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Information Given on the Margins of Aerial Photographs and Interpretation of Aerial Photograph

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Abstract: ***Aerial photography is the taking of photographs of the ground from an elevated position. The photographic interpretation is the act of examining photographic images for the purpose of identifying objects and judging their significance. Aerial photographs provide a unique too. Images on aerial photographs are permanent and unbiased representation of objects on occurring on earth's surface. There are several factors like shape, size, pattern, tone, texture, shadow, site and association in identifying object on aerial photographs. Process of photo interpretation involves detection of a feature and its identification.***

Keywords: Remote Sensing (RS), Geographical Information System (GIS), Aerial Photograph, Terms of aerial photograph, Stereoscope, Arc GIS 9.3

1. Introduction

The word `Photography` means `writing with Light. Aerial photograph means taking pictures of the earth from air. Or a photograph is the signature of energy emitted or reflected by air object on photographic films. The photographic interpretation is "the act of examining photographic images for the purpose of identifying objects and judging their significance." The most important principle of photo interpretation is the observation and secondly the capacity to use logical modes of thought to draw correct conclusion from the things observed. Aerial photographs provide a unique tool. They cover a large area on earth's surface. Overlapping pairs of photographs provide a three dimensional view of the object photographed. Images on aerial photographed are permanent and unbiased representation of objects occurring on earth surface. Large area photographed enables a photo interpreter to perceive relations between objects and their background.

2. Historical Background of Aerial Photography

Photography was born in 1839 with the public disclosure of the pioneering photographic process of Nicephore Niepce, William Henry Fox Talbot and Louis Jacques Mande Dagurre. The first known aerial photograph was taken in 1858 by a Parisian photographer named Gaspard Felix Tournachon. The earliest aerial photograph was taken from a ballon over Boston in 1860 by James Wallace black. In the early 1900s the kite photography of an American, G.R. Lawrence, brought him worldwide attention. The airplane, which had been invented in 1903, was not used as a camera platform until 1909 when a "biosphere" motion pictures. They were taken oven centocelli, Italy, during one of Wright's training flights made for Italian naval officers. Obtaining aerial photographs became a much more practical matter with the airplane than it had been with kites and balloons. The Army Geographic Service (SGA) upto 1940 and later National Geographic Institute ensured aerial coverage of all of France and for a number of years, overseas regions. At present, the entire territory is photographed on average every five years or less. Aerial photographs are sold at IGN.

3. Fundamentals of Aerial Photography interpretation

Aerial photographs contain a detailed record of features on the ground at the time of exposure. An interpretation is made as to the physical nature of object and phenomena appearing in the photographs. Interpretation may take place at a number of levels of complexity, from the simple recognition of objects on the earth's surface to the derivation of detailed information regarding the complex interactions among earth surface and subsurface features.

4. Terms of Aerial photograph

Interpretation of information given on the margins on aerial photograph, many terms are given on an aerial photograph. These are followings:

4.1 Fiducial Marks

Fiducial marks are small registration marks exposed on the edges of a photograph. (Figure: 1)The distances between fiducial marks are precisely measured when a camera is calibrated. They are helpful to locating Principal Point. These marks are also called collimating marks.

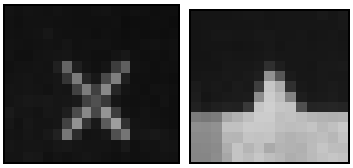

Figure1: Fiducial Marks

4.2 Task Number

Every aerial photograph is given a task number by Survey of India (SOI). (Figure: 2)

Figure 2: Task Number

4.3 Agency Number

In India, aerial photography's works by three agencies:

- Indian Air Force
- M/S Air Survey company – Dumdum(Kolkata)
- NRSC(National Remote Sensing Centre)

Survey of India (SOI) has given codes of these agencies. For example Indian Air Force's code is `A`, M/S Air survey company's code is `B` (Figure: 3)and the code of NRSC is `c`.

Figure 3: Agency Number

4.4 Photographic Number

Aerial Photographs are numbered serially along the strip or flight direction. (Figure: 4) When strips are flown East-West photographs are numbered from West towards East. When strips are North-South, they are numbered from South towards North.

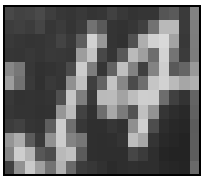

Figure4: Photographic Number

4.5 Strip Number

A photographic task includes number of strips or runs. (Figure: 5) If strips are flown East-West, they are numbered successively from North-South then they are numbered consecutively from West, starting with strip number 1 with East increasing order.

