illustrate the animal background, he recommended the inclusion of species such as reindeer, elk, wolverine, arctic fox, and wolves. While these species are typical of this environment, we also possess fossilized remains of these species from the surrounding area. He graciously provided us with access to the photographic archive, which encompasses the Nevlje mammoth

excavations in 1938 and the subsequent time of bone protection and skeletal assembly in the museum. This was followed by a study of the exhibition featuring the mammoth skeleton in the Natural History Museum and an analysis of the accompanying material.

2.1.3. Existing solutions

During the research, only two similar existing solutions in the form of animation were identified. In the first case, the subject is a 3D animation of the Nevlje mammoth, which is located in the mammoth room of the Natural History Museum in Ljubljana. The visual element is presented in a continuous loop on a large monitor. The background of the animation is constituted by a live video projection from a camera positioned in the corner of the room. The digital 3D model of the mammoth skeleton is being gradually upgraded by the addition of muscles and hair, until the complete image of the animal as it existed during the Ice Age is revealed. The depiction of the room, which has been employed as the background of the presentation, is then transformed into a three-dimensional model of a snowy landscape. The depiction of the mammoth in its natural environment is static. In comparison to our own depiction, the 3D mammoth model is characterised by a significantly squatter posture and greater rigidity. Its movement is confined to the head and neck region. The image of the monitor with the animation described is shown in Figure 5.



» **Figure 5:** *The image of the monitor with the animation*

Another example of the use of animation as a tool to display professional content related to natural heritage was also found in the mammoth room of the Natural History Museum, only on a second, smaller monitor. It is a 3D animation that is more stylized, and it features more characters and scenes. Similar to our animation, it begins with a map showing Europe today and during the last glaciation. The story then focuses on the depiction of Nevlje in the Ice Age, where a herd of mammoths moves across a snowy steppe. The next scene shows the Paleolithic people and their hunt for a mammoth. The movement of the characters is rigid and slow, while the movements of the "camera" are faster and smoother. The emphasis in depicting the landscape is on the steppe and not on the swamp. The Paleolithic people are implicated in the mammoth's death in the animation, which modern science has not been able to confirm.

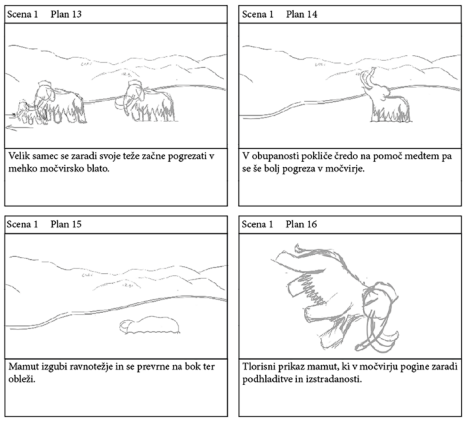
2.2. Animation pre-production

2.2.1. Synopsis

The animation begins with Europe as we know it today, and then we spin time 23,000 years back in time to the time of the last ice age. The Northern Glacier covers the whole of northern Europe. The frame focuses on the territory of Slovenia, which is partially covered by the Alpine Glacier. The frame then zooms in on the surface, which shows a swampy world where reindeer and elk graze, with snow-capped mountains in the background. A mammoth steps into the foreground, which at first we see only halfway through. We focus on its features: hair, tusks and trunks. As the frame expands, we see a herd of mammoths moving across the wetland. The largest of them begins to sink into the soft mud as the herd leaves it. It lets out one last dramatic cry before it topples over and dies. From a bird's eye view, we see his corpse decomposing until only the bones covered with snow remain. Sediment is deposited on the bones in summer, and in winter they are covered with snow. After numerous deposits, they are covered with grass. After the last winter, we can follow the construction work along the regulation of the Nevljica riverbed. We see two workers who have found something and inform the mayor about it, who is passing by. He recognizes a fossilized bone in the obstacle. In the next scene, he holds the bone in his hand while Josip Nikolaj Sadnikar looks at it with a monocle, indicating to him that it is a mammoth. A hand holds a newspaper that reports on the finding of a mammoth. When the hand releases the newspaper, the façade of the National Museum of Slovenia is displayed. This is followed by a demonstration of excavations at the Nevlje site, led by Dr. Fran Kos, followed by a demonstration of the assembly of the mammoth skeleton in the museum, followed by the final museum installation of the skeleton on an iron frame. This frame represents the transition from monochromatic to chromatic style. The last one is a bronze statue of a mammoth, erected on the occasion of the 85th anniversary of the find, which is then photographed by someone. The last shot of the animation is a realistic photograph of this statue.

