Unit geological disaster survey technology based on aerial survey image of small unmanned aerial vehicles

Tang Yi

School of Environmental Science and Engineering, Suzhou University of science and technology, Suzhou, Jiangsu, 215009, China

Keywords: drone; aerial survey technology; impact processing; geological survey;

Abstract: The prosperity of the country's comprehensive strength has promoted the continuous improvement of the level of science and technology, especially for the field of unmanned aerial vehicles. Nowadays, it is possible to transmit detection images to the ground stably. Because of the special nature of image transmission, drones are also widely used in surveys of ground units, for land rights, and even in many important areas such as waterway remediation, and have made important achievements in these areas. . Especially for the aerial survey technology of the drone, the image processing can greatly reduce the difficulty of the survey work, and the analysis of the returned image is more efficient than the manual field shooting, and the achieved results are higher. This article focuses on the survey of UAVs, especially geological hazard surveys, and makes the following analysis.

1. Introduction

The birth of UAV aerial survey technology, indispensable for the stability technology of drones and the background of dynamic shooting technology. It is precisely because of these technological means that the drone can also serve as a survey for geological disasters. Compared with the more traditional survey methods, UAV surveys undoubtedly have many advantages such as simple operation, wide application range, high fault tolerance, high shooting efficiency, sTable transmission and easy production, and wide coverage and use. These advantages, especially in the real-time updating of network maps in engineering construction, navigation channel adjustment, and even daily use, have made significant contributions to drones. In addition, there are some special features in the UAV survey, because the conventional camera mode is relatively flat, and it is difficult to find a suiTable angle. There are always many limitations, but the drone does not need to worry about finding it. The problem of angle, there is no limit to its height, it is more convenient to find the appropriate camera angle and position, which is also a major advantage of the drone compared to the traditional shooting mode.

2. Aerial survey image processing of drones

For the drone, its own conditions determine that its own weight must not cause serious interference, so in general, the weight of the drone is relatively light. Therefore, compared with the traditional shooting mode, the drone is more likely to be disturbed by the outside world, especially the wind direction or airflow, which will cause the tilt of the drone or the attitude angle to be affected and change [1]. Then, for the imaging process, the overall image will be affected by the interference of the external environment. Generally speaking, the original camera will have the first step of aerial triangulation, the purpose is to be able to adjust and refine the free adjustment of the network within the area. For external control, triangulation is also performed in the air, and finally processed to form a feedback picture.

In detail, it is first to obtain rough influence information acquisition through the flight platform of the drone, and then to measure the appearance of the entire terrain, select a suiTable flight attitude, and then shoot the entire influence by controlling delay or exposure, and transmit Go back to the ground reception. The figure is shown in Figure 1 below. And generally speaking, because

  DOI: 10.25236/aisct.2019.021

the rotation angle in the air is relatively large, triangulation techniques are often used to avoid loopholes.

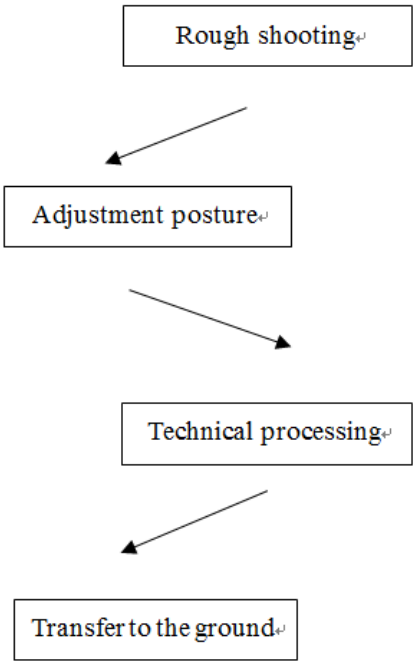

Figure 1 UAV processing flow

3. Advantages of UAV aerial survey technology in geological exploration

In combination with actual surveys, there will be more complex situations or natural disasters than normal use. For example, in the case of use, once the bad weather occurs near the surveyed address, causing strong airflow or instability of the air pressure, these conditions will cause the drone to slip or roll, etc., seriously affecting itself. Camera clarity and transmission capabilities [2]. However, due to the special geological aspect, many geographical locations are not convenient for the staff to work in the field, so in comparison, the use of drones is more conducive to improving safety. Moreover, because the drone itself can complete the work combined with its own special nature, such as being unconstrained by the ground in the air, it can move freely and quickly, and quickly move to a designated place to survey the geological disasters on the ground. In the case of manually carrying digital products for shooting, the more rapid and convenient form in the air can save a lot of manpower and powerlessness, and it is easier to obtain the required image data in combination with the current working scene. In addition, because the structure of the drone is relatively simple, even the use of the civilian SLR series can return very good image data, which is convenient for the working technician to carry out the actual survey of the geographical disaster location. In the process of surveying, the rapid response capability of the drone itself is also effective. The emergency remote sensing mapping of the fuselage will quickly make adjustments when the danger comes, avoiding the situation of unnecessary losses due to unexpected conditions. Moreover, the weight of the drone itself is definitely not heavy, so the transportation is convenient, and there is not much burden on the cross-country life. Only a small amount of energy to maintain the operation of the device can maintain long-term sTable image transmission. For the lifting place, the requirements are not particularly high, and because of the helicopter propeller itself, it can be lifted straight up and down, so the terrain requirements are not particularly harsh, except for the various forms of lifting. In addition, the installation and adjustment of the entire machine and even the take-off process are very simple, the staff can be well trained to master the use of the entire drone. It is precisely because of these points that the drones are particularly valued by geological exploration units, and the scope of application is more extensive and widely recognized by the public [3]. From the aspect of data transmission, the transmission speed of the whole drone is superior to that of satellite transmission, which undoubtedly has an unparalleled superiority in terms

