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ON METHODS OF DOCUMENTING ROCK PICTURES

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Abstract
With the development of modern information technology and software, the improvement of photographic equipment, new methods of studying rock photo images without manual influence are emerging. The article discusses the recommendations developed by experts for photographing rock monuments and processing them in digital format.

Keywords: Primitive art, photogrammetry, three-dimensional scanning and modeling, digital catalogs, poster exhibitions, "stiken" technology, ACDSee, Adobe Photoshop Lightroom, Adobe Photoshop , Adobe Light Room graphic editing programs, pigment card method, LAB color environment

Introduction

Primitive art reflected the first ideas about the world surrounding man, served to preserve his knowledge and skills and leave them to the next generation. Communication between people was formed through art. As much as the stone weapon played an important role in the crafting activity of the primitive period, art acquired such an important importance in the formation of the spiritual world of the primitive man.

Primitive art territorially includes all regions of the Earth's surface, chronologically all periods of human history. One of the universal events in the history of mankind was the fact that people turned to art, a new type of activity for them.

Ancient rock images are considered to be one of the sources of information about the distant past, and these rock images can be seen only in the natural environment. Various animal figures, people, mythical creatures, many geometric symbols, which were painted or hammered on the surface of the rocks, have reached us over thousands of years.

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Relevence

Today, in the mountainous and sub-mountainous regions of Uzbekistan, about 150 monuments of rock paintings have been identified in chronological order from the Mesolithic to the Middle Ages. Monuments are mainly located in the north-eastern (western Tien-Shan, Turkestan, Aloy mountain ranges), central (Nurota, Zarafshan ranges) and north-western (Bukantau, Tamditau, Sultan Uvais, Kuljuktau) parts of Uzbekistan [1]

Among them, Zarautkamar cave, Sarmishsay petroglyphs, images of Khojakent, Suratlisoy, Karaqiyasoy, Bukantau are considered famous among the scientific community [2].

The study of rock paintings is related to the process of documenting them. Documenting the photos is a source of defining the content of the images and a way to prevent these unique monuments from disappearing without a trace. In this sense, high-quality documentation of rock paintings is considered an urgent issue. Today, a number of modern methods such as photogrammetry, three-dimensional scanning and modeling, mapping using GIS technology, and aerial photography using drones are used in global petroglyphs. The relevance of research in this direction is beyond doubt. These methods allow researchers to look at previously studied monuments with new eyes and discover new ones. Modern digital methods are characterized by a high level of accuracy and effective results in the study of rock paintings.

Methods and Level of Research

Today, photography is the main method for studying and documenting rock paintings and petroglyphs in global petroglyphology (Finland, Sweden, Russia). Today, with the development of computer technology and software, and the improvement of photographic equipment, new methods of studying rock photo images without manual influence are emerging. Using these techniques, researchers will be able to identify, document, and identify inaccuracies in previously identified rock monuments using modern digital photography techniques. Modern methods can serve as a basis for the study of many abstract, ambiguous forms identified in rock paintings to this day. In addition, modern digital photo technologies, study of petroglyphs, monitoring of the state of preservation of rock paintings and the rock surface where they

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are located, their restoration , typology of images , study of the specific aspects of rock painting imaging technology, creation of digital catalogs of petroglyphs, organization of poster exhibitions and has a number of other similar possibilities.

Research Results

The goal of photographing petroglyphs is to create a quality copy of the image. A photo image taken at a professional level is considered the main document that helps to understand the correlation of the findings found in the research process. When photographing petroglyphs, it is recommended to use professional grade equipment.

In the process of obtaining and processing photo material, a number of methods are being developed by specialists. The world petroglyphists have developed an algorithm for taking photos of rock monuments. Below, we consider the recommendations developed by experts for taking quality photos and processing them in digital format:

1. Prerequisites for filming

When photographing rock paintings, the topography of the place where the petroglyphs are located and the seasons are important. It is observed by researchers that in most cases, images detected in spring, in rainy weather, "disappear" in summer [3 . S.23] . The reason is that in the spring, after the rain, the image is clearly visible. In the summer, it becomes difficult to see the image under the influence of the sharp rays of the sun.