2.2.2. Storyboard

The synopsis is followed by a storyboard that visually presents the plot. The animation is illustrated scene by scene in a series of rectangles, with a description beneath each one explaining what is happening in that particular shot. Figure 6 shows an excerpt from the animation, while Appendix 1 contains the complete storyboard.



» **Figure 6:** *Excerpt from the storyboard of the Nevlje mammoth animation*

2.2.3. Defining styles

Given the structure of the animation, which spans three distinct time periods, the Palaeolithic era, 1938, and the present day, we decided to assign a unique and recognisable visual style to each of them. This approach enables viewers to clearly distinguish between the three periods without the need for narration or subtitles. The animation begins in the Palaeolithic era, specifically 23,000 years ago, in the area where the town of Nevlje stands today. This period is depicted in a style inspired by Palaeolithic illustrations commonly found in books. Characteristic features of these illustrations include desaturated colours, earthy brown and green tones, soft forms, subtle shadows, and textured surfaces.

The next visual style represents the year 1938, when the skeleton was discovered. This period is portrayed using a combination of monochromatic and chromatic rendering. Black-and-white photographs taken at the excavation site in 1938, for which we obtained permission to use, form the background, while the main figures and bones are rendered in colour. This allows for a realistic depiction of the scene while simultaneously using colour to emphasise the most significant events and key figures. The present day is depicted in a colourful, semi-realistic style inspired by our own photographs. Appropriately, the final shot of the animation features an actual photograph of the mammoth statue, unveiled in 2023 to mark the 85th anniversary of the discovery. This further reinforces the significance of the find and highlights its importance as a real-world cultural heritage asset that should be preserved.

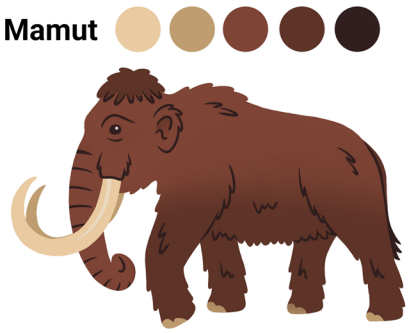
2.2.4. The script

We devoted considerable time to developing the script for several reasons. The primary objective was to present accurate and verifiable information about the life, death, and discovery of the Nevlje mammoth. The second major challenge was to convey this information in a clear, engaging, and concise manner, which proved to be a demanding task. As a result, the script underwent numerous revisions and reductions before we were satisfied with its content and structure. Once we considered it complete, we submitted it to Mrs. Janja Železnikar and Mr. Matija Križnar for review. They provided valuable feedback and suggested several corrections, which we carefully incorporated into the final version of the script.

2.3. Animation production

2.3.1. Analysis and drawing of characters

Character design was a lengthy process that required extensive analysis and planning, as our goal was to create characters that were both recognisable and stylised. All characters were designed and illustrated using the IbisPaint X drawing software. The mammoth, as the main character, presented a particular challenge. On the one hand, we wanted it to remain as faithful as possible to scientifically accurate depictions of woolly mammoths; on the other, it needed to be simplified and stylised to fit the visual language of the animation. To support this process, we created an inspiration collage containing a variety of realistic and stylised mammoth depictions gathered during our research. Alongside these references, we compiled a list of key woolly mammoth characteristics that had to be considered during the design process. The initial sketch was based on the shape of the skeleton exhibited in the Natural History Museum and on the mammoth statue created by Miha Kač. We then developed a full illustration of the mammoth and established its colour palette. The final character design and colour palette are presented in Figure 7.



