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ВАЖНОСТЬ ИЗУЧЕНИЯ ПАМЯТНИКОВ ИСТОРИИ, ПРИРОДЫ И КУЛЬТУРЫ НА ОСНОВЕ ФОТОГРАММЕТРИИ

Аннотация:

Актуальность исследования в области фотограмметрии неуклонно растет в контексте сохранения и изучения исторических, природных и культурных объектов. Цель данной работы - проанализировать важность применения фотограмметрии в изучении таких объектов, описать методы исследования, представить результаты и сделать выводы о значимости этого подхода.

Ключевые слова:

фотограмметрия, исторические объекты, природные памятники, культурные артефакты, трехмерные модели, изучение, археология, геология, архитектура, искусство

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THE IMPORTANCE OF STUDYING THE HISTORY, NATURE AND CULTURE OF MONUMENTS ON THE BASIS OF PHOTOGRAMMETRY

Annotation:

The relevance of research in the field of photogrammetry is steadily increasing in the context of preservation and study of historical, natural and cultural objects. The purpose of this work is to analyze the importance of using photogrammetry in the study of such objects, describe the research method, present the results, and draw conclusions about the importance of this approach.

Keywords:

photogrammetry, historical objects, natural monuments, cultural artifacts, 3D models, study, archeology, geology, architecture, art

Introduction

Photogrammetry, the science of taking measurements from photographs, is a powerful tool for the study and preservation of historical, natural and cultural monuments. In the modern world, the preservation of cultural heritage and natural resources is becoming an increasingly urgent task, especially in the context of rapid technological development and a changing environmental situation.

Literature review

Currently, due to the active development of technology and scientific methods, the use of photogrammetry in the study of historical, natural and cultural monuments is attracting more and more attention from researchers in various fields. An extensive review of the literature allows us to understand the versatility and multi-level application of photogrammetry in various disciplines.

Photogrammetry in archaeology. Research in archeology emphasizes the importance of photogrammetry in documenting and reconstructing archaeological finds. Work by authors such as Smith and Brown raises questions about how accurate 3D models created using photogrammetry can help with structural analysis and artifact reconstruction. Particular attention is paid to the possibility of studying complex archaeological contexts and investigating connections between various elements [1, p. 46].

Photogrammetry in geology and geography. Lee and Kim and Johnson et al. Photogrammetry is actively used to create high-precision relief maps and

geological maps. This approach allows not only to accurately map the earth's surface, but also to analyze changes in the natural environment. Research in this area expands the scope of photogrammetry, making it an effective tool for monitoring and studying natural processes [2, p. 223].

Photogrammetry in architecture and art. The application of photogrammetry in architecture and art is taken up in works such as Johnson et al. Here, special attention is paid to accurately documenting architectural objects, reconstructing lost details and creating virtual tours of historical buildings. This not only contributes to the preservation of architectural heritage, but also opens up new perspectives for architectural research [3, p. 86].

A general analysis of the literature highlights that photogrammetry has become a key tool for the study of cultural and natural heritage sites in various scientific fields. The diverse applications of photogrammetry provide new solutions and opportunities for preserving and studying objects, enriching our understanding of the world and its history.

Main part

Photogrammetry methodology

Photogrammetry is a powerful tool that allows you to create three-dimensional models of objects based on a set of digital photographs. This process involves several key steps: taking photographs, measuring objects in photographs, creating a point cloud, building a 3D model, and analyzing the resulting data.

The first step is to capture the subject using a digital camera or drone. Photos should be taken from different angles and points of view to capture all the details of the subject.

Next comes photo processing using special software. This involves identifying key points and special characteristics of the subject in each photo, and then matching those points to create a point cloud.

The next stage is the construction of a three-dimensional model based on the resulting point cloud. This can be done using various algorithms, including differential geometry methods or least squares algorithms.

Application of photogrammetry in the study of historical objects. Photogrammetry is widely used in the study of historical sites such as castles, churches, monuments and ancient settlements. It allows you to study in detail the architectural features and design of these objects, as well as restore lost elements.

For example, when studying ancient buildings, photogrammetry can help researchers recreate the original appearance of a structure and determine changes that occurred during its existence. Accurate 3D models allow virtual tours of historical sites and preservation of information about them for future generations.

Application of photogrammetry in the study of natural objects. Photogrammetry also has applications in the study of natural objects such as mountain ranges, rivers, lakes and forests. With its help, researchers can create detailed relief maps, analyze changes in the natural environment and monitor various natural processes such as erosion, landslides and changes in vegetation cover.

The use of photogrammetry in the study of natural objects allows us to better understand the relationship between man and nature, and also contributes to the conservation and protection of natural resources.

The use of photogrammetry in the study of cultural artifacts. Cultural artifacts such as statues, paintings, sculptures, and relics can also be studied using photogrammetry. This approach produces highly accurate 3D models of artifacts that can be used to document, preserve, and study historical and cultural assets.

Studies of cultural artifacts using photogrammetry can help researchers decipher historical symbols, understand their meaning and context, and preserve them for future generations.

Photogrammetry is a powerful tool for studying and preserving historical, natural and cultural monuments. Its application in various fields of study opens up

new possibilities for understanding the world and its history, and for preserving cultural and natural heritage for future generations.

Conclusions and further prospects for the study

The study revealed that photogrammetry plays a key role in the study and preservation of historical, natural and cultural monuments. This method not only allows the creation of accurate 3D models of objects, but also makes them easier to study, analyze and preserve for future generations.

One of the main findings is that photogrammetry is becoming an increasingly popular tool in various fields of study, including archaeology, geology, architecture, art history and others. Its application expands the boundaries of our knowledge about the past, natural processes and cultural heritage.

Future research prospects include the development of new photogrammetry methods, improvement of image processing software, and expansion of the areas of application of this approach.

It is important to continue research in the field of photogrammetry in order to improve the accuracy and efficiency of methods for creating 3D models, as well as their adaptation to different types of objects and shooting conditions.

Consideration should also be given to the potential for photogrammetry to be used in conjunction with other technologies, such as artificial intelligence and machine learning, which could lead to more accurate and complete models of objects.

Overall, photogrammetry plays an important role in the conservation and study of cultural and natural heritage, and its further development and application will contribute to a better understanding of the world and its history, as well as the preservation of heritage for future generations.

List of used literature

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