

PHOTOGRAMMETRY

WHAT IS PHOTOGRAMMETRY?

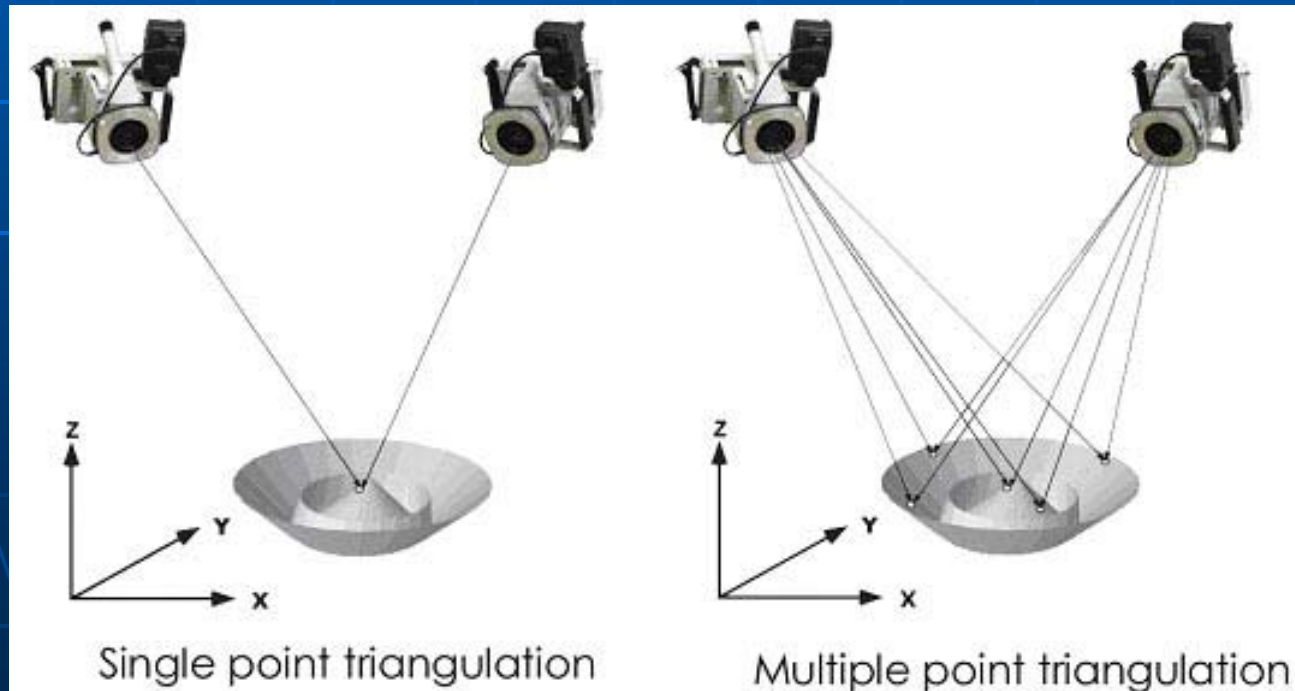
- PHOTOGRAMMETRY REVERSES THE PROCESS OF PHOTOGRAPHY, TRANSLATING 2D INFORMATION INTO 3D DATA.

HOW DOES IT WORK?

- REQUIRES AT LEAST 2 CAMERAS, YET MORE CAMERAS CREATE BETTER RESULTS
- COMPUTES COORDINATES BY USING *TRIANGULATION* AND *RESECTION*