of delay and image definition, and its own use cost is very low, so professional and professional Compared with satellites, it is a small physical energy. In addition, from a practical point of view, the drone does not need a particularly grand “companion” team, does not need to use high-value vehicles to transport, and does not require special professional venues, even for operators, It would be as rigorous as the pilot of the aircraft to ask how long the flight time represents how much experience they have. It is easy to operate, easy to carry, and can acquire a large number of video resources in a short time, and the transmission of the video is sTable, and the effect is ensured to be true. These advantages are advantageous for the drone.

4. Practical applications of drones

The actual use of the entire drone can be roughly discussed from three perspectives, which are actual data from the laboratory, actual data at the shooting site, and comparisons with professional camera transmission images. These three angles will more intuitively reflect the use prospects of the entire drone or the actual application level of the drone. After exploring through these three aspects, it is only necessary to carry out typesetting research on the acquired images, and the local geological conditions can be clearly distinguished. Then, through the triangulation in the air, the picture state that needs to be drawn can be completed, and the actual situation can be clearly and completely reflected.

Then, before actually preparing for work, the relevant work technicians need to have a general understanding and survey of the local area, collect local geological conditions, plan the plants on the surface and nearby buildings, or the wreckage of important buildings. The interference-causing items can eliminate the effects and help the drone to pick up the appropriate position, and the air pressure or airflow interference caused by the terrain can be greatly reduced, so that the working technician can select the appropriate flight route, or Develop emergency strategy strategies, etc. [4].

After finishing the preparation work, it is necessary to complete the analysis and explain in combination with the actual work. Before the drone is used, it is necessary to plan the entire task. How to complete the task more efficiently and comprehensively is a problem that the work technician needs to solve. If the scope of the shot includes some special geographical areas, such as military areas, mountain areas, or some special geographical areas, it needs to be given special attention and treatment. The purpose of all this is to avoid accidents. The second step is to assign work tasks according to regulations. The technical personnel of each department or work will start a reasonable division of labor and personnel allocation. The third step is the more important aspect of information collection. This step is related to the final result, so it needs to be given special attention, which is no less important than the previous preparation work. The fourth step is to use the relevant aviation data and software to achieve matching matching of the drone, receive data, and analyze the data. The fifth step is to perform the cropping analysis on the received data according to the requirements, and the sorting result is the desired result state. As shown in Figure 2.

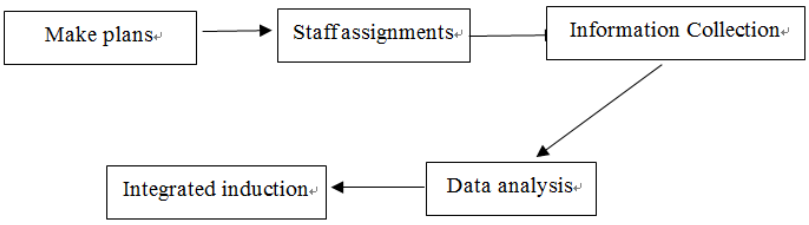

Figure 2 Five steps to plan implementation

5. Conclusion

Any one of the UAV cameras needs to specify a series of related measures, set the plan in advance, and the overall process is carried out according to the plan. Even if there is a deviation, there will be an emergency strategy, which can greatly reduce the accident rate and guarantee.

Security in terms of property and information. As far as the current technical level is concerned, there is still much room for improvement in drone technology, and the prospects are very broad. Many of its own characteristics are unique. It is believed that the rational use of these features will make geological disaster exploration more concise. And it is efficient, and it can also guarantee the improvement of human life quality and overall knowledge level.

References

[1] Ren Jing, Fan Xuanmei, Dong Xiujun, et al. The UAV aerial survey application based on ground-free control measurement correction image[J].江江,2017(20):66-70.

[2]Yang Juan.Study on the investigation and monitoring method of geological disasters in the Three Gorges reservoir area based on the aerial survey technology of UAV[J].Silu Field Vision,2017(3):145-145.

[3] Bai Chunqi. Discussion on the Teaching Practice of Photogrammetry Based on Small UAV[J]. Beijing Surveying and Mapping, 2018(9): 1112-1116.

[4] Dai Tingting, Ma Jun, Xu Yannan. Application of automatic splicing of drone image based on AgisoftPhotoScan in landscape architecture planning[J]. Journal of Nanjing Forestry University (Natural Science Edition), 2018, v.42; 196 (04): 169-174.