The Processing of Unmanned Aerial Vehicle Remote Sensing Image based on IPS Software

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Abstract

This article describes the features and advantages of IPS in Unmanned Aerial Vehicle remote sensing image processing processes and software. Examples validate the software can he able to quickly meet the massive Unmanned Aerial Vehicl remote sensing data processing, remote sensing image data processing for the Unmanned Aerial Vehicle market provides a practical and effective solution.

Keywords

IPS; Unmanned Aerial Vehicl; Remote Sensing; Aerial Triangulation; Image Processing.

1. Introduction

UAV remote sensing is flexible, efficient, fast, precise and accurate, low operating costs, is a powerful complement to traditional aerial photogrammetry, rapid access to small areas and difficult areas of high-resolution images have obvious advantages, has It is widely used in the fields of geological environment and disaster investigation, criminal investigation, land resource management, basic geographic information updating, etc., especially in emergency mapping protection, and can provide real-time disaster data for disaster relief. To make up for the lack of satellite remote sensing and conventional aerial photography. At present, for the acquisition and processing of unmanned aerial vehicle remote sensing image data, the introduction of the corresponding technical standards. UAV remote sensing is also difficult, UAV flight platform using ultra-light aircraft, Low load and poor stability. The camera carried by the UAV is a frame-type non-measurement ordinary digital camera with small image distortion and large image distortion. Compared with the traditional aerial photography, the image coverage and data volume increase exponentially, It is difficult for the later data processing to find the effective data processing solution of UAV remote sensing image, which is the common aspiration of the UAV remote sensing image processing workers. Nowadays, the international Commercial UAV data processing software mainly Inpho, IPS (icaros photogrammetric software), PixelGird and DPGrid, are developed by the traditional photogrammetry software, and IPS as a new force in aerial photogrammetry software, the current digital photography era The data processing carried on the massive optimization, obtained the industry generally to approve..

2. Basic concept of Unmanned Aerial Vehicle Systems and Ips

2.1 Layout of a UAV system

A UAV is the prominent part of a whole system that is necessary to fly the aircraft. Even though there is no pilot physically present in the aircraft, this doesn't mean that the it flies by itself autonomously. In many cases, the crew responsible for a UAV is larger than that of a conventional aircraft.

The aircraft is controlled from the ground (the Ground Control Station or GCS), so it needs reliable communication links to and from the aircraft, but also to the local Air Traffic Control (ATC) authorities if required (usually when flying higher than 150-200 m above the ground). The GCS provides a working space for a pilot, navigator, instrument operator and usually a mission commander.

2.2 UAV classification

Low altitude systems (up to 150-200 m) fly underneath the air traffic. They can be operated with ease, but usually only within sight of the pilot. This limits the area that can be covered in a single mission (minutes to about one hour). On the other hand, they can be brought to the survey area by car or truck, and operated by many. These systems are very attractive for research groups involved in instrument design and thematic research, because they offer a low cost, flexible way to acquire data.

A tethered balloon (Çabuk, 2007; Vierling, 2006) or blimp (Martinez Rubioa, 2005) is probably the simplest UAV conceivable. It is easily controlled (especially its altitude), but of course quite unstable if the wind speeds grow. The balloon can be adapted to the size and mass of the instruments that need to be carried.

Fig. 1 Free-flying low altitude blimp

Free-flying blimps are offered to the users as platform for monitoring and survey Small micro-UAV airplanes have been designed and built by many aircraft design schools. Some are as small as a few centimeters, and all are able to carry only modest payloads (about 100-200 gram). To generate enough lift, they have to fly at considerable speed, which may be a concern if they fail at low altitude. Fig 1 shows a typical micro UAV with a wingspan smaller than 30 cm. This one is developed by the University of Ghent, Belgium.

Fig. 2 A micro UAV designed to carry video and still imagery systems

3. The Processing of UAV Remote sensing image

3.1 Introduction

IPS is the all-digital photogrammetric workstation system from Israel ICAROS, which can quickly and accurately process aerial image data, including large aircraft aerial data (such as DMC camera, UCX camera)(Cannon, SONY, Nikon, etc.), mainly used in large-scale mapping, engineering applications, disaster monitoring, agricultural and forestry analysis, pipeline and energy audits, mine assessment, Environmental monitoring point monitoring and evaluation industries. IPS software can achieve parallel processing functions in low-precision POS Data, fast and accurate generation of matching points, the use of beam area adjustment method of regional adjustment for air space, fast generation DTM, single-chip orthorectification and automatic mosaic line generation, automatic color and mosaic, greatly improving the operation effectiveness.