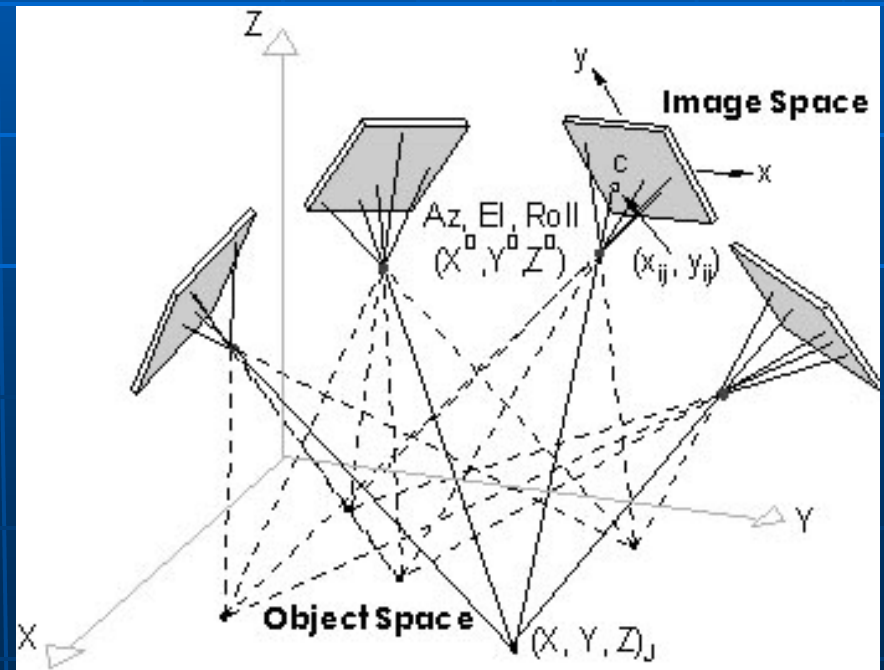
TRIANGULATION

- TAKE PHOTOGRAPHS FROM TWO DIFFERENT LOCATIONS, "LINES OF SIGHT" DEVELOPED



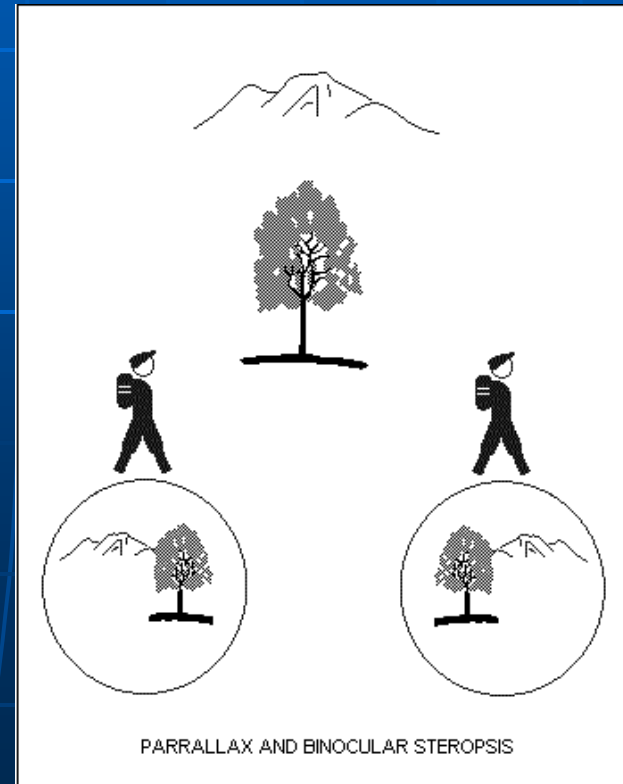
TRIANGULATION