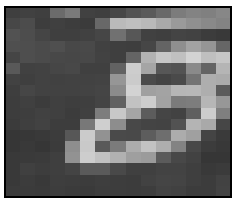

Figure 5: Strip Number

4.6 Principal Point

The intersection point of the fiducial marks on a photograph called Principal Point. The Principal Point denotes the position of camera vertically above the photography.

4.7 Scale

Scale is correct on the Principal Point. When we go away from the Principal Point, scale is exaggerated.

4.8 Transfer Point

When we transfer the principal point on other aerial photograph, the point does not come on photograph. It is on any object or building. Or find out the principal point on other photograph with fiducial marks, than we make 3D and after we transfer the point. Transfer Point does not come in the centre but the Transfer Point will come in side.

4.9 Watch

On aerial photograph a watch has given to see time. (Figure: 6) Watch is help to know about:

- Which type of shadow?
- Number of photograph.

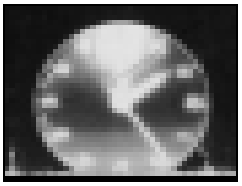

Figure 6: Watch

4.10 Focal Length

Focal Length is the distance between negative plane and optical centre. It has shown on aerial photograph right side of watch. (Figure: 7) Generally it is in millimeter. As focal length increases, image distortion decreases. The focal length is precisely measured when the camera is calibrated. The focal Length helps for calculating the scale.

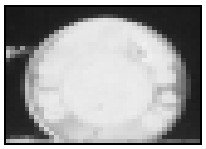

Figure7: Focal Length

4.11 Altimeter

Altimeter means height from above mean sea level. Average height also must be any area. It has shown on aerial photograph left side of watch. (Figure: 8)

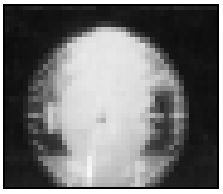

Figure8: Altimeter

4.12 Secret

These photograph not for sale in market. Secret is use for educational purpose. (Figure: 9)

Figure 9: Secret

4.13 Negative Number

Figure10: Negative Numbers

4.14 Number of Press

Figure11: Number of Press

5. Elements of Aerial Photography Interpretation

There are several factors in identifying object on aerial photographs. Process of photo interpretation involves detection of a feature and its identification. Photo interpretation depends largely upon the capability of human eye to differentiate details in the aerial photographs and although object recognition is actually a function of photo quality and personal capability. It also depends upon the typical reflectivity of object itself. The following basic elements are used for the identification of objects on aerial photographs like shape, size, pattern, tone (or hue), texture, shadows, site and association. In Figure: 12 and Chart: 1

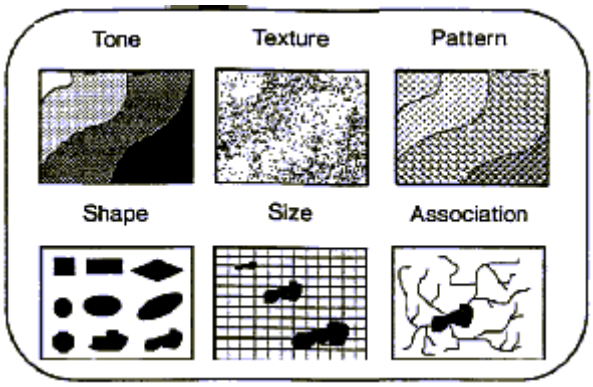

Figure 12: Elements of Aerial Photography Interpretation

5.1 Shape

Shape refers to the general form, configuration, or outline of individual objects. However, each object has its own shape or the object's height defines its shape. The shape of some objects is so distinctive that their images may be identified solely from this criterion. The shape of a tree is important in identification of the species. Oblique photography is very useful in this respect.

5.2 Size or Dimension

Size of objects on photographs must be considered in the context of the photo scale. Relative sizes among objects on photographs of the same scale must also be considered. The crown size of a tree is an important element in forestry. Height and crown size give an indication of tree species in some cases. Crown size is also correlated to the basal area of a tree and thus helps in getting idea of the volume.

5.3 Pattern

Pattern or repetition or the spatial arrangement of objects like orchards, plantation etc. is a characteristic of manmade objects as well as of some natural objects such as the different drainage patterns on different geological and soil types. Pattern is important in assessing land use type.

