FIELD-USED DIGITAL PHOTOGRAMMETRIC WORKSTATION

Hui CAO

Wuhan University, 129#Luoyu Road, 430079 Wuhan, China
huicao@supresoft.com.cn

Commission II, IC WG II / IV

Key Words: DPW, Countryside and Field-Used, Production Efficiency, Easy-to-use.

ABSTRACT:

In traditional photogrammetry, there are two main steps in vector data collection: 1).site investigation in the field and control survey; 2).feature collection via digital photogrammetric workstation (DPW). Usually control survey and photo interpretation is the basic step in photogrammetry. Each processing needs to wait the results and then going to the next step. In order to raise the efficiency of the photogrammetric production, the DPW, suitable for using in not only a town but also a countryside or field, should be developed. The system then can be moved from a town to a countryside or field easily and frequently. It will change the serial workflow to parallel workflow. Field-Used digital photogrammetric workstation is a simple and efficient digital mapping system.

1. INTRODUCTION

The data of cartography and GIS are mainly acquired from digital photogrammetry nowadays. However, digital photogrammetric system (DPS) or digital photogrammetric workstation (DPW) is a complex system with some special hardware, including the hand wheels and the foot disk for measuring and the Liquid crystal shutter system or the polarizing system or the stereo reflector for stereo observation. It is hard to move the DPS/DPW from a town to a countryside even field frequently. On the other hand, after acquiring images, the mapping procedure is as follows;

1.Control survey in field.
2.Automatic aerial triangulation in DPS/DPW.
3.Stereo mapping in DPS/DPW.
4.Interpretation in field.
5.Stereo mapping according to photographic map, where the ground feature is drawn manually in the countryside or field.

Among them, the step 2 has to wait the result of the step 1, the step 3 has to wait the result of the step 2, as mapping should be done based on the condition of existing all of parameters, including the interior orientation, the relative orientation and the absolute orientation. Meanwhile the step 5 has to wait all of the results from the step 1 to the step 4. There are two reasons: The first one is the same as mentioned above. The second one is that sometime the objects are not very clear in stereo model, and interpretation in field is needed. Therefore, many vector data in the maps are drawn two times in countryside/field and indoors respectively. Waiting and repeating causes the low efficiency of photogrammetric production.

In order to raise the efficiency of the photogrammetric production, the DPW, suitable for using in not only a town but also a countryside or field, should be developed, which can be moved from a town to a countryside or field easily and frequently. In this paper, a simple and efficient digital mapping system, V-Imapper (The integration of interpretation and mapping), is introduced. V-Imapper is an easy-to-use DPW with no special hardware excepting the computer and the red-green glasses. The operation of measurement can be controlled through the normal mouse (control the movement in x and y direction) and keyboard (control the movement in z direction). Comparing the hand wheels and foot disk in normal DPW, the mode of stereo observation is that the left image (as red channel) is superimposed onto the right image (as green channel), and the red-green glasses are used for the stereo observation. The Liquid crystal shutter system or the polarizing system or the stereo reflector still can be supported for stereo observation if clients like to use them,. The computer is the normal personal computer (PC). Even it could be a notebook computer. Because there is no special hardware, the DPW could be moved to countryside easily. If the notebook computer is applied, it can be used in field.

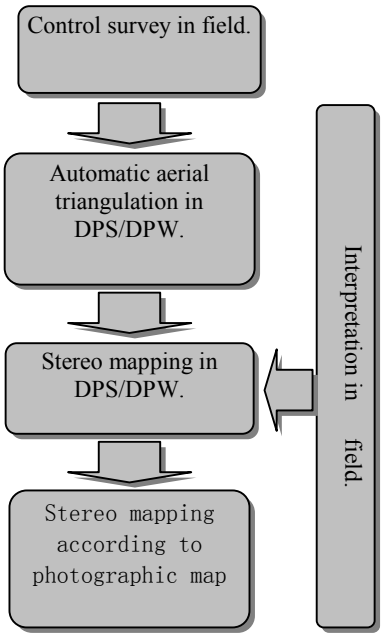

Figure 1. photogrammetric work flow

2. SYSTEM CONFIGYRATION AND WORK FLOW

Now, the mapping procedure in this field-used digital photogrammetric workstation could be changed as follows.