- THESE LINES ARE MATHEMATICALLY INTERSECTED, PRODUCE 3D DIMENSIONAL COORDINATES



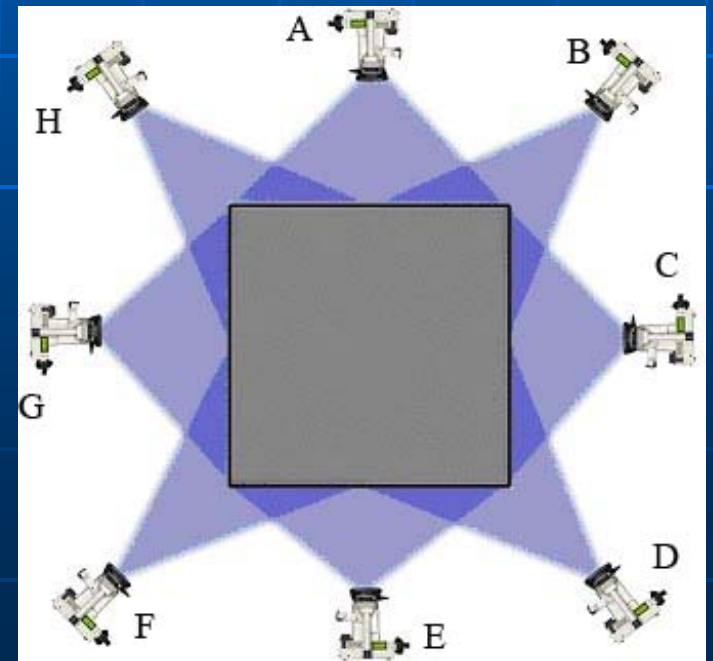
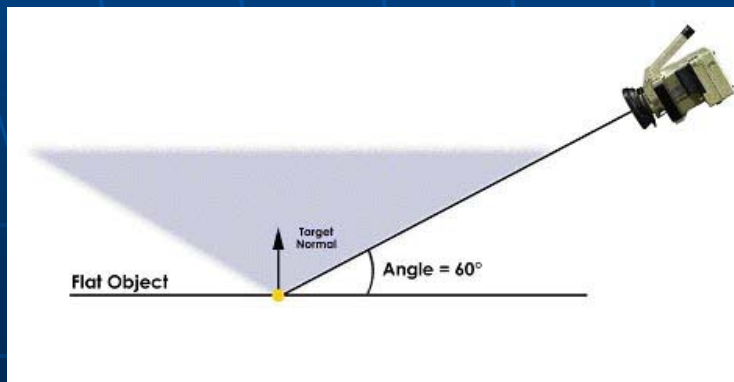
TRIANGULATION

- SAME AS STEREOPSIS FOR PEOPLE AND ANIMALS (RETINAL DISPARITY)