» **Figure 7:** *The final drawing of the mammoth figure and the color palette that was used*

The animation also features human characters, which are divided into primary and secondary roles. Their design was likewise informed by detailed research, including archival photographic material, the aesthetics of contemporary fashion trends, and the visual style of the animation itself. The primary characters are the only human figures depicted in colourful clothing,

using the basic colours blue (Nande Novak, Mayor), green (Josip Nikolaj Sadnikar, Veterinary Inspector), and red (Dr. Fran Kos, Zoologist). As shown in Figure 8, their designs are based on real black-and-white photographs. All secondary characters wear clothing in shades of brown, reflecting the most common colour of men's attire in Slovenia during the 1930s.



» **Figure 8:** *Final drawing of the main human characters with color palettes*

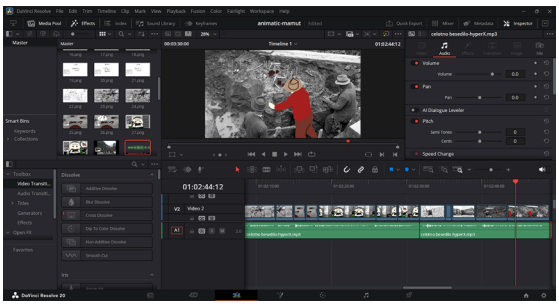
2.3.2. Recording narration audio

We recorded the narration in the visual evaluation laboratory at the faculty. We selected this location because of its relatively small size and infrequent use, which provided easier access and a more controlled recording environment. The recording was carried out using a Blue Yeti microphone connected via USB to an HP laptop, with Adobe Audition 2025 used for audio capture. The script was recorded in several sections, and the quality of each recording was checked immediately afterwards. Whenever a recording did not meet the required standard, it was repeated.

2.3.3. Making an animatic

The animatic was created in DaVinci Resolve 19. We imported all key frames from the storyboard, along with several additional in-between frames, and synchronised them with the recorded narration. All visual and audio elements were arranged chronologically according to the script.

The video was produced in a resolution of 1920 × 1080 pixels, the standard format for Full High Definition (Full HD) video. The frame rate was set to 24 frames per second (fps). Finally, we added opening and closing credits containing all relevant information. Figure 9 shows a screenshot of the animatic production process.



» **Figure 9:** *Screenshot of the animatic in DaVinci Resolve*

2.3.4. Backgrounds

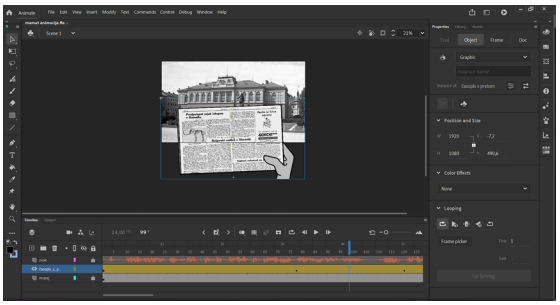
The various visual styles used throughout the animation are accompanied by distinct backgrounds that differ not only in colour schemes but also in the media from which they are created. Some scenes feature fully hand-illustrated backgrounds, such as the maps of Europe and Slovenia, while others use authentic photographs, including scenes from the twentieth century and images of the mammoth statue. In several instances, illustration and photography are combined, blending seamlessly into one another, as seen in the depiction of the Ice Age landscape of Nevlje. The illustrated backgrounds were created in the IbisPaint X drawing software, while the photographs were edited in Adobe Photoshop. Only minor adjustments were made to the photographs, primarily involving brightness correction and the removal of small visual imperfections that could interfere with the animation process. These corrections were carried out using the Spot Healing Brush tool. We intentionally limited the extent of the edits in order to preserve the authenticity of the photographs, as they represent the most reliable visual evidence of historical events in Nevlje. Permission to use the photographs was obtained either directly from their owners, such as the photographs provided by Mr. Naglič, or the materials were sourced from the public domain, including newspaper articles. The image that underwent the most extensive editing was the Ice Age landscape of Nevlje. As a base, we used a satellite image from Google Maps showing Nevlje during the summer season, with the Kamnik-Savinja Alps visible in the background. Because we wanted the landscape to appear snow-covered, we made use of Neural Filters, one of the newer features available in Adobe Photoshop. This AI-powered tool transformed the summer landscape into a winter scene. We then selectively applied the effect to the mountains and hills using a brush, ensuring that only the desired areas were affected. Additional adjustments were made using adjustment layers to achieve a less saturated and more earthy colour palette that better matched the atmosphere of the scene. Once the photographic background had been finalised, it was transferred to IbisPaint X, where we illustrated the swamp and prehistoric animals in the foreground.