5.4 Tone or Hue

Tone (or Hue) refers to the relative brightness or colour of objects on photographs .Without tonal differences, the shapes, patterns and textures of objects could not be discerned. Objects of different colour have different qualities of light reflectance and therefore, appear in varying shades of grey on photograph. Tone on photograph also depends upon the conditions existing at the time of exposure such as angle of the sun, topography, moisture, clear or cloudy atmospheric conditions, developing and printing of negatives and positive prints etc.

5.5 Texture

Texture is the frequency of tonal change on the photographic image. Texture is produced by an aggregation of unit features that may be too small to be discerned individually on the photograph, such as tree leaves and leaf shadows. It is a product of their individual shape, size, pattern, shadow and tone. It determines the overall visual "smoothness' or 'coarseness' of image feature. It is also related to photographic scale.

5.6 Shadows

Shadows are important to interpreters in two opposing respects: (1) the shape or outline of a shadow affords an impression of the profile view of objects and (2) objects within shadows reflect little light and are difficult to discern on photographs. Shadows mainly depend upon the time of photography and direction of flight. Shadows falling on the ground beside an object, such as tree, help in knowing the shape of the crown and even length of shadow is useful in height determination. Shadows are not always useful and many times obscure ground details.

5.7 Site or Location

Site refers to topographic or geographic location and is a particularly important aid in the identification of vegetation types. For example, the permanent snow line is generally above 4000m in Himalayas. Species like fir, spruce, chirpine occur at certain elevations and on certain aspects.

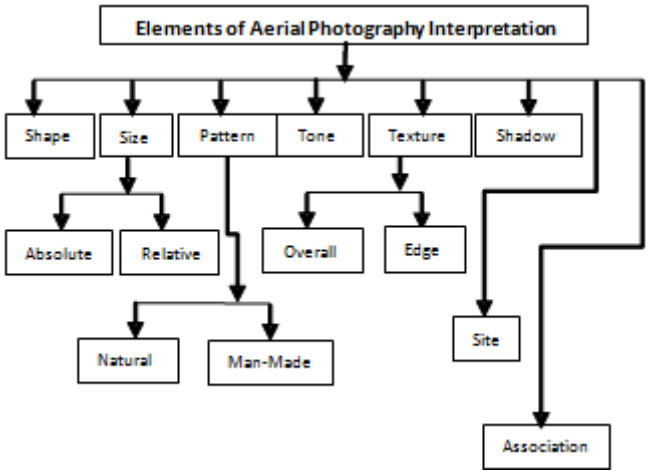

Chart 1

5.8 Association

Association refers to the occurrence of certain features in relation to others. Location and association is not object characteristic but denote its immediate surroundings. Deductive photo interpretation is done while dealing with these two elements and familiarly with the ground conditions is essential in analyzing them example Silver oak; Erythrina species are associated with tea plantations in Nilgiris.

6. Identification of objects on a single aerial photograph

Aerial photograph require interpretation like thematic and photogrammetric interpretation. Thematic interpretation is based on the subdivision of the photograph into areas that are visually distinct. Stereopair give surface relief and texture. Overlapping pairs of photographs provide a three dimensional view of the object photographed. Images on aerial photographed are permanent and unbiased representation of objects occurring on earth surface. In this aerial photograph (in Figure: 13), there are many thematic classes like drainage pattern, settlement, transport, vegetation, surface material, harvested and non – harvested area and topography.

Figure13: Aerial Photograph

6.1 Drainage Pattern

In this aerial photograph, the drainage pattern is dendritic and linear pattern. Dendritic word made of Greek language dendron which means `tree`. In dendritic Pattern, the tributaries meet in the main river on acute angles. (Figure: 14)

