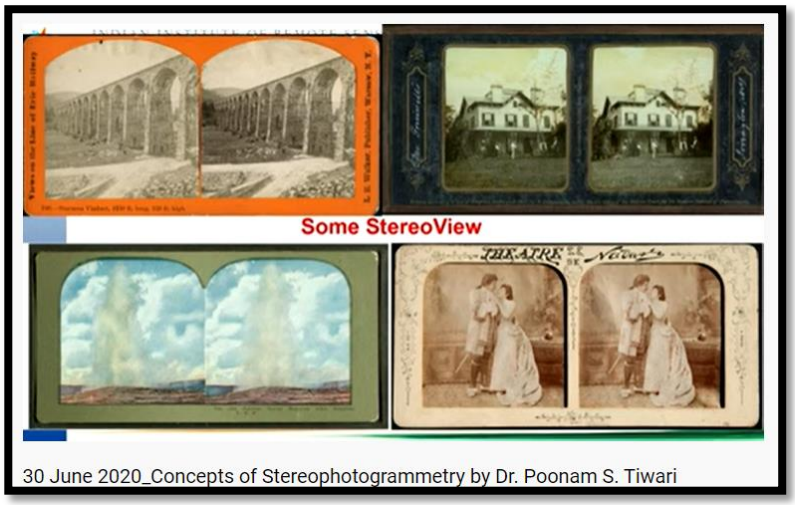
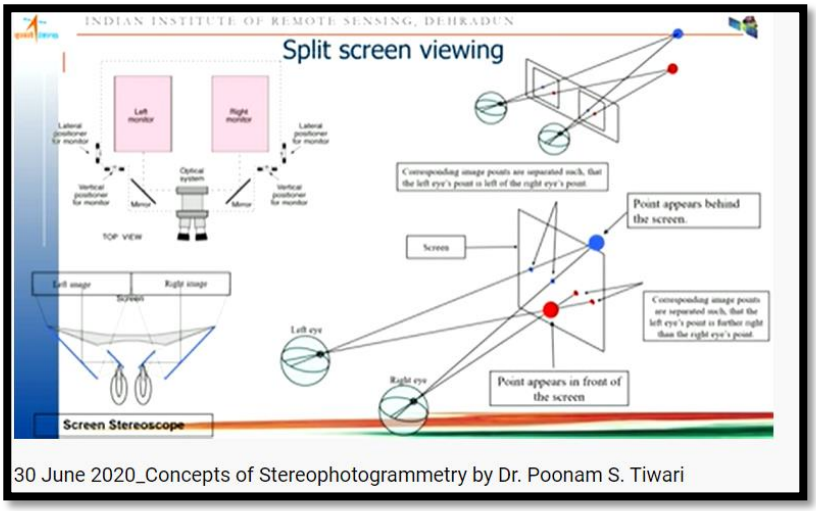
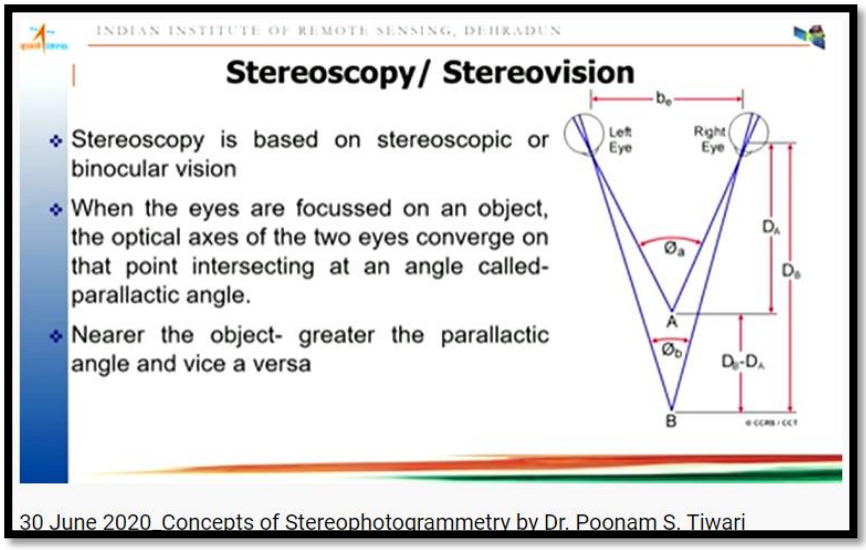
DAILY ASSESSMENT