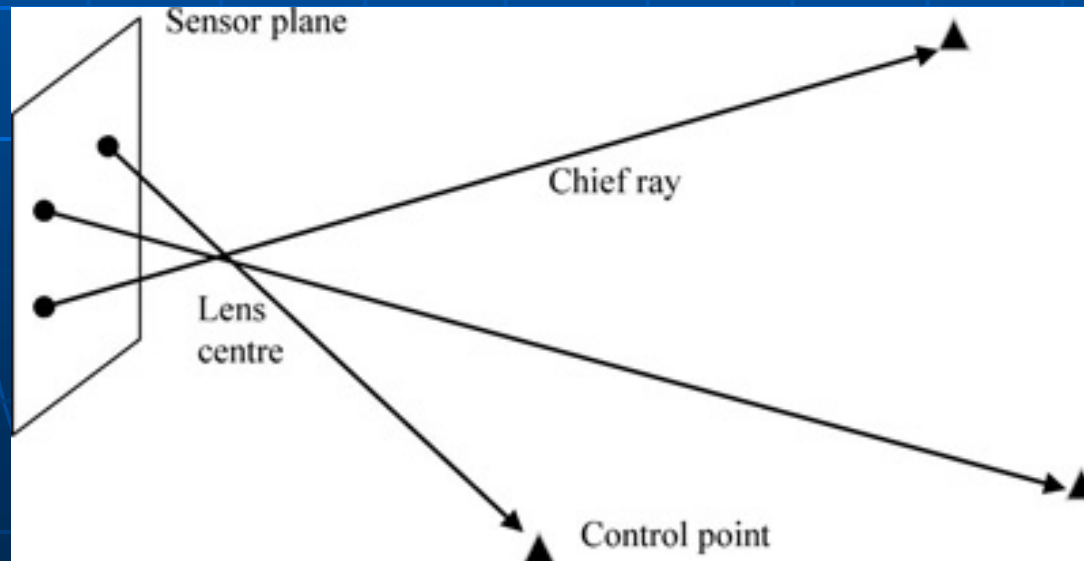
TRIANGULATION

- CAMERA LOCATION AND ANGLE MUST BE KNOWN



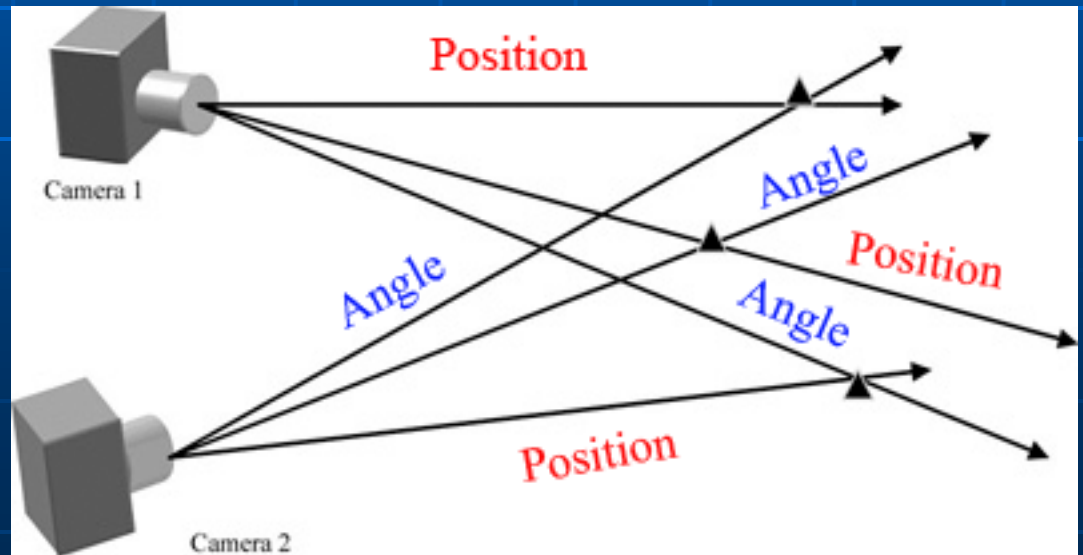
RESECTION

- PROCEDURE USED TO DETERMINE FINAL AIMING AND LOCATION (ORIENTATION)