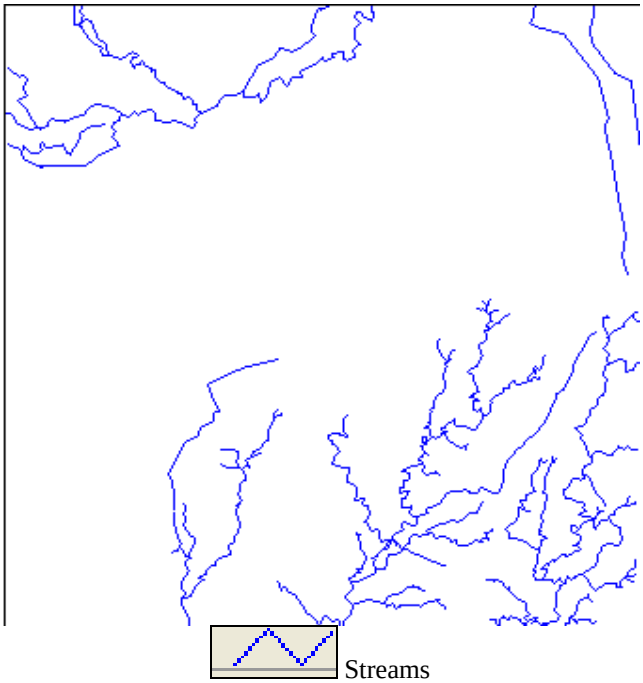

Figure 14: Drainage Pattern

6.2 Transport

In this aerial photograph, transport (roads, railway) pattern is linear. (Figure: 15)

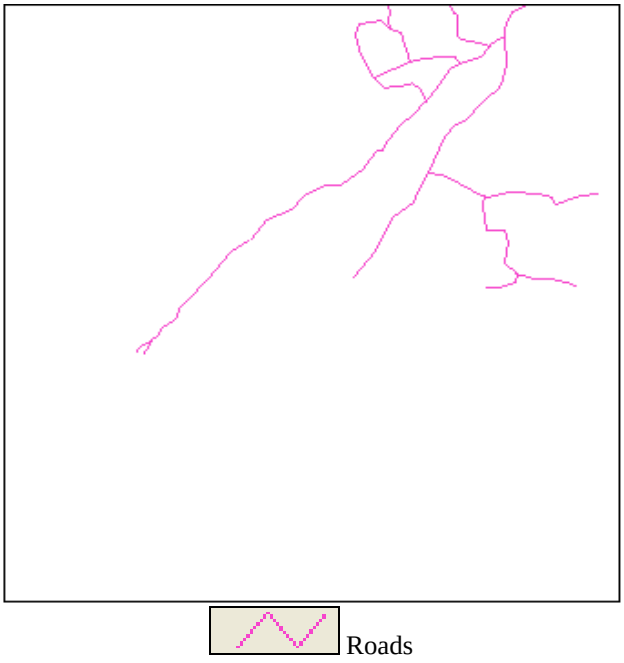

Figure15: Transport

6.3 Settlement

In this aerial photograph, the settlement is cover less area. The settlement pattern is cluster. (Figure: 16)

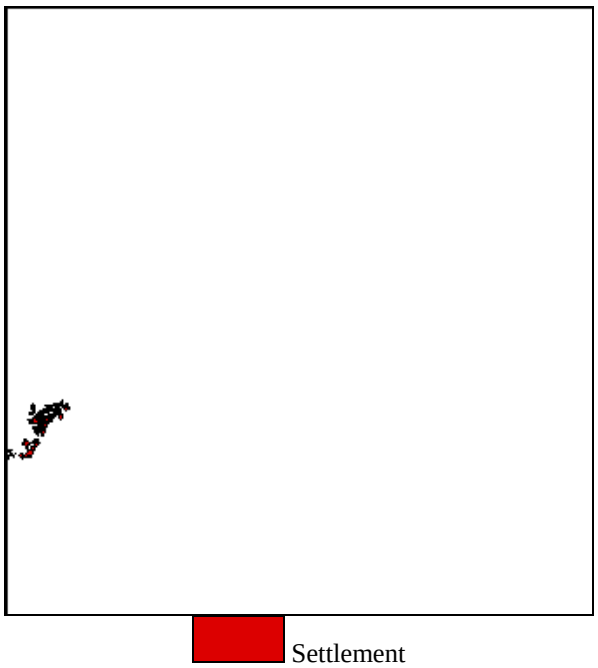

Figure16: Settlement

6.4 Field Pattern

In this aerial photograph**,** the field pattern of harvested area's is rectangular and square. In this aerial photograph, harvested area is more. (Figure: 17)

Figure17: Field Pattern

6.5 Non –Harvested Area

In this aerial photograph, the field pattern of non harvested areas is rectangular and square. In this aerial photograph, non harvested area is less. (Figure: 18)