Date:	**30/06/2020**	**Name:**	**Davis S. Patel**
Course:	**IIRS Outreach Programme on "Satellite Photogrammetry and its Applications"**	**USN:**	**4AL16EC045**
Topic:	**Concepts of Stereo photogrammetry**	**Semester & Section:**	**8th - A**
GitHub Repository:	**Davis**		

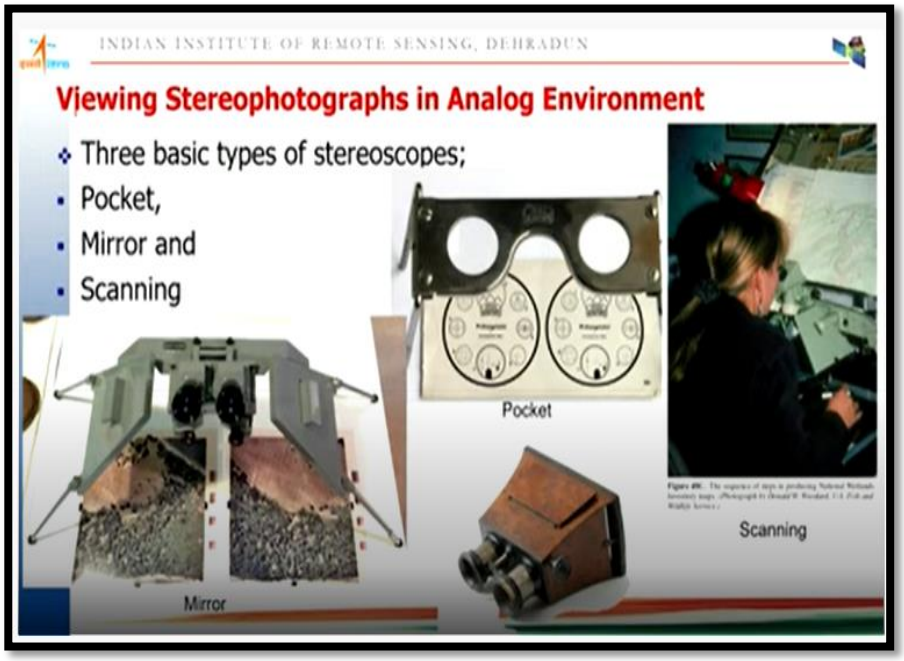
FORENOON SESSION DETAILS
Image of session







30 June 2020_Concepts of Stereophotogrammetry by Dr. Poonam S. Tiwari



REPORT –

Stereo photogrammetry, involves estimating the three-dimensional coordinates of points on an object employing measurements made in two or more photographic images taken from different positions (see stereoscopy). Common points are identified on each image. A line of sight (or ray) can be constructed from the camera location to the point on the object. It is the intersection of these rays (triangulation) that determines the three-dimensional location of the point. More sophisticated algorithms can exploit other information about the scene that is known a priori, for example symmetries, in some cases allowing reconstructions of 3D coordinates from only one camera position. Stereo photogrammetry is emerging as a robust non-contacting measurement technique to determine dynamic characteristics and mode shapes of non-rotating and rotating structures.

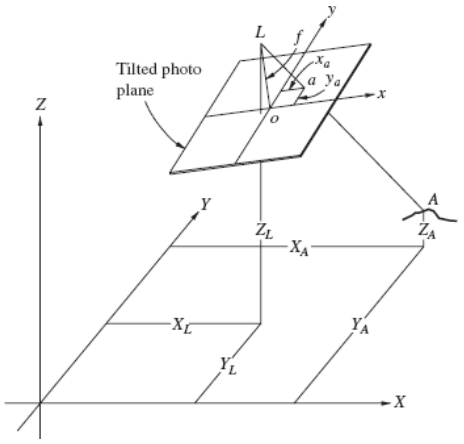
Stereoscopy creates the illusion of three-dimensional depth from given two-dimensional images. Human vision, including the perception of depth, is a complex process, which only begins with the acquisition of visual information taken in through the eyes; much processing ensues within the brain, as it strives to make sense of the raw information. One of the functions that occur within the brain as it interprets what the eyes see is assessing the relative distances of objects from the viewer, and the depth dimension of those objects.

