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Research and application of GPS in aerial photogrammetry and architectural Surveying Engineering

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Abstract: photogrammetry and remote sensing belong to the category of geospatial information science. It is a science and technology that uses non-contact imaging and other sensors to obtain reliable information on the earth's surface and environment, other targets or processes, and record, measure, analyze and express it. The author analyzes its influence and importance in geotechnical engineering investigation in detail, and puts forward some corresponding prevention measures for the harm of groundwater.

Keywords: aerial photography; Architectural Survey; research, application*

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1.Introduction

Through the research on the practical application of GPS in aerial photography, this paper expounds the further utilization of GPS. GPS aerial photography technology is applied in many fields such as military and architecture. With the expansion of its application scope and the requirements of new technology quality, it is also in continuous improvement and development. GPS plays a key role in aerial photogrammetry, and it is also the top priority of scientific and technological research and development for people. The advantage of this technology is that it can be dynamically positioned. Based on the principle of combining theoretical and practical teaching, cultivate professionals with solid theoretical foundation of radiation spectrum, imaging geometry and image information, and the ability of aviation and satellite image data processing, analysis and interpretation, To meet the growing demand for Photogrammetry and remote sensing technology in many fields (including civil engineering survey, land and resources survey, natural disaster and environmental monitoring and regional sustainable development planning). Only the development of modern measurement industry and society needs a large number of high-quality talents. At present, some employees do not pay attention to their own work, or do not have a correct understanding of engineering survey work. They can pass through their work and do not play their own role. At present, most employees lack the spirit of active learning, and few people take the initiative to learn in their spare time, which affects the improvement of measurement quality. Most UAV operations will not be affected by the application of remote sensing technology at low altitude. UAV can obtain high-resolution aerial survey data and images when flying at low altitude, which has more significant advantages than traditional aerial survey technology or remote sensing technology.

2.Background

2.1. Research Value

People mainly use various measurement methods to measure the position of control points on photos; Adjust and draw field photos. With the continuous improvement of GPS technology, using this technology can accurately determine the spatial coordinates. From the point of view of positioning, aerial photogrammetry has two methods: air to ground and ground to air. The air to ground method uses a variety of direct measurement methods to calculate the spatial position and shape of the camera or sensor. Most of the commonly used aerial photogrammetry is full-automatic digital photogrammetry. The basic operation process is aerial photography, measurement of external operation image control points and photo adjustment, arrangement of image control points by plane area network, point calculation and encryption of in-flight area network, etc. The so-called digital orthophoto technology refers to the use of DEM technology to correct, mosaic and cut aerial photos, and obtain the final aerial survey data. The image data obtained by UAV aerial photography mainly includes two types: JPG original photo data and camera POS data. For rapid processing of UAV data, the field measured control data should be considered.The data

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acquisition of UAV remote sensing technology should go through the established process. To realize the process and key points of UAV remote sensing technology data acquisition, the surveyors are required to formulate an appropriate survey scheme according to the actual situation. In addition, emergency plans should be formulated to complete the survey by means of field survey. At the same time, in the process of field survey, the portable handheld GPS device is used to select the target coordinates, and the flight altitude of UAV remote sensing measurement is determined according to the collected data and images, so as to ensure the accuracy of measurement results.Before the UAV remote sensing aerial photography starts, the surveyors need to conduct field survey, select the site suitable for UAV take-off and landing, and formulate appropriate routes according to the survey needs.

2.2 Present situation of this test

First of all, aerial photogrammetry must be carried out to take aerial photos that are more suitable for technical requirements. Then, when the processed photos are obtained, the joint measurement of image control points can be carried out. Finally, according to the layout design scheme of image control points, select the points, check the external data and calculate the internal adjustment. The side laying shall exceed at least one baseline of the boundary line. If the aerial photographing task has zones, each zone shall ensure its full width. Clarify the aerial survey route of UAV. There are many kinds of route laying methods during UAV flight, mainly including heading laying and side laying. At present, most UAV data processing software can implement full-automatic space-time encryption. Users only need to prepare the original image, POS data, camera parameter file and control point file according to the corresponding software format requirements, and can carry out automatic space-time calculation, automatic or semi-automatic image pricking point and space-time output through several simple settings.The former is mainly in the part parallel to the boundary line of the flight area. In order to ensure that the photo coverage on the boundary meets the requirements of 30%, the first and last routes are generally designed on or outside the boundary line. If the speed is too slow, the measurement operation time will be prolonged. The clarity of the image data picture can be ensured by controlling the flight speed of the UAV. The image data required for the measurement is obtained through the UAV remote sensing technology. If there is a problem when using the UAV, too fast flight speed will cause unclear and fuzzy shooting effect. UAV operation technicians should master the key points of operation technology, do a good job in daily operation practice training, and improve the technical level of UAV operation. It should also be operated at a constant speed to control the flight speed of the UAV and maintain a constant speed, so as to ensure the clarity of the image data obtained by the UAV remote sensing technology.

