

UNIT: 5DATA PRODUCTS AND INTERPRETATIONSyllabus:

Photographic and digital products - Types, levels and open source satellite data products - selection and procurement of data - Visual Interpretation: basic elements and interpretation keys - Digital Interpretation - Concepts of image rectification, image enhancement and image classification.

Visual Interpretation:

Image interpretation of remote sensing data is to extract qualitative and quantitative information from the photograph.

It involves identification of various objects on the terrain which may be natural or artificial consists of points, lines or polygons.

In the beginning when digital images and computerised classification were not available the aerial photographs were analyzed only by visual interpretation.

Accuracy of the interpretation depends on the training, experience, scale of photograph, geographic location of the study area, associated map, ground observation data etc.

After the availability of satellite images, the data were categorized in two processing methods.

Analogue aerial photographs Digital satellite images

In image some objects may be readily identifiable while other may not.

The detail to which an image can be analyzed depends on the resolution and scale of the image.

Visual interpretation involves visual analysis of aerial photographs and satellite images.

Visual image interpretation is the process of identifying features seen on the images by an analyst and communication of information obtained from these images to others for evaluating their significance.

⇒ Elements of Visuals Interpretation :

Interpretation of aerial photographs and images are different because of three important aspects:

The portrayal of features from an overhead often unfamiliar, perspective.

The frequent use of wavelengths outside of the visible portion of the spectrum.

The depiction of the earth's surface at unfamiliar scales.

Eight fundamental elements are used in the interpretation of remote sensing images. They are

- Tone (color)
- Texture
- Size
- Shape
- Pattern
- Shadow
- Site
- Association

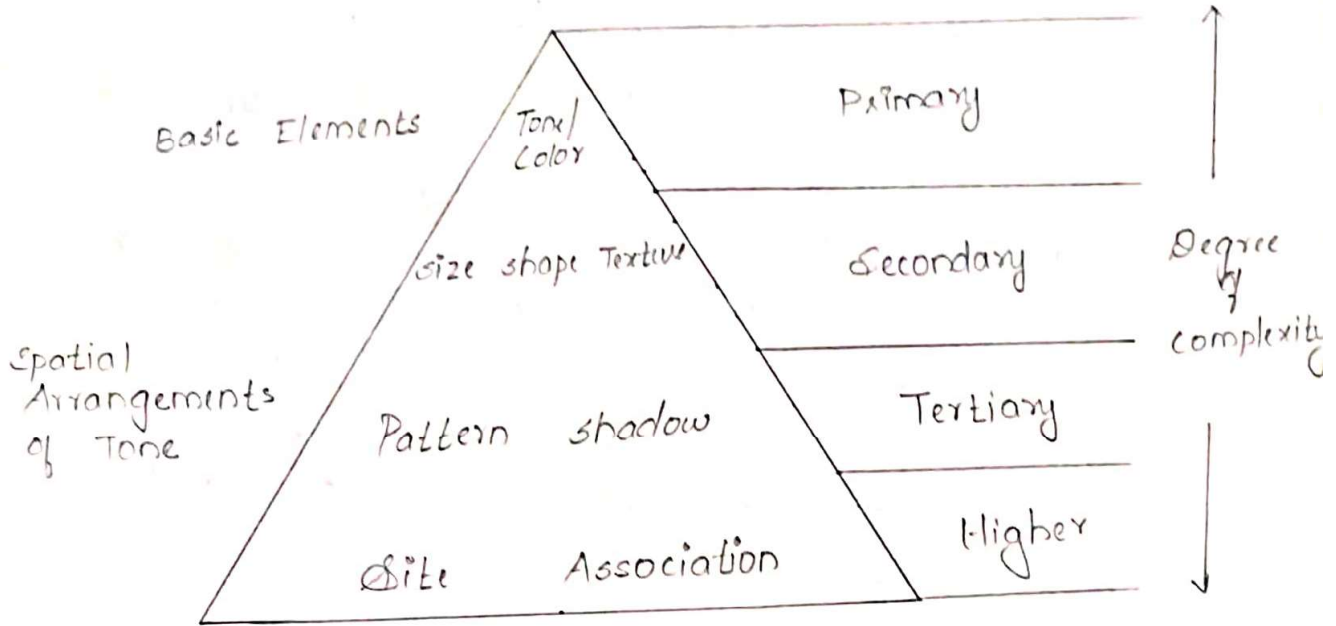


Fig: Ordering of image elements in image interpretation

(i) Tone (or) Color:

Tone is the relative brightness of grey level on black and white image or color image.

