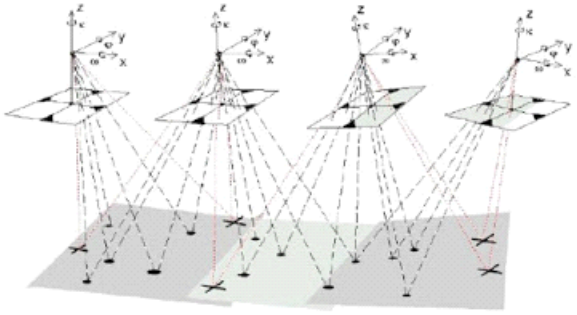
Report-3

Aerial Triangulation:

It is method to determine and calculate 3 Dimensional object coordinates by using photographs taken from different positions, on the same object.



If a point appears in two or more images, then the 3d coordinates of the point in object space can be determined from image coordinates provided that the position and orientation of the camera and its internal geometry is known in object space.

Analytical photogrammetry is a term used to define the mathematical calculations based on the camera parameters, the measured image coordinates and the ground truth about the object to be modeled.

The Aerial Triangulation process can be accomplished easily for all kind of aerial sensors (both analog and digital) and also for satellite imagery.

Radial Triangulation: Radial triangulation is a graphical approach and based on the fact that angles measured in a photograph at the iso-centre, located in the middle of line connecting the principal point and photo-nadir, are true horizontal angles and can be used for planimetric triangulation.

Block Triangulation: The available tie points in consecutive strips assists in the roll angle recovery which is one of the weaknesses inherent in strip triangulation. In terms of the computational aspect, aerial triangulation methods are categorized as: analog, semi-analytical, analytical, and digital triangulation.

Benefits:

- Minimizing delays and hardships due to adverse weather condition.
- Access to much of the property within the project area is not required.
- Field surveying in difficult area,such as Marshes,Extreme Slope can be minimzed.

Bundle Blocks: A bundle of rays that originates from an object point and passes through the projective centre to the image points forms the basic computational unit of aerial triangulation

Bundle adjustment is the problem of refining a visual reconstruction to producejointly optimal3D structure and viewing parameter estimates.

- Bundle adjustment amounts to jointly refining a set of initial camera and structure parameter estimates for finding the set of parameters that most accurately predict the locations of the observed points in the set of available images.
- Bundle adjustment boils down to minimizing the reprojection error between the image locations of observed and predicted image points, which is expressed as the sum of squares of a large number of nonlinear, real-valued functions. Thus, the minimization is achieved using nonlinear least-squares algorithms.
- Bundle adjustment is almost always used as the last step of every feature-based 3D reconstruction algorithm. It amounts to an optimization problem on the 3D structure and viewing parameters.

Strucure From Motion:

- Structure from Motion (SFM) is to determine the spatial and geometric relationship of the target through the movement of the camera, which is a common method of 3D reconstruction.
- The way in which you approach the problem depends on different factors, such as the number and type of cameras used, and whether the images are ordered.

- Used in SLAM(Simultaneous Localization and Mapping), 3-D Scanning.

Multi-View Stereo: It is a collection of techniques that use stereo correspondence by capturing from multiple viewpoints in-between to increase robustness.

- MVS algorithms are designed to deal with images withmore varying viewpoints, such as an image set surrounding an ob-ject, and also deal with a very large number of images, even in theorder of millions.

PDAL: PDAL was designed to meet the needs of users working with airborne LiDAR datasets. It has since grown to accommodate a number of different styles of point cloud data, and ways to use them. It was an early adopter of the LAS 1.4 community standard, and offers the best open-source, interoperable point cloud data processing engine we have seen to date.

GDAL: Geospatial Data Abstraction Library is a software used for manipulating raster and vector geospatial data . Various CLI can be built with GDAL for data translation and processing.

- Has package in python.
- Some common uses of GDAL include: quickly getting basic information about a dataset, converting between geospatial file types, clipping one dataset against another

References:

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