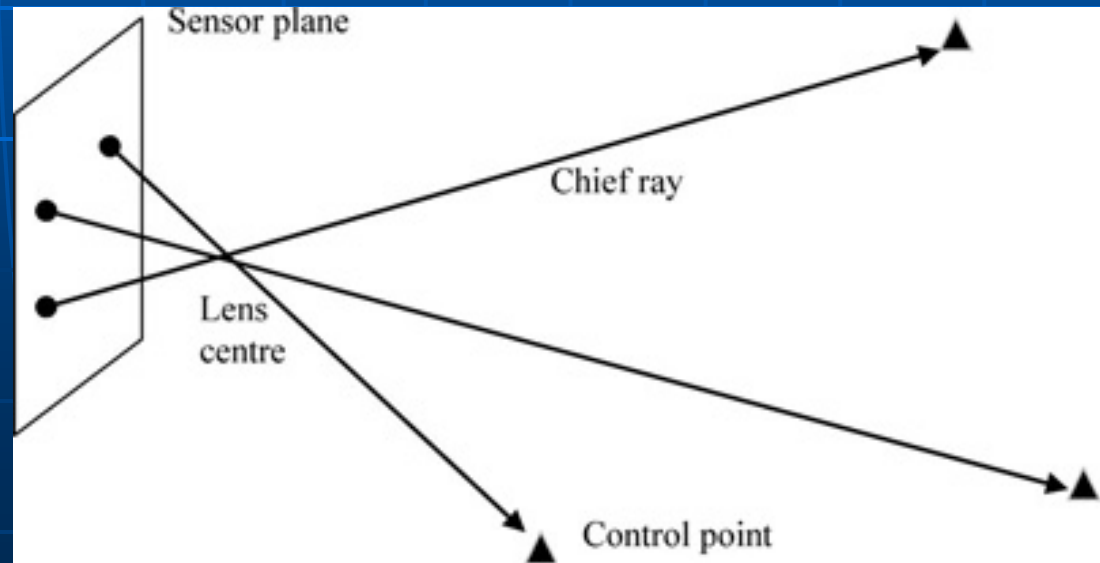
RESECTION

- MUST KNOW SIX COORDINATES, 3 FOR POSITION, 3 FOR ANGLE



RESECTION

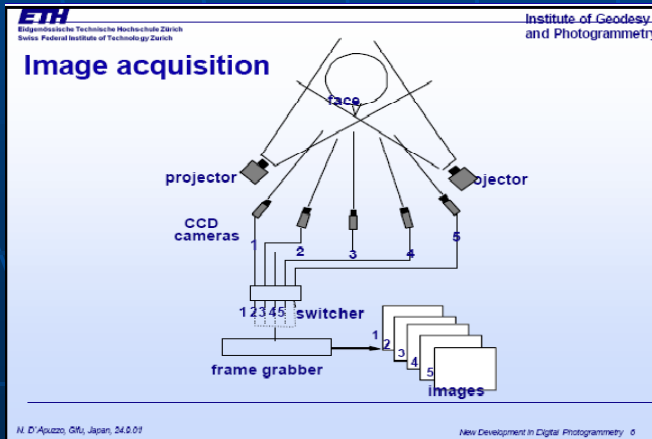
- WITH LINES OF SIGHT KNOWN AND ORIENTATION, 3D DATA CAN BE CAPTURED



WHAT IS NEEDED

HARDWARE

- DIFFERING MULTI-CAMERA SET UPS
- MULTI BLACK AND WHITE CAMERAS, ONE COLOR
- PRIMARY CAMERAS TO THE SIDES



WHAT IS NEEDED

SOFTWARE

- CUSTOM SOFTWARE PACKAGES
- FACIAL RECONSTRUCTION
- PICTORIAL AVERAGING
- TEXTURE MAPPING



APPLICATIONS

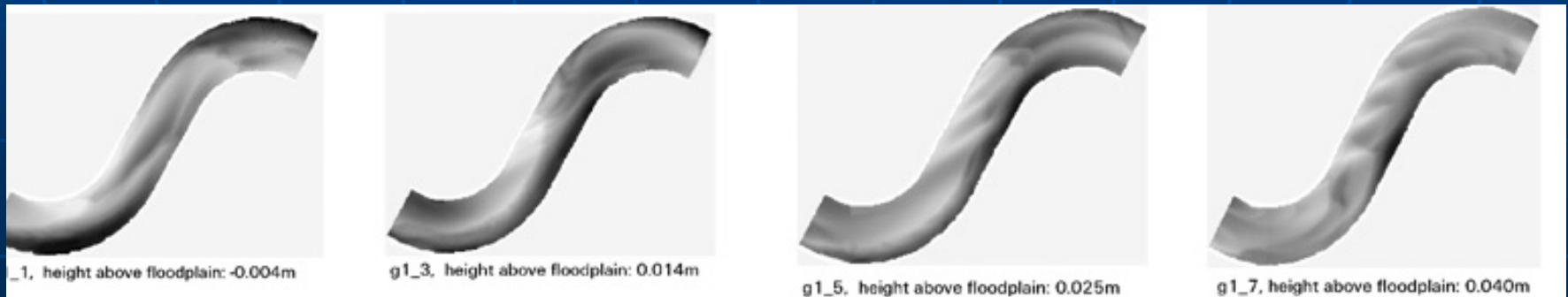
- SECURITY
- DATABASES
- FACE RECOGNITION
- MEDICAL
- ANTHROPOMETRIC ANALYSIS
- BEAUTY RESEARCH

