RESEARCH ARTICLE

Application Countermeasures of UAV Aerial Photogrammetry in Topographic Mapping

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Abstract: in the process of urban geographic information collection, topographic mapping plays an important role. Under the influence of various external factors, it brings great difficulty to topographic mapping. In order to effectively solve the mapping problem, the mapping department needs to introduce UAV aerial photogrammetry technology, which has many advantages and provides support for the smooth implementation of topographic mapping This paper mainly studies the application countermeasures of UAV aerial photogrammetry in topographic mapping.
[Keywords: UAV aerial photogrammetry; Topographic mapping; Application countermeasures

Citation: Guanglei Nie, 2020. Application Countermeasures of UAV Aerial Photogrammetry in Topographic Mapping. *International Journal of Geology*, 5(1): 16-17. http://doi.org/10.26789/IJG.2020.01.005

1. Introduction

At present, the technical level of aerial photogrammetry in China has been greatly improved, and aerial photogrammetry requires high professionalism, which needs to be supported by a large amount of costs and is easily affected by various unfavorable factors. Therefore, it is necessary to introduce unmanned aerial vehicle technology, which has the advantages of flexible operation and high cost performance, and plays an important role in aerial photogrammetry. Based on this, this paper introduces the related contents of UAV aerial photogrammetry technology, analyzes the related examples of topographic mapping, and studies the application countermeasures of UAV aerial photogrammetry in topographic mapping.

2. Overview of UAV Aerial Photogrammetry Technology

UAV aerial photogrammetry technology effectively solves the problem of small area and low altitude photogrammetry, and it can obtain comprehensive and accurate data and information in a short time by using advanced technology, providing reference for construction and production. In addition, the UAV has relatively low cost and high maneuverability, and can shoot different contents. The main steps of UAV technology application are setting and measuring field image control points, obtaining image data of the survey area, encryption of indoor space and digital mapping, etc. Among them, the encryption of indoor space is the key, and its output mainly includes encrypted image, recorded image geodetic coordinates, three corner element files, DEM data and coordinate files, and any image can be digitally mapped after being encrypted.

3. Topographic Surveying and Mapping Engineering Examples

A house survey company is mainly responsible for the management of 1:1000 topographic map of expressway. The survey area is mainly mountainous and hilly. The average altitude of this area is 800m, the lowest is 600m, and the highest is 1000 m. The actual area of the survey area is 3.2km. The terrain of the survey area is relatively complex, so it takes a lot of manpower and time to use the traditional survey technology, while the survey area has a wide field of vision. The survey department can introduce the aerial photogrammetry technology of unmanned aerial vehicles and make use of it.

4. Application of UAV Aerial Photogrammetry in Topographic Mapping

4.1 Image Control Survey and Aerial Triangulation

In the process of topographic map mapping, aerial triangulation technology mainly uses unmanned aerial vehicle (UAV) measurement equipment to map the terrain in the mapping area. In UAV aerial photogrammetry technology, the internal system can count and operate the measurement targets, without artificially adding content to optimize the photogrammetry process. At the same time, in the process of applying triangulation technology, technicians need to make clear the terrain of the photographic area, select the connection points reasonably, and debug the connection points and image control points of triangulation to achieve the expected goal of aerial triangulation.

4.2 DOM Process

DOM technology can collect aerial photography data information and model photography information of each link, effectively deal with the existing problems, and use aerial photography equipment to obtain accurate data. It mainly uses unmanned aerial vehicle equipment to acquire data at low altitude, so as to realize corresponding operations. According to the acquired data, it will be turned into DOM results after verification, effectively controlling the measurement results. Using this technology to fuse photographic data and information, according to the measurement results, aerial triangulation and clear terrain conditions, the survey will be carried out.

4.3 DLG Production and Field Operation

DLG refers to the digital line map, which mainly uses the existing topographic map elements to collect and save the spatial element relations and basic attribute contents. In this process, technicians need to use the perfect landmark information to describe, save and display the results, and extract and display the basic data according to the spatial analysis, so as to achieve the spatial analysis goal. From an overall perspective, DLG technology is practical and intelligent, which is conducive to guiding aerial photogrammetry and quickly forming thematic images. However, its own data volume is relatively small, which meets the application requirements of information systems to a great extent and provides support for subsequent data analysis and decision-making work [1]. At the same time, many terrain fields will be affected by some factors, which makes the photogrammetry data of the internal position of the target field imperfect. At this time, it is impossible to use UAV aerial photogrammetry technology for topographic mapping.

4.4 Photo Control

In the process of topographic map mapping, the survey technicians can master the topographic situation of the survey area by using the aerial photogrammetry technology of unmanned aerial vehicles, and connect the aerial photography of unmanned aerial vehicles with the global positioning system when controlling the photos, so as to ensure that the aerial acquired data meet the actual requirements of the ground, which is helpful to master the topographic map of the survey area, accurately record the acquired data and realize the completeness and accuracy of data and information. In addition, during the aerial photogrammetry of unmanned aerial vehicles, technicians can use photo control points for distribution and design, and combine them with GPS measurement technology to better understand the terrain of cities. At the same time, in the process of distributing control points, technicians need to clarify the relationship between points and positions to avoid affecting subsequent measurement work.

5. Conclusions

To sum up, in the development of surveying and mapping industry in the new era, the application of UAV aerial photogrammetry technology is of great significance. In the process of aerial photogrammetry of UAV, the surveying and mapping technicians use the aerial photography results from multiple angles to complete the large-scale topographic mapping work. Combined with aerial triangulation technology, the topographic mapping work can be completed accurately and quickly. This technology has relatively low data processing cost and strong flexibility, which effectively improves the overall level of engineering surveying and mapping.

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