Tone is the measure of the intensity of the reflected or emitted radiation of the objects of the terrain.

Lower reflected objects appear relatively dark and higher reflected objects appear bright.

Rivers does not reflect in NIR region: thus appear black and the vegetation reflects much thus appears bright.

False color composite (FCC) using NIR, red and green are most preferred combination for visual interpretation.

(ii) Texture:

Texture refers to the frequency of tonal variation in an image.

Texture is produced by an aggregate unit of features which may be too small.

It depends on shape, size, pattern and shadow of terrain features.

Texture is always scale or resolution dependent. Same reflected objects may have difference in texture helps in their identification.

Smooth texture refers to less tonal vibration and rough texture refers to abrupt tonal vibration in an image.

(iii) Pattern:

Pattern refers to the spatial arrangements of the object.

Objects both natural and manmade have a pattern which aids in their recognition.

The repetition of certain general form or relationship in tones and textures creates a pattern.

(iv) Size:

Size of objects on images is important to assess the size of a target relative to other objects in the scene, as well as the absolute size to aid in the interpretation of that target.

The most measured parameters are length, width, perimeter, area and occasionally volume.

(v) Shape:

Shape refers to the general form, configuration, or outline of an individual object.

(3)

Shape is one of the most important single factors for recognizing object from an image. ROHINI COLLEGE OF ENGINEERING & TECHNOLOGY

Generally regular shapes, squares, rectangles, circles are signs of man-made objects. Eg: Buildings, roads etc.

Whereas irregular shapes, with no distinct geometrical patterns are signs of a natural environment. Eg: River, Forest.

(vi) Shadow:

Shadow is a helpful element in image interpretation. It also creates difficulties for some objects in their identification in the image.

Knowing the time of photography, we can estimate the solar elevation which helps in height estimation of objects.

Shadow is also useful for enhancing or identifying topography and landforms particularly in radar image.

(vii) Association:

Association refers to the occurrence of certain features in relation to other objects in the imagery.

In urban area a smooth vegetation pattern generally refers to a playground or grass land not agricultural land.

(viii) Site:

Site refers to topographic or geographic location.

It is also an important element in image interpretation when objects are not clearly identified using the previous elements.

A very high reflectance feature in the Himalayan valley may be snow or cloud but in Kerala it is not snow.

⇒ Interpretation Keys:

The criterion for identification of an object with interpretation elements is called an interpretation key. It provides guidance about the correct identification of features or conditions on the images.

There are eight interpretation keys available namely,

- Size
- Shape
- Shadow
- Tone
- Colour
- Texture
- Pattern
- Association

For agricultural and tree species identification a number of keys have been employed based on location and season.

Besides these, the time the photograph is taken, film type and photo scale should be considered while developing interpretation keys.

Interpretation keys for forestry mapping is given in the below table.

There are two types of keys: Selective key and Elimination key.

Selective key: It is also called reference key which contains numerous examples images with supporting text.

Elimination key: It is also called dichotomous keys where the interpreter makes a series of choices between two alternatives and progressively eliminates all but one possible answer.

Species	Crown shape	Edge of crown	Tone	Pattern	Texture
Cedar	Conical with sharp spear	Circular and sharp	Dark	spotted grain	Hard and Coarse
Cypress	Conical with round crown	Circular but not sharp	Dark but lighter than cedar	spotted	Hard and Fine
Pine	Cylindrical with shapeless crown	Circular but unclear	Light and unclear	Irregularly spotted	soft but coarse
Larch	Conical with unclear crown	Circular with unclear edge	Lighter than cypress	spotted	Soft and Fine
Fir / Spruce	Conical with wide crown	Circular with zig zag edge	Dark and clear	Irregular	Coarse
Deciduous	Irregular shapes	Unclear	Lighter	Irregular	Coarse

Digital Interpretation:

Digital interpretation facilitates quantitative analysis of digital data with the help of computers to extract information about the earth surface.

Digital interpretation is popularly known as Image Processing.