1.Control survey, Interpretation and stereo mapping with V-Imapper in the countryside or field.
2.Automatic aerial triangulation.
3.Transform the vector data from image coordinates or model coordinates to ground coordinates.

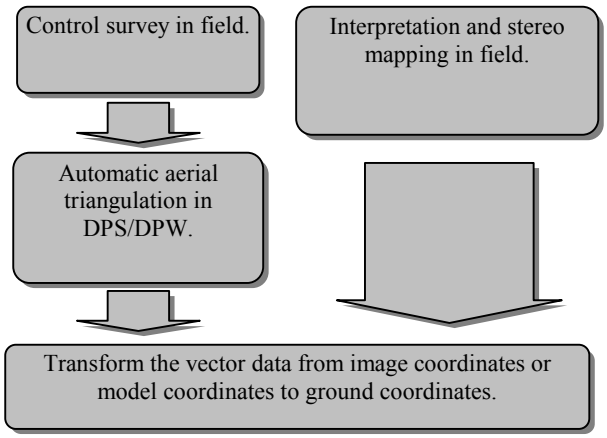

Figure 2. V-Imapper work flow

Because after interior and relative orientation, the epipolar image pair could be created and mapping could be completed based on the epipolar image pair and relative orientation result. The vector data could be recorded in image coordinates or model coordinates. The mapping does not need to wait the result of absolute orientation from the aerial triangulation. Moreover, interpretation and stereo mapping can be done in the countryside or field, the vector data could be drawn in the computer directly, instead of using photograph, and it was drawn only one time, which should be transformed from image coordinates or model coordinates to ground coordinates later. Furthermore, the aerial triangulation needs the data of ground control points. In the procedure of the aerial triangulation if some problem were found, it should be sent to the person, who had worked in field for acquiring the data of the control points. After resolving the problem, the message would be sent back. Sometimes the site is far away from the town, and the aerial triangulation has to wait. In this case, the step 2, the automatic aerial triangulation, could be moved to countryside also, and would not wait for a long time.

With this field-used digital photogrammetric workstation and its new production scheme, waiting and repeating could be avoided. The entire production efficiency could be raised greatly. In addition, the normal DPW is quite complex system. Users should be trained sufficiently in order to operate this system conveniently and exactly, and it is not so easy for the cartographers and GIS users. However, the field-used digital photogrammetric workstation is an easy-to-use system. Its application needs only simple training. Therefore, the field-used DPW is also suitable for the cartographers and GIS users.

3. CONCLUSION

The great benefits in Field-Used Digital Photogrammetric Workstation is as follows:

- New production scheme, waiting and repeating operation could be avoided.
- New kind of stereo observation for vector data capture, such as red-green imagery based with red-green stereo glass, so that the software can be running in normal PC, which easy to work in doors and outdoors.
- Low-cost digital photogrammetric workstation, no special device is needed.
- Easy-to-use

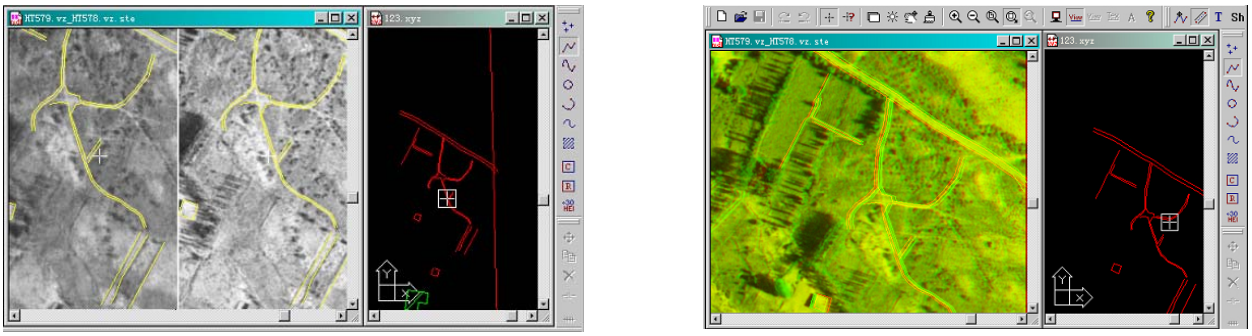

Figure 3. VirtuoZo V-Imapper vector data collection modul