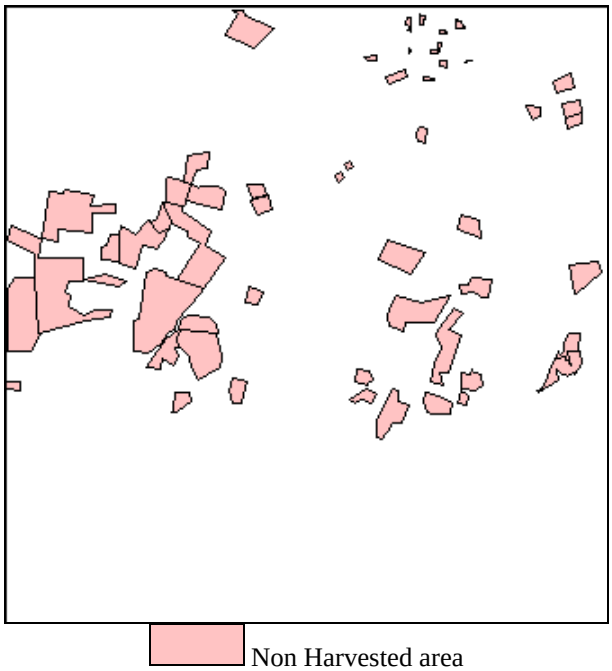

Figure18: Non-Harvested area

6.6 Vegetation

In this aerial photograph, there are major trees along roads and in fields. There is forest area. The forest area is more cover in this aerial photograph. Major trees pattern is linear and cluster. Vegetation's pattern is cluster. (Figure: 19)

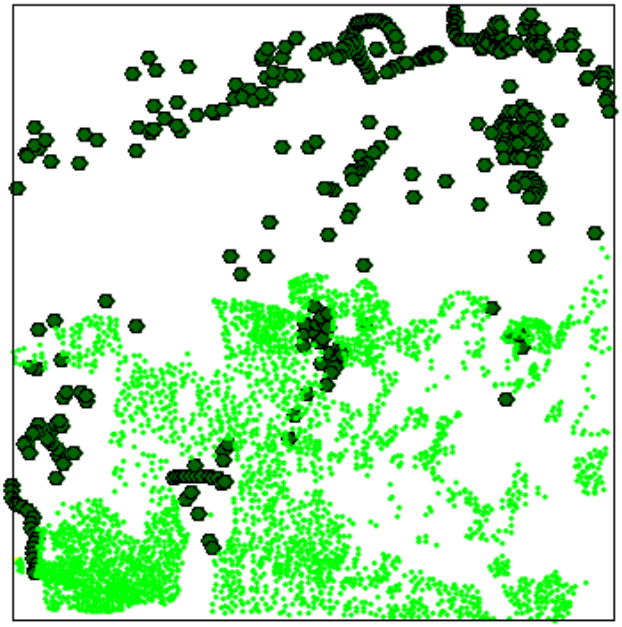

Figure19: Vegetation

6.7 Land-Use Pattern

In this aerial photograph, the area is use for fields, roads, vegetation, streams ect. (Figure: 20)

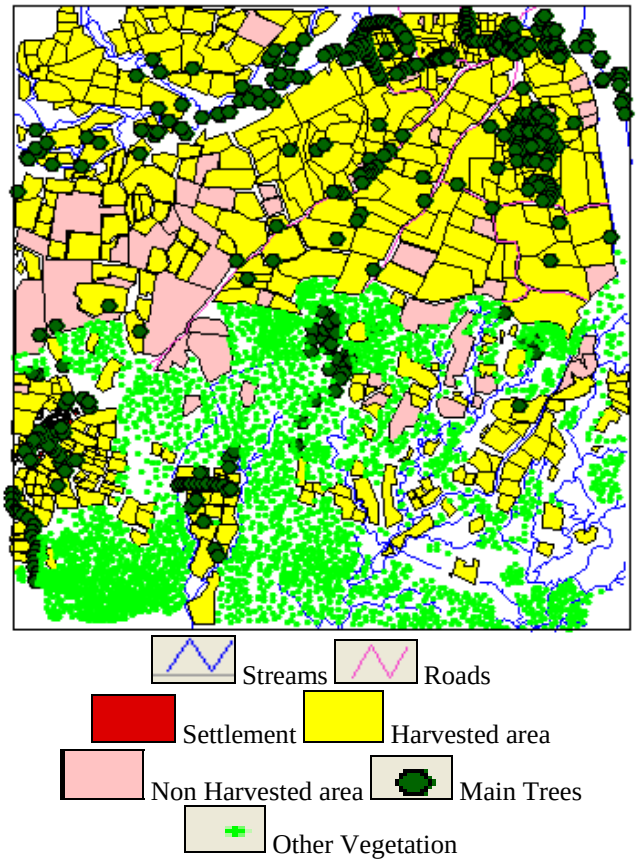

Figure 20: Land-Use Pattern

6.8 Topography

In this aerial photograph, two types of area. One is upland area and second is lowland area. The stream's area is lowland area. And the field area is upland area. (Figure: 21)