IPS is currently the latest version of 3.1, including IPS solution manager (IPS solution manager), IPS image mosaic (IPS atitchtne), IPS patching tool (IPS patching tool) three independently run the package.

3.2 Features

And the main features of IPS are listed as follows:

(1) Friendly interface to users

IPS user interface consists of three windows, allowing users to point data and image data editing and display is more simple and intuitive.

The data window consists of the image data table and the point data table, and carries on the separate management to the image data and point data of the introduction, as shown in Fig 3.

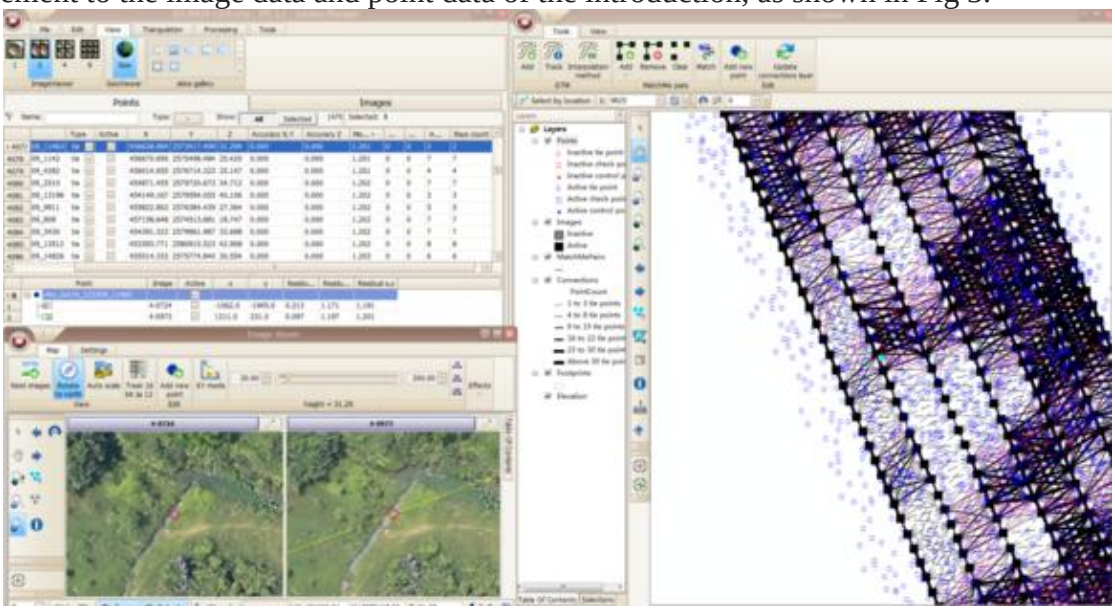

Fig. 3 The list window of vertexes and images

(2) The technique feature of the image progressing

1) Powerful computing power. IPS algorithm is used to solve the problem, which can save the time and improve the precision greatly. Under the premise of the hardware condition, the IPS based on the image matching method of different types of image data can be used to get the better result. GPU (graphics processor) for parallel processing acceleration.

2) Automated solution. Customizable workflows allow automatic resolution of any process from image matching to mosaicking orthoimage output.

3) Fast DSM. You can choose to generate fast (low-density) DSM files, to avoid the need to generate high-density DSM longer, improve the efficiency of the solution.

3.3 Processing

1) Match the parameter settings. According to the relative relationship between the images created by the navigation coordinates, you can manually set the connection strength of the image (initially, the program can reduce the search range according to the setting). Meanwhile, set the feature operator size, search radius, multi-scale threshold, Area and density, and other parameters related to feature matching.

2) Image matching. IPS matches the selected images by matching, extracts connection points from overlapping areas, and automatically matches large areas by C'UDA parallel computing architecture and innovative matching techniques.

The gray matching engine of IPS (the extraction quality is independent of the outer azimuth elements) generates thousands of potential matching points in each stereo pair, and the intelligent filter based on the geometric automatic statistical method can achieve the highest matching point extraction quality The level of 0.1 pixel, making the air three adjustment accuracy than the accuracy of artificial connections to add several times higher.

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