2.3.5. Animation and video editing

We used Adobe Animate and DaVinci Resolve to create the animation. The project was produced in the standard Full High Definition (Full HD) format of 1920 × 1080 pixels, with a frame rate of 24 frames per second (fps). These settings ensured a high-quality visual output while maintaining smooth character movement and seamless transitions between individual frames. Based on the animatic, we defined the individual scenes and imported the corresponding audio, backgrounds, and character assets. Two different animation techniques were used throughout the project. All human and animal charac-

ters were animated using traditional frame-by-frame animation, in which each frame is drawn by hand. An exception is the scene featuring Josip Nikolaj Sadnikar, where certain movements were created using computer-generated animation to improve clarity and achieve smoother motion. This technique was also applied to the scenes involving the newspaper and the camera, as these objects required only limited movement, primarily entering and exiting the frame, while containing numerous small details that would have been highly time-consuming to animate entirely by hand. Nevertheless, traditional animation was still employed in these scenes for the movement of the characters' fingers. A screenshot of the animation process is shown in Figure 10. After completion, each scene was exported separately in MP4 format.

The completed animated sequences, together with scenes that did not require manual animation, were imported into DaVinci Resolve as PNG and MP4 files. There, we assembled the entire animation, added the narration and sound effects on separate audio tracks where necessary, and synchronised all visual and audio elements into a cohesive final composition.



» **Figure 10:** *Screenshot of the animating process in Adobe Animate*

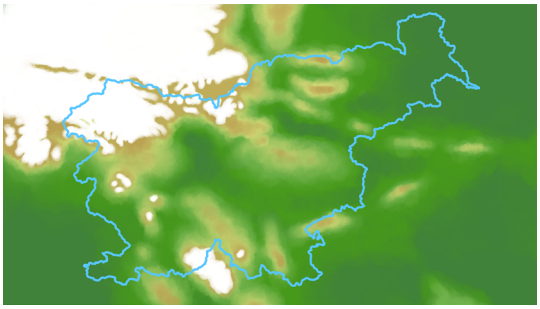
To ensure smooth transitions between scenes, we incorporated various effects available within the software. The transition used most frequently was Cross Dissolve, which provided subtle, non-distracting transitions and allowed the animation to flow naturally from one scene to the next.

3. Results

The result of our project is a 2D animation, which aims to educate and will be uploaded to a museum's website. The animation tells the story of the Nevlje mammoth's life and death and the discovery of its skeleton, taking us on a journey through different styles and using real photographs as the basis for its visuals.

3.1. Animation description

The first part is characterised by topographic depictions of Europe and Slovenia, drawn and illustrated according to real maps and not strongly stylised. The alternation of brown and green colours shows differences in altitude – mountains and lowlands – as in actual topographic maps. At the beginning of the animation there is an image of the map of Europe as we see it today. Then we go back 23,000 years into the past, when most of northern Europe was covered by an ice sheet. After this reveal, the image enlarges and focuses on the territory of present-day Slovenia, shown in Figure 11, where the northern part was covered by glaciers, including the Kamnik-Savinja Alps.



» **Figure 11:** *The territory of present-day Slovenia*

The frame is then enlarged to reveal a depiction of the Ice Age environment at the site where the town of Nevlje stands today. The upper half of the scene is a real satellite image, edited in Adobe Photoshop to make it appear as though the mountains are covered in snow. The lower part of the scene is illustrated and shows a swampy world, where we can see moose in the central plane. The animation style in this section is inspired by artistic depictions from the Palaeolithic found in literature and online sources, characterised by unsaturated, earthy shades of colour. The appearance of the environment represents a personal visual interpretation, based on all the information obtained during the research.