2.3Test results

Working steps of aerial photogrammetry with GPS. Multiple datum points shall be arranged according to the scope of the shooting area, and the location distance of the station shall not be greater than 40km The use of GPS navigation system for aerial photography, the combination of GPS and computer, and aerial photography according to the set route. In order to make the triangular network in the air achieve a stable effect, it is indispensable to install a vertical frame aircraft belt. First, it is necessary to determine the type of dynamic GPS antenna carried by the aircraft. The GPS antenna must be suitable for the specifications of aviation products. The GPS antenna should be installed on the aircraft, the orientation of the camera should be fixed, and the camera should be placed directly below the phase antenna. After amplifying the GPS antenna, it is connected with the GPS receiver. Finally, the eccentricity of the phase center of the GPS receiving antenna and the node behind the camera is measured.

Taking the observation in Xinjiang as an example, Tianbao 5700 dual frequency GPS receiver should be used for the observation of open space punctuation in this area. The two reference stations should be erected on the reference points for long-term observation, and the mobile station should be observed for 2 hours. The observation time of 2-4 hours is correspondingly extended when the open space punctuation is more than 90 kilometers away from the reference station. The obtained data shall be processed and integrated to a certain extent, and the results show that the data is qualified.

Relevant problems should be considered in the data acquisition of GPS assisted aerial survey. First, the accuracy of known coordinates should be ensured, and then the location should be selected with broad terrain and good vegetation. The time point of data acquisition should be determined in advance according to the graph of the best satellite combination selected. For the above data requirements, the corresponding time interval and angle shall be determined, and finally verified to meet the qualified standard [1]. When the aerial camera works, the aerial camera will send a pulse in the implementation photography room. It and the pulse output by the GPS receiver interface are processed by the computer to convert the exposure time into GPS time, which is convenient for the computer to calculate the position of the photography station at this time [2]. After the dynamic positioning of GPS is settled, a

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continuous coordinate sequence with a certain time interval is obtained. In order to accurately calculate the position of the camera station, in addition to measuring the eccentric vector, the location of the instantaneous antenna phase center of the camera should also be inserted from the regular coordinate sequence of GPS.

When introducing the geodetic coordinates of field image control points to implement the joint adjustment accounting of regional network, data preprocessing the measurement of image control points should be observed manually. The accuracy and limits of aerial triangulation data processing without constrained adjustment and constrained adjustment are mostly suitable for the needs of technology. After the flight of the aircraft, using the GPS observation data of the synchronous base station, the Airborne GPS, inertial measurement units and aerial photography time shall be recorded and settled. Using IMU assisted air three technology means, the ground base station and field image control point are used to process data. GPS is well applied in aerial photogrammetry and has obvious advantages. It can reduce the intensity and difficulty of traditional manual operation, reduce personnel investment, save the funds required for measurement on the one hand, and provide a broad prospect for the large-scale development and application of aerial photogrammetry. Aerial triangulation is to realize the internal and external orientation elements of photos and digital image correction points and other element data required by digital photogrammetry. [3]

3.Conclusion

Taking aerial images and satellite meter high-resolution images as data sources, expand computer stereo related theories and algorithms, develop new methods for determining and refining stereo geometric models, and study new technologies for digital stereo mapping in difficult areas; This paper studies the new fast calibration algorithm of digital camera in close range (ground) photogrammetry, the accurate matching of digital image, and the problems in the automatic monitoring of industrial production process and the deformation monitoring of civil engineering buildings (such as bridges and tunnels). Taking this regional survey as an example, after obtaining the aerial photos, select two ground object locations with obvious terrain and capable of controlling the edge of the map in the fifth encryption area as coordinate points, and select 20 obvious terrain and ground object locations in the eighth encryption area as detection points. After the data is processed, the information obtained meets the requirements. [4]

Taking multi spectral, multi-resolution and multi temporal satellite images as data sources, this paper studies the new remote sensing method of surface change and geological survey; Study the effective methods of detecting the change of earth resources (such as land use), and develop semi-automatic or fully automatic remote sensing monitoring means; Develop practical remote sensing systems for monitoring urban environmental pollution and natural disasters (such as floods and forests, crop diseases and insect pests), and so on. Based on synthetic aperture radar images, carry out research on three-dimensional surface reconstruction, large-scale precise surface deformation (including landslide, urban subsidence and crustal deformation) detection and meteorological change monitoring by Interferometric Radar (InSAR) and other technologies [3]. The method and algorithm of vehicle CCD sequence image mapping are studied to provide a fast and effective ground remote sensing measurement means for linear engineering survey and investigation; Study the mode and method of 3S technology integration including remote sensing (RS), global positioning system (GPS) and geographic information system (GIS), explore a new survey and design hand for the railway and highway construction of China's western development, and the continuous development of GPS dynamic positioning technology has brought great development to aerial photogrammetry technology. For this field survey, The staff made a comprehensive and overall analysis of the actual situation of the survey, determined the number of landmark points and the actual layout position according to the topography and landform of the area, and further investigated the factors that may be disturbed.

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