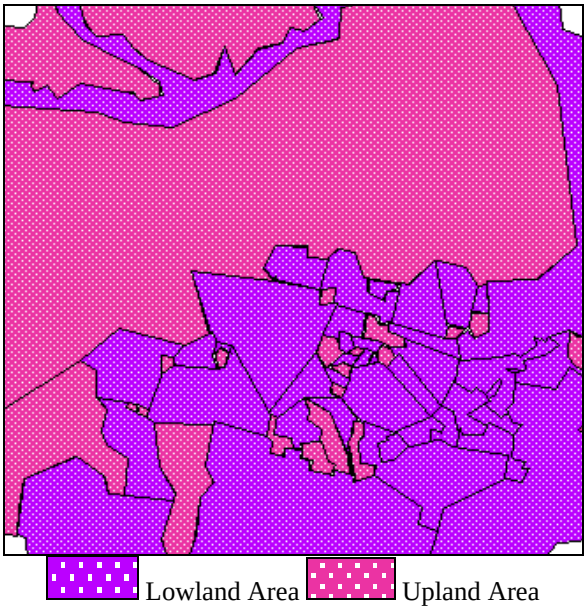

Figure 21: Topography

6.9 Surface Material

In this aerial photograph, two types of surface material. One is fine material and another is coarse material. In this aerial photograph, the fine material is fielded area. And streams are coarse material because streams' water flow surface material. (Figure: 22)

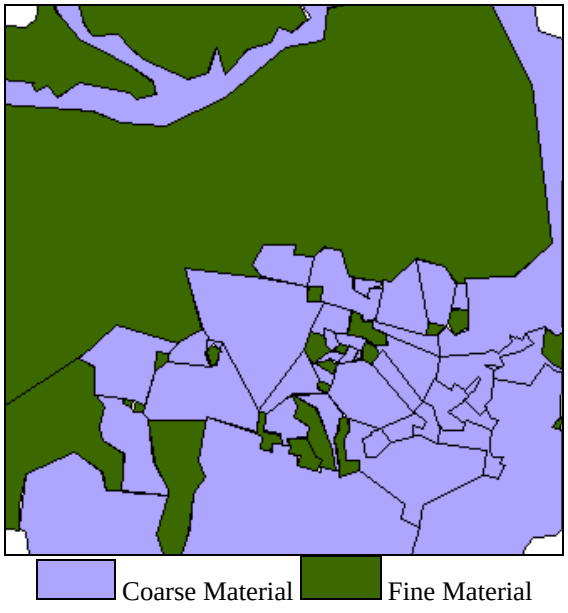

Figure22: Surface Material

7. Conclusion

Aerial photographs became obtaining a much more practical matter with the air plane than it had been with kites and balloons. Photography from air during World War I. The

greatest stimulation to photo interpretation occurred during World War II. The first interpretation of colour emulsions were made using aerial photographs which constituted a step forward in the direction of development of modern remote sensing. Aerial photograph require interpretation like thematic and photogrammetric interpretation. Overlapping pairs of photographs provide a three dimensional view of the object photographed. Images on aerial photographed are permanent and unbiased representation of objects occurring on earth surface. Thematic interpretation is based on the subdivision of the photograph into areas that are visually distinct. Stereopair give surface relief and texture. There are many terms on an aerial photograph like fiducial marks, focal length, altimeter, watch, strip number, task number, agency number, photographic number, Secret, negative number, number of press etc. There are many elements used for the identification of objects on an aerial photographs like shape, size, pattern, tone (or hue), texture, Shadows, site and association. Aerial photography has long been employed for topographic and thematic investigations for which a large number of surface maps which have been prepared using aerial photographs. They are used as guide maps and essentially for delineating boundaries between map units.

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