A researcher photographing petroglyphs must have the skills of a traditional photographer, be able to adapt to the existing conditions and create the necessary environment. The importance of incident light (natural sunlight, solar light, light reflected by a mirror, etc.) is important in studying the image on the rock, that is, in obtaining the maximum image that reflects all its elements. An image taken in natural light allows to reflect the image down to all the small subtle elements only if it is taken at certain times of the day [4 . P.445-446] .

ISSN: 2776-0987 Volume 3, Issue 11 Nov. 2022

Since rock paintings are usually located in mountainous areas and in winter they are often covered with snow, it is difficult to study them in this season. Favorable conditions for photographing and studying such images correspond to the second half of spring and autumn.

During field research during the summer months, traditional methods of working with light are used for photo imaging, for example: shadowing the object to be photographed using black polyethylene film or cloth, and lighting it from the side using a large mirror. By changing the angle of inclination of the mirror, it is possible to get a clear image of the petroglyph corresponding to the terrain. Rock pictures can be photographed at night with the help of projectors to clearly reflect the terrain [5 . s. 462] .

2. Technical description of photo cameras for photographing petroglyphs.

It is recommended to use a 24X36 mm full-frame, sensor, small-format camera (Full Frame) and a lens with strong light sensitivity for taking pictures of rocks. The light sensitivity of the matrix (ISO) depends on the shooting conditions. When photographing petroglyphs, it is convenient to work in the enhanced aperture mode. Usually, the middle position of the aperture allows you to clearly capture not only the central part of the image, but also the elements on the sides in most lenses. When the amount of light is not enough, it is recommended to mount the camera on a tripod so that the picture is not dim and unclear. The main problem in zooming in on petroglyphs is the lack of resolution of the object being photographed. Since most of the petroglyphs are located in places that are difficult to approach , various problems arise when photographing them. In such situations, it is recommended to use the "sticken" technology, that is, to adjust the focus of the camera by taking several pictures by moving the lens closer or further away from the image. The process of gently zooming in and out of the lens allows you to adjust the desired focus. Today, small rotor drones can be used to photograph petroglyphs in hard-to-reach places.

3. The method of photographing a group of rock paintings and a panoramic image. Applying this method involves several steps, including:

INNOVATIVE TECHNOLOGICA
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a) As a result of photographing the entire image of the rock, not only the part with the pictures, but the entire image, the general appearance and shape of the rock is captured.
b) The image of the rock photo is captured in a panoramic photo along with the surrounding landscape.
c) When photographing a group of rock images, the images located on the surface of the rock are divided into parts of the same size. Each of these pieces is digitized and photographed under the same conditions and in the same light. In this case, the s urates are taken at the same distance and at right angles. To capture the surface of the rock at the same distance, a photo camera is mounted on a 1.5-meter rod and photographs are taken using this device. At the other end of the rail, a color scale is installed to determine the color ranges of the image during processing. Each photo frame captures a 1X0.7 m surface of the rock. A photo includes a part of the side images, and then, in the process of editing with the help of a computer program, the images are combined and brought to a single composition. As a result, a high-quality, general image of a group of petroglyphs, all elements of which are clearly visible, is created, reflecting all the small details of the large object.
g) Photographs are taken using digital cameras or 135 mm film. These films are then converted to digital format [6].

4. Processing of digital photos

Documenting and processing of images taken with digital cameras is carried out using graphic editing programs ACDSee, Adobe Photoshop Lightroom, Adobe Photoshop , Adobe Light Room [7.,8] .
Using the capabilities of the software, in the process of photo processing, you can get a realistic image of the petroglyphs, reflected to the smallest elements, without the influence of hands. While these methods have a number of advantages, there are also some disadvantages. For example, most of the time, the unevenness of the surface of the rock or the location in a high place, which is inconvenient to approach, limits the researcher's ability to take a photo in a right-angle projection, changes the image, and gives a distorted form.
Graphical editing software is useful for archaeologists involved in studying and documenting petroglyphs, as they allow the study of petroglyphs without physical impact.

ISSN: 2776-0987 Volume 3, Issue 11 Nov. 2022

With their help, images with a high resolution can be obtained as a result of image processing. In addition, they allow you to convert and save the processed images of rock images to various formats for use in further processes.