TYPES OF PHOTOGRAMMETRY

- THERE ARE SEVERAL TYPES OF PHOTOGRAMMETRY: AERIAL, TERRESTRIAL, AND CLOSE RANGER.
- AERIAL IS THE MOST COMMONLY USED

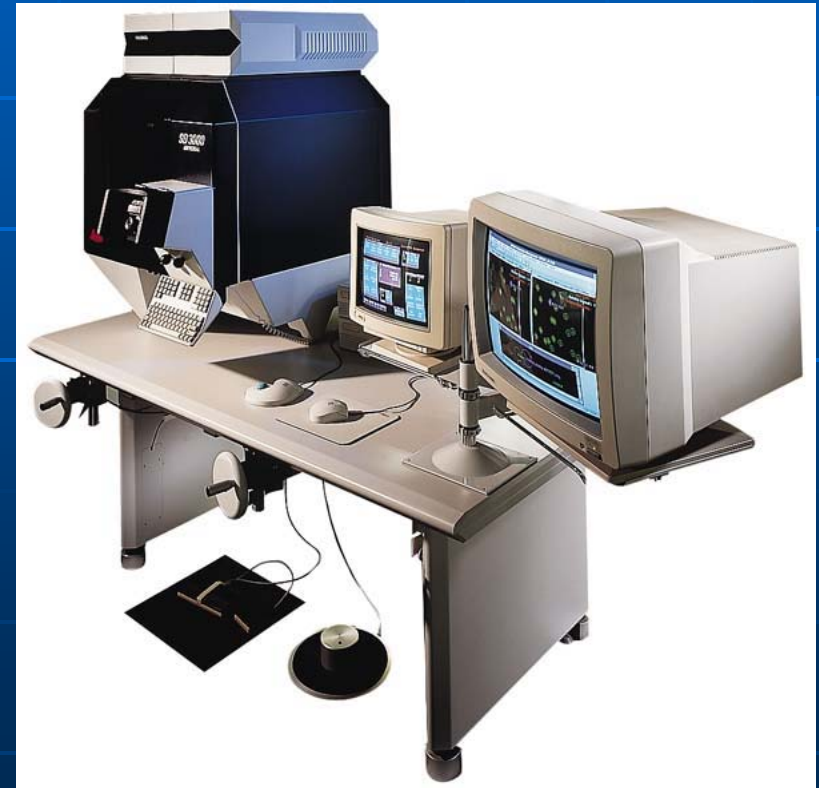
AERIAL PHOTOGRAMMETRY

- A CAMERA IS MOUNTED IN AN AIRCRAFT AND IS USUALLY POINTED VERTICALLY TOWARDS THE GROUND
- MULTIPLE OVERLAPPING PHOTOS OF THE GROUND ARE TAKEN AS THE AIRCRAFT FLIES ALONG A FLIGHT PATH



AERIAL PHOTOGRAMMETRY

- THESE PHOTOS ARE PROCESSED IN A STEREO-PLOTTER



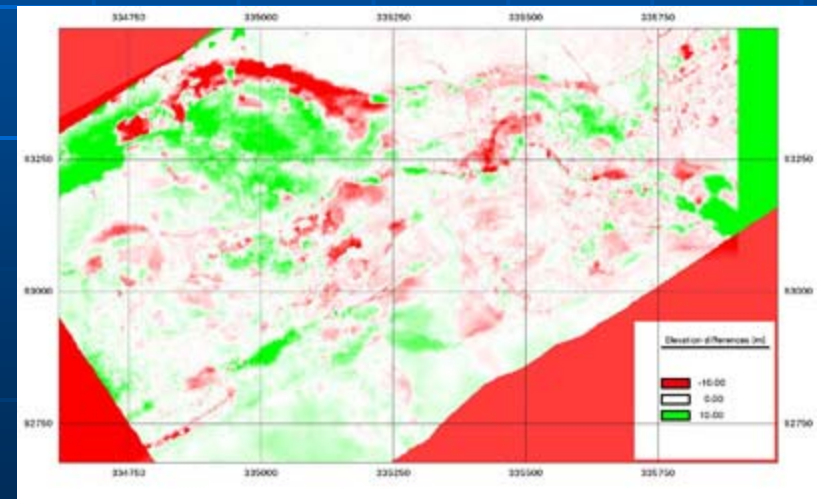
AIN'T IT CUTE->

WHAT IS A STEREOPLOTTER?