Stereoscopy is the production of the illusion of depth in a photograph, movie, or other two-dimensional image by the presentation of a slightly different image to each eye, which adds the first of these cues (stereopsis). The two images are then combined in the brain to give the perception of depth. Because all points in the image produced by stereoscopy focus at the same plane regardless of their depth in the original scene, the second cue, focus, is not duplicated and therefore the illusion of depth is incomplete. There are also mainly two effects of stereoscopy that are unnatural for human vision: (1) the mismatch between convergence and accommodation, caused by the difference between an object's perceived position in front of or behind the display or screen and the real origin of that light; and (2) possible crosstalk between the eyes, caused by imperfect image separation in some methods of stereoscopy.

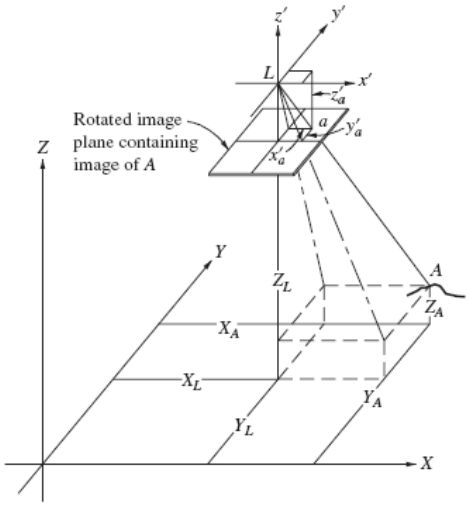
Although the term "3D" is ubiquitously used, the presentation of dual 2D images is distinctly different from displaying an image in three full dimensions. The most notable difference is that, in the case of "3D" displays, the observer's head and eye movement do not change the information received about the 3-dimensional objects being viewed. Holographic displays and volumetric display do not have this limitation. Just as it is not possible to recreate a full 3-dimensional sound field with just two stereophonic speakers, it is an overstatement to call dual 2D images "3D". The accurate term "stereoscopic" is more cumbersome than the common misnomer "3D", which has been entrenched by many decades of unquestioned misuse. Although most stereoscopic displays do not qualify as real 3D display, all real 3D displays are also stereoscopic displays because they meet the lower criteria also.

Stereoscopic vision is also called space vision or plastic vision, is a characteristic, possessed by most persons of normal vision and is important for ability to conceive objects in three dimensional effects and to judge distances. Stereoscopic vision is the basic prerequisite for photogrammetry and photo interpretation. Stereoscopy is defined as the science or art which deals with stereoscopic or other three dimensional effects and methods by which these effects are produced. The close objects are larger, brighter, and more detailed than distant object, and that the close object obstructs the view of distant object. Monocular vision means seeing with one eye. Binocular vision means using both eyes simultaneously. The degree of depth perception is called as “Stereoscopic acuity.” Normal Stereoscopic acuity is possible when images on retina have certain characteristics.

Collinearity, as illustrated in Fig. below, is the condition in which the exposure station of any photograph, an object point, and its photo image all lie on a straight line. The equations expressing this condition are called the collinearity condition equations. They are perhaps the most useful of all equations to the photogrammetric.



In Fig.below, exposure station L of an aerial photo has coordinates XL, YL, and ZL with respect to the object (ground) coordinate system XYZ. Image a of object point A, shown in a rotated image plane, has image space coordinates x′a, y′a, and z′a, where the rotated image space coordinate system x′y′z′ is parallel to object space coordinate system XYZ. Initially, it is assumed that the principal point o is located at the origin of the xy photo coordinate system. A correction that compensates for this assumption is introduced at the end of the development.



Stereo pair a pair of flat perspective images of the same object obtained from different points of view. When a stereo pair is viewed in such a way that each eye sees only one of the images, a three-dimensional (stereoscopic) picture giving a sensation of depth is perceived. Stereo pairs are used to create three-dimensional images of objects in stereoscopic motion-pictures, stereo-photography, and stereoscopic television; they are also used for scientific purposes.

Stereo pairs are obtained with stereoscopic cameras, both still and motion-picture, with two television camera tubes, or with special attachments for the lenses of conventional still and motion-picture cameras. In addition, various instruments are used to obtain and study stereo pairs in stereo photogrammetric surveying.