


# IMAGE INTERPRETATION

- Images of the Earth you see on the computer are taken from cameras mounted on aircraft or satellites in space
  - Images from aircraft are called aerial photographs
  - Images from satellites are called satellite imagery
  - Maps are representational drawings of Earth features while images are actual pictures of the Earth
- 
- 
- Ex: We may be able to see roads on an image, but are not labeled as roads. Image interpretation helps in identifying the image features for further use
  - Image interpretation is the act of examining photographic (or, satellite) images for the purpose of identifying objects and judging their significance
  - Ex: Identification and classification of structural faults and lineaments from a satellite image

# IMAGE INTERPRETATION

- Image interpretation is a method (process) of deriving useful information from the raw image

- Image interpretation requires

Knowledge of the subject of interest (and associated fields)

Knowledge of geographic region of interest

~~Knowledge of remote sensing system~~

- Remote Sensing based Image Interpretation differs from regular (human eye / photograph) interpretation as:

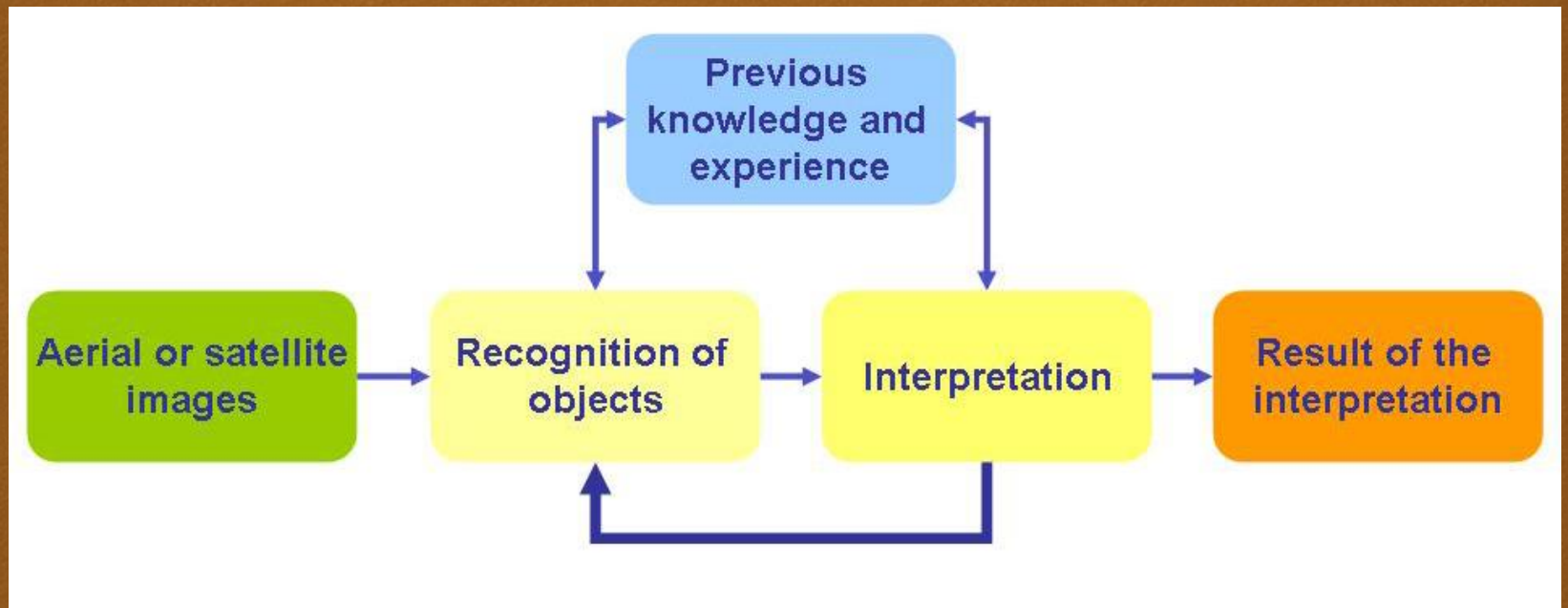
Images are portrayed from overhead view

Images use radiation outside Visible Region (most generally)

Images are taken at unfamiliar scales and resolutions



# IMAGE INTERPRETATION



# IMAGE INTERPRETATION

- Image interpretation Elements

- Image tone ; Image texture ; Shadow ; Pattern ; Association ; Shape ; Size ; Site



- Image interpretation Tasks

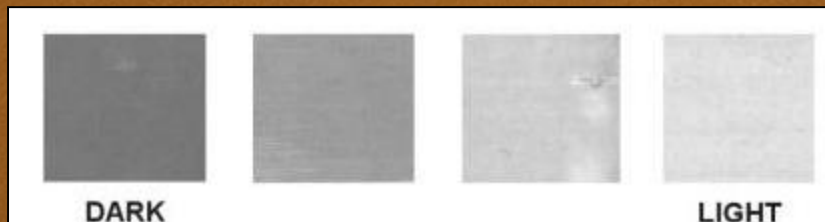
- Classification ; Detection ; Recognition ; Identification ; Enumeration ; Mensuration ; Delineation