In the next frame, a mammoth steps in front of the camera. The scene highlights its size and mass compared with the other animals in the scene. The animation then follows the narrative of the mammoth's individual characteristics. The camera then zooms out and expands to a wider frame that shows an entire herd of mammoths travelling across the swamp. Meanwhile, the largest and heaviest mammoth begins to sink into the soft swamp mud. As the herd moves away and leaves the scene, the trapped mammoth lets out a dramatic cry for help, as shown in Figure 12, then rolls onto its side and lies down in the middle of the swamp, symbolising its death.



» **Figure 12:** *The trapped mammoth lets out a dramatic cry for help*

Subsequently, the carcass of a mammoth undergoes various stages of decomposition until only the bones remain. The passage of time is shown in the animation by the changing seasons. The animal's carcass is first covered in snow, followed by summer, when the swamp is half drained and only the bones are visible. This is followed by a depiction of winter, which marks a milestone between the style of the second and third parts of the animation – the transition from the Palaeolithic to the year of the find, 1938.

The third part begins with a black-and-white photograph of the construction site for the regulation of the Nevljica stream. The main human characters, such as the mayor in blue, are presented in colour in the story, while the background consists of real photographs from the skeleton site, which we got permitted to use. With this style, we emphasise the main characters while preserving and sharing the existing documentation of the event. This allows the viewer to imagine the events more easily and at the same time pick out the most important characters and content.

Figure 13 shows the moment when the mayor of Kamnik brought a fragment of bone found by workers at the construction site to the veterinary inspector Josip Nikolaj Sadnikar. In the next frame, Mr Sadnikar confirms that the remains of a woolly mammoth have been found. The picture shows that the background behind the figure is blurred, creating the effect of depth in the room.



» **Figure 13:** *Josip Nikolai Sadnikar, who carefully examines the bone brought by the mayor*

The next frame shows a hand holding a newspaper with an article about the discovery of a mammoth skeleton. The hand then descends from the scene, revealing a photograph of the National Museum in the background.

The next frame, depicts an excavation led by Dr Fran Kos, dressed in red. The assembly of the mammoth skeleton is shown in the following frame, after it has already been transported to what was then the National Museum, today the Slovenian Natural History Museum. The next frame shows the assembled mammoth skeleton, which shifts from a monochromatic display to a colourful image, i.e. the fourth and final style of animation, which represents modern day. The last frames of the animation first show the illustration presented in Figure 14, followed by a life-size photograph of the hairy mammoth statue, the work of sculptor Miha Kač. The transition between illustration and animation is created by a camera with which a tourist photographs the statue using a flash. With this approach, we aim to present the mammoth legacy in the Kamnik region.



» **Figure 14:** *Illustration of the mammoth sculpture in Kamnik*

3.1.1. Intended use and audience

The final product is used for educational purposes and is intended for a broad audience, i.e. it does not have a specific target group. It is aimed at anyone who would like to learn more about this exceptional palaeontological find from the Kamnik region.

4. Discussion

The creation of the 2D animation demonstrated that animation can be an effective tool for presenting scientific and cultural heritage content to a wider audience. By combining factual information with visual storytelling, the project transformed the story of the Nevlje mammoth into an engaging and accessible educational experience.

One of the main challenges was balancing scientific accuracy with a concise and visually appealing narrative. This was addressed through extensive research, multiple revisions of the script, and consultations with experts,

ensuring that the information remained both reliable and understandable. The use of three distinct visual styles for the Palaeolithic era, 1938, and the present day proved particularly effective in helping viewers distinguish between different historical periods. In addition, the combination of traditional frame-by-frame animation and digital techniques allowed for a visually rich result while maintaining an efficient production workflow.

The integration of archival photographs and historically accurate references further strengthened the credibility of the animation and connected the audience with real events surrounding the discovery of the mammoth skeleton. At the same time, the project highlighted the potential of animation as a medium for communicating local heritage and raising awareness of important historical and scientific discoveries. Although the animation's short duration limited the amount of information that could be included, the final product successfully presents the key aspects of the Nevlje mammoth's story in an engaging and accessible way.

The creation of the 2D animation demonstrated that animation can be an effective tool for presenting scientific and cultural heritage content to a wider audience. By combining factual information with visual storytelling, the project transformed the story of the Nevlje mammoth into an engaging and accessible educational experience. One of the main challenges was balancing scientific accuracy with a concise and visually appealing narrative. This was addressed through extensive research, multiple revisions of the script, and consultations with experts, ensuring that the information remained both reliable and understandable. The use of three distinct visual styles for the Palaeolithic era, 1938, and the present day proved particularly effective in helping viewers distinguish between different historical periods. In addition, the combination of traditional frame-by-frame animation and digital techniques allowed for a visually rich result while maintaining an efficient production workflow.