Graphic editing programs are powerful image processing programs. These programs include image editing, processing, saving, printing of 8, 16, 32-bit images, reading and processing of images in TIFF, PNG, GIF, JPEG, BMP, DICOM, FITS, RAW, PK, Mac, Linux formats. have

In practice, the most effective method for identifying and recording color images is the pigment card method developed by A.K. Solodeynikov [9, 10, 11] , that is, the image obtained by graphic processing of the photo image (digital filtering of the photo using Adobe Photoshop graphic editing software) is counted. The above programs allow you to increase the sharpness of the image, produce different colors using the LAB color environment, and achieve other similar effective results with very simple operations.

Graphical programs provide the ability to provide high-quality images of colored rock images using color environments such as RGB, LAB, YDS, YBK, LDS . For example, YDS and LDS reflect pale yellow colors, YBR and LRE red colors, and YBK r light media enhance black and blue images. With the help of computer graphics programs, the colors in the image are enhanced and the level of color accuracy is achieved. As a result, it becomes possible to see elements in the image that are difficult to see with the naked eye.

A complete image of the rock with the help of digital documentation methodology; cracks in the rock, its damaged parts, small elements and other aspects are created. At the end of the research, a general electronic database of rock photo monuments will be formed.

Graphics software helps reveal the content of the image by enhancing the visibility of subtle images captured during the capture and review process by using imperceptible ocher, and by seeing distinct elements in the image. In this process, the original colors and shadows in the photo are enhanced.

5. Three-dimensional scanning and modeling of rock pictures (3D format) .

High-quality pictures taken from different angles allow creating a model of the monument in 3D format - photogrammetry. Photogrammetry technology allows digitization of objects from 5 cm to 2 m in quality with the help of a camera, personal computer and special programs . In this case, the quality of

ISSN: 2776-0987 Volume 3, Issue 11 Nov. 2022

modeling is related to the number of captured images, that is, the more quality images, the more perfect the model in 3D format [12].

While showing the wide possibilities of digital photography, it is necessary to dwell on a number of shortcomings that are common in practice, but can be eliminated if the work is properly organized. In most cases, photos taken in natural light are taken at a sharp angle to the surface of the rock. In order to take a quality photo of the rock, and then put it on paper, it is necessary to take the photo at right angles to the surface of the rock and from different angles. In some cases, depending on the terrain, it is recommended to use a lens with the function of shifting and bending so that the image does not come out blurry and unclear.

In the article, while summing up our thoughts on the above-mentioned methods and technologies, we want to show that these methods do not negate other useful methods, such as tracing or film, but on the contrary, complement and improve them. At the same time, we must emphasize the need for a complex approach to the process of studying rock monuments. Because documenting the monument in digital format was considered preferable in terms of preserving the monument and achieving quick results.

CONCLUSIONS

Based on the above, we can come to the following conclusions:

- The method of researching rock pictures without manual effects, photo images with the help of computer graphic editing programs, is considered one of the most effective methods in practice today.
- Graphics editing software is a convenient solution for studying poorly preserved rock paintings. For example, it becomes possible to identify and study images that are hidden under the shell of calcite, which cannot be seen with the naked eye.
- Images processed by graphic editing programs in laboratory conditions make it possible to identify images in the ancient layer of petroglyphs, which are difficult to see with the naked eye.
- Editing programs have the ability to reveal the original content of the image by enhancing the subtle elements in the color rock photos. Color environments such as RGB, LAB, YDS, YBK, LDS allow you to display a high-quality and bright picture.

ISSN: 2776-0987 Volume 3, Issue 11 Nov. 2022

- The elements identified as a result of the study of images with the help of computer programs expand the possibilities of studying pictures of a certain plot or their content.
- With the help of graphic editing programs, it becomes possible to create a whole panoramic photo image of a rock photo monument.
- At the end of the research, it will be possible to form a general electronic database of rock photo monuments.

Generally speaking, the main goal of the article was to show the possibilities and the future of modern technology and technical tools in the process of identifying and studying complex resources such as rock paintings in field conditions.

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