- DUPLICATES THE POSITION AND ORIENTATION OF THE AERIAL CAMERA AT THE TIME AN INDIVIDUAL STEREO PAIR WAS ACQUIRED

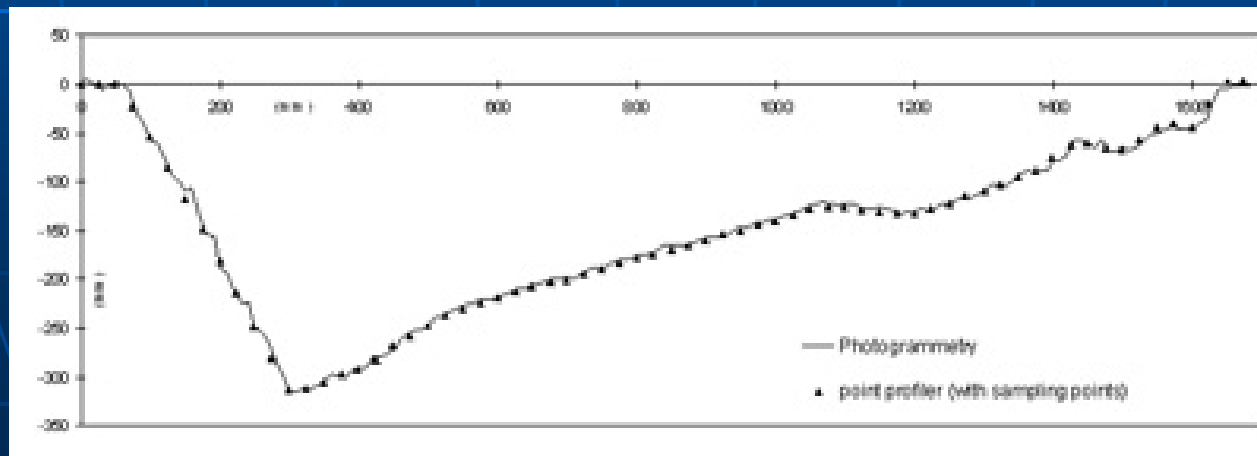
MOST WIDE SPREAD USE OF PHOTOGRAMMERY

- THE CONSTRUCTION AND REVISION OF TOPOGRAPHIC MAPS



AERIAL PHOTOGRAMMETRY

- IDENTIFIABLE POINTS ON THE GROUND (GROUND CONTROL POINTS) ARE USED TO DETERMINE DISTANCES AND GEOMETRIC PROPERTIES OF THE IMAGE



DISTORTION

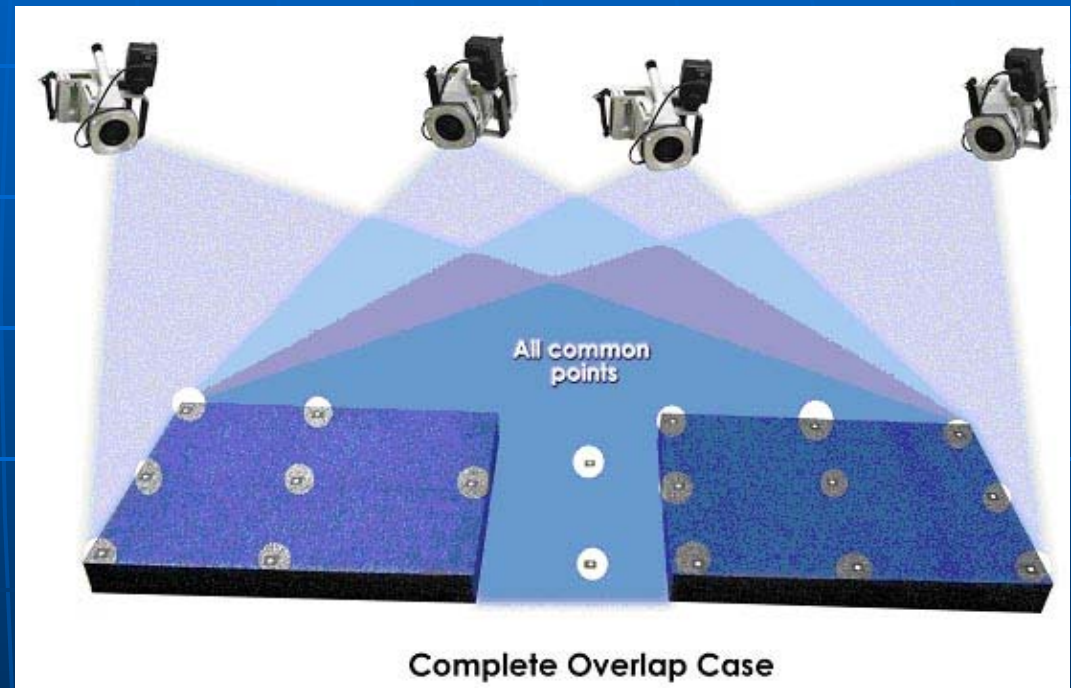
➤ TYPES OF DISTORTION:

➤ RELIEF DISPLACEMENT - CAUSES TALL OBJECTS TO APPEAR TO LEAN AWAY FROM THE CENTER OF THE IMAGE

➤ STEREOSCOPIC PARALLAX - APPARENT SHIFT OF AN OBJECT WITH RESPECT TO A POINT OF REFERENCE

DISTORTION CORRECTION

- IN ORDER TO CORRECT THESE DISTORTIONS, OVERLAPPING PHOTOS AND GROUND CONTROL POINTS ARE INTEGRATED TO PRODUCE A STEREO MODEL OF THE TERRAIN



TOO THE FUTURE!!!

- THE USES OF PHOTOGRAMMETRY ARE EXPANDING INTO MANY DIFFERENT FIELDS:
 - FORENSICS
 - LANDSCAPE
 - MEDICINE AND PROSTHETICS
 - BIOLOGY AND ZOOLOGY
 - ARCHITECTURAL STUDY & PRESERVATION

HOW ITS BEING USED IN...

FORENSICS

- GATHERING EVIDENCE
- CRIME SCENE PRESERVATION
- EVIDENCE PRESERVATION AND CATALOGING

HOW ITS BEING USED IN...

LANDSCAPING

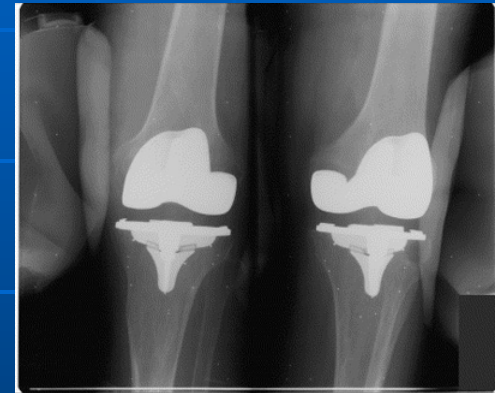
- RECORDING LAND MOVEMENTS
- AERIAL MAPPING



HOW ITS BEING USED IN...

MEDICINE & PROSTHETICS

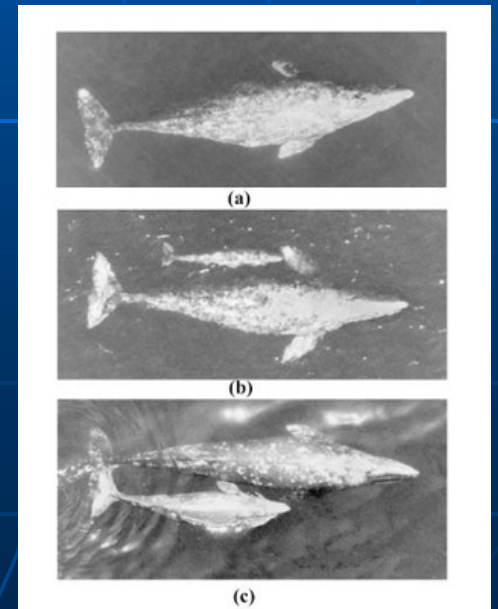
- HUMAN MEASUREMENTS
- PROSTHETICS RESEARCH
- ATHLETIC STUDIES OF BODILY MOTIONS AND MOVEMENTS



HOW ITS BEING USED IN...

BIOLOGY & ZOOLOGY

- DATA CAPTURE AND RECORDING OF PLANTS AND ANIMALS
- INCREASED STUDY OF AQUATIC UNDERWATER LIFE



HOW ITS BEING USED IN...

ARCHITECTURAL STUDY & PRESERVATION

- PRESERVATION OF AGING OR DECAYING MONUMENTS
- CATEGORIZING HISTORICAL REMAINS
- HISTORICAL MONUMENT RECONSTRUCTION