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5. Conclusions

The 2D animation about the Nevlje mammoth represents an important contribution to raising awareness of our palaeontological heritage and the need for its preservation. Through an engaging and contemporary visual approach, the animation presents the discovery of the fossilised mammoth skeleton in 1938, bringing this remarkable extinct animal closer to both younger and older audiences and helping to ensure that its story remains in their memory.

The result of this project is a three-minute 2D animation that tells the complete story of the Nevlje mammoth and presents it in a fresh and visually engaging way. One of the main motivations behind the creation of the animation was an early fascination with the mammoth skeleton displayed at the Natural History Museum in Ljubljana, which deepened upon learning that it had been discovered near the author's hometown. Despite the significance of this find, relatively little written and visual material has been published about it, even though it is still regarded as one of the best-preserved fossilised mammoth skeletons in Central Europe. We are proud of the completed animation, which presents the mammoth's story and the discovery of its remains in a simple and visually appealing manner, while educating audiences of all ages about this exceptional palaeontological find.

The animation will be published on the website of the Kamnik Inter-Municipal Museum, where it will be freely accessible to all visitors. As animation is a relatively simple, engaging, and accessible medium for presenting historical and scientific discoveries, it could also be used to communicate other stories related to important finds or notable achievements within the local environment. In doing so, it could help raise awareness of valuable yet lesser-known aspects of local heritage that often remain overlooked and underappreciated.

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7. References

Bezek, B. and Bezek, D. (1998) Po sledeh neveljskega mamuta. Kamnik: Osnovna šola Frana Albrehta.

Bezek, D. (2013) 'Po sledeh neveljskega mamuta', *Proteus*, 75, pp. 462–467.

Bezek, D. (2015) Mamut v naših krajih. 1st ed. Ljubljana: Viharnik, pp. 3–38.

Čebašek, I. (2018) Okostje orjaškega mamuta izkopano v Nevljici pri Kamniku. Kamnik.info. Available from: https://www.kamnik.info/okostje-orjaskega-mamuta-izkopano-v-nevljici-pri-kamniku/ [Accessed 1 May 2025].

Connolly, M. (2025) Cultural Heritage Animation Projects: Your 101 Full Guide!. Available from: https://educationalvoice.co.uk/cultural-heritage-animation-projects/ [Accessed 5 September 2025].

Jamnik, P. and Križnar, M. (2024) 'Nove kamenodobne najdbe nad najdiščem mamuta v Nevljah', *Kamniški zbornik*, 27, pp. 89–99.

Jeršek, M. and Križnar, M. (2001) 'Kustodiat za geologijo- razkrivanje geološke dediščine Slovenije', *SCOPOLIA*, pp. 18–20.

Kos, F. (1939a) 'Paleolitske najdbe ob Nevljici', *Etnolog*, 11, pp. 417–419.

Kos, F. (1939b) 'Neveljski paleolitik', *Glasnik muzejskega društva za Slovenijo*, 20, pp. 25–65.

Križnar, M. (2014) 'Neveljski mamut v nekaterih arhivskih zapisih', *ARGO*, 57, pp. 63–67.

Križnar, M. (2021) 'Zgodovina in razvoj muzejskega naravoslovja do osamosvojitve Prirodoslovnega muzeja leta 1944', *SCOPOLIA*, pp. 91–97.

Občina Kamnik (n.d.) Občina Kamnik praznuje: Odprtje trga in odkritje skulpture mamuta v naravni velikosti. Available from: https://www.kamnik.si/post/738950 [Accessed 1 April 2025].

Vulikić, V. (2005) Kamniški kulturnik in mecen Josip Nikolaj Sadnikar. Znameniti Kamničani. Kamnik: Agencija za razvoj turizma in podjetništva v občini Kamnik.

Železnikar, J. (2008) Mamut po mamutu. Kamnik: Medobčinski muzej, pp. 1–16.

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