Photogrammetry (CE 474) [2]

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Photogrammetry

Do You remember…

Photogrammetry is the technique of measuring objects (2D or 3D) from photographs.

Its most important feature is the fact, that the objects are measured **without being touched**

Photogrammetry

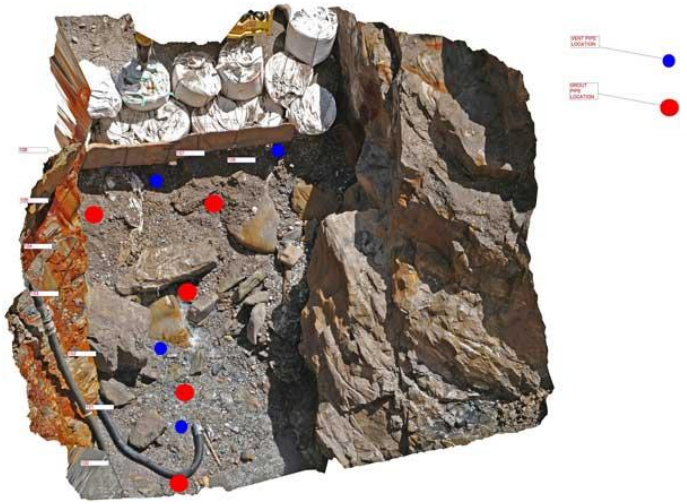
- Objects are measured without touching.
- It is a Remote Sensing technique.
- It is a close range method of measuring objects.
- It is a 3-dimensional coordinate measuring technique that uses Photographs as the fundamental medium for measurement.

Types of Photogrammetry

Photogrammetry can be divided into:

Range photogrammetry (mostly **aerial** photogrammetry) and

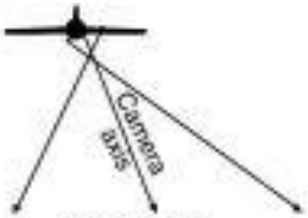
Close range photogrammetry (mostly **terrestrial** photogrammetry).



Types of Aerial Photogrammetry

1. Vertical photograph

Vertical



Low oblique

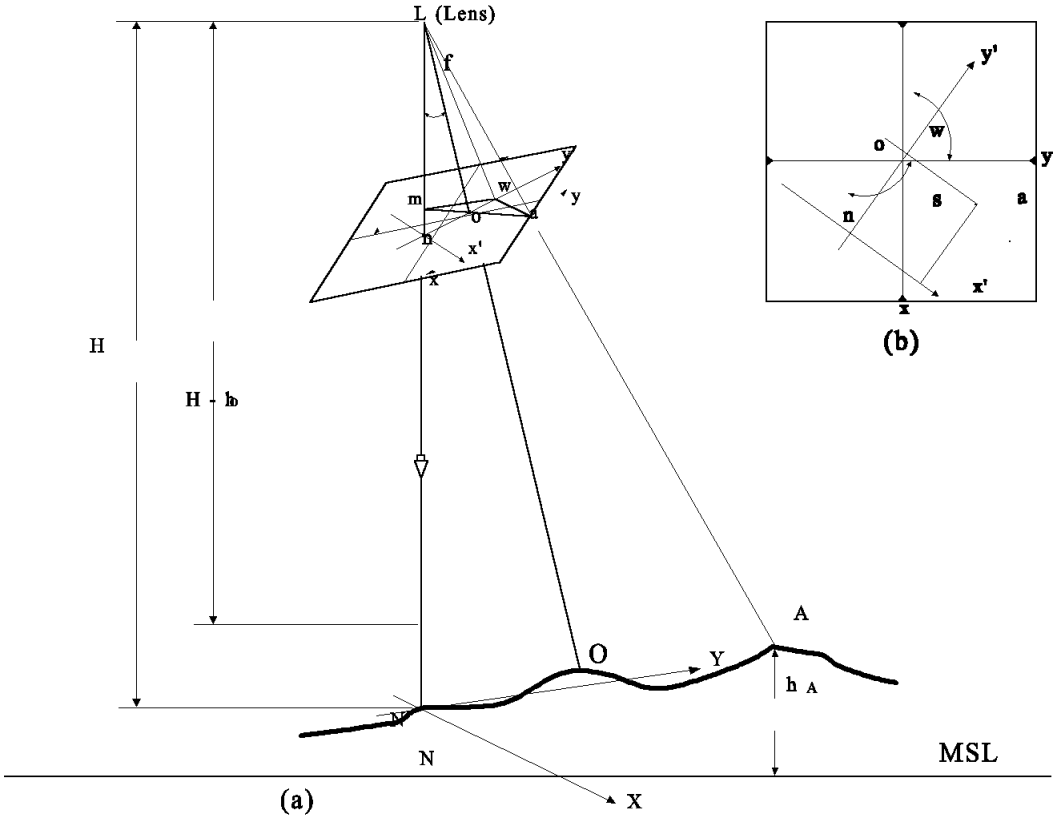
High oblique

Fan of 4 cameras with overlap


Typical view angle of panoramic camera

Types of Aerial Photogrammetry

2. Tilted photograph



Types of Aerial Photogrammetry

2. Oblique photograph

Applications of Photogrammetry

Principally, it is utilized for object interpretation (what is it? What's its type, quality, and quantity) and object measurement (where is it? What's its form and Size?)

- *Aerial* photogrammetry is mainly used to produce large scale topographical or thematical maps and digital terrain models (DTM)
- It is also used to combine live action with computer generated imagery in movie post-production.

Applications (cont.)

Among the users of close-range photogrammetry are architects and civil engineers:

(*supervising buildings*, document their current state, deformations or damages)

archaeologists, geophysicists, geodesists, surgeons or police departments (documentation of traffic accidents and crime scenes).

Applications (cont.)

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Photographing Devices

Photographing devices can be divided into three main categories:

1. Metric cameras
2. Stereometric camera
3. 'Amateur' cameras

1. Metric cameras

These cameras have stable and precisely known internal geometries and very low lens distortions.

- The principal distance is constant, which means, that the lens cannot be sharpened when taking photographs. As a result, metric cameras are only usable within a limited range of distances towards the object.
- The image coordinate system is defined by (mostly) four fiducially marks, which are mounted on the frame of the camera.

1. Metric cameras

Aerial metric cameras are built into aero planes mostly looking straight downwards. Today, all of them have an image format of 23 by 23 centimeters.

2. Stereo-metric camera

A stereometric camera in principle consists of two metric cameras mounted at both ends of a bar, which has a precisely measured length (mostly 40 or 120 cm). This bar is functioning as the base, while both cameras have the same geometric properties. Since they are adjusted to the normal case, stereo-pairs are created easily.

3. 'Amateur' cameras

The photogrammetrist speaks of an "amateur camera", when the internal geometry is not stable and unknown, as is the case with any commercial available camera.

They can only be used for purposes where no high accuracy is demanded.