Photogrammetry Notes and Observations

Marvin Smith

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Contents

Common Variables

- H - Height of the camera above ground, *Flying Height*

- B - Distance between two image, *Air Base*

Common Programs and Usage Notes

This section is dedicated to solving easy problems using common programs.

GDAL Binaries

gdalinfo

Description

gdalinfo is an application bundled with GDAL which provides the user with the ability to extract information about a particular geographic file to the console.

This application works on elevation information, vector files (KML, KMZ), imagery (NITF), and many more.

Information Provided

- Corner Coordinates

- Geographic Projection Used

- Image Raster Datatype

- Date Taken

- more Metadata and image info

Usage

```
./gdalinfo   data/dted/w119/n036.dt2

Driver: DTED/DTED Elevation Raster
Files: data/dted/w119/n036.dt2
Size is 3601, 3601
Coordinate System is:
GEOGCS["WGS 84",
    DATUM["WGS_1984",
```

```
        SPHEROID["WGS 84",6378137,298.257223563]],
    PRIMEM["Greenwich",0],
    UNIT["degree",0.0174532925199433],
    AUTHORITY["EPSG","4326"]]
Origin = (-119.000138888888884,37.000138888888884)
Pixel Size = (0.000277777777778,-0.000277777777778)
Metadata:
  DTED_VerticalAccuracy_UHL=0007
  DTED_VerticalAccuracy_ACC=0007
  DTED_SecurityCode_UHL=U
  DTED_SecurityCode_DSI=U
  DTED_UniqueRef_UHL=G18 063
  DTED_UniqueRef_DSI=G18 063
  DTED_DataEdition=02
  DTED_MatchMergeVersion=A
  DTED_MaintenanceDate=0000
  DTED_MatchMergeDate=0000
  DTED_MaintenanceDescription=0000
  DTED_Producer=USCNIMA
  DTED_VerticalDatum=E96
  DTED_HorizontalDatum=WGS84
  DTED_DigitizingSystem=SRTM
  DTED_CompilationDate=0002
  DTED_HorizontalAccuracy=0013
  DTED_RelHorizontalAccuracy=NA
  DTED_RelVerticalAccuracy=0009
  AREA_OR_POINT=Point
Corner Coordinates:
Upper Left  (-119.0001389,  37.0001389) (119d 0'0.50"W, 37d 0'0.50"N)
Lower Left  (-119.0001389,  35.9998611) (119d 0'0.50"W, 35d59'59.50"N)
Upper Right (-117.9998611,  37.0001389) (117d59'59.50"W, 37d 0'0.50"N)
Lower Right (-117.9998611,  35.9998611) (117d59'59.50"W, 35d59'59.50"N)
Center      (-118.5000000,  36.5000000) (118d30'0.00"W, 36d30'0.00"N)
Band 1 Block=1x3601 Type=Int16, ColorInterp=Undefined
  NoData Value=-32767
  Unit Type: m
```

Camera Calibration Notes

Intrinsic Parameters

Common Intrinsic Camera Parameters

- Focal Length (f)

- Radial Distortion

Glossary

Aerotriangulation The process of assigning ground control values to points on a block of photographs by determining the relationship between the photographs and known ground control points.. 6

Boresight Boresight is the physical mounting angles between an IMU and a digital camera. Basically, if the IMU defines a flight axis, the Boresight defines the angles from the axis of which the camera is pointing.. 6

Bundle Adjustment The process of simulaneously refining 3D coordinates derived from multiple viewpoints. This requires that the user has multiple 3d coordinates measured from multiple image pairs. This is often solved with Levenberg-Marquardt.. 6

Focal Length The distance between the focal point and the image plane. This is relevant as the focal length determines attributes such as the clarity of the image and the depth of field. It is an essential part of camera calibration.. 6

Georectification A method of stretching and warping an image to align with another map projectin or spatial data in GIS. This is comparable to Google Earth and other systems which implement overlays. If an image is rectified, Ground Control Points (GCP) can be used to create a transformation which aligns one image to the GIS data. This is different from orthorectification as well because it is assumed that the image is already orthorectified. Georectification just changes the projection and/or coordinate system.. 6

Georeference Same as Georectification . 6

Orthorectification A method of correcting an image to align with real-world coordinates on a map. This involves measuring the exact location of the image center as well as the camera angle. This is followed by the computation of the camera calibration parameters to remove camera and lens distortions. Finally, you may terrain induced distortions using DEM data.. 6

Bibliography

[1] Bon A. DeWitt and Paul R. Wolf. *Elements of Photogrammetry(with Applications in GIS)*. McGraw-Hill Higher Education, 3rd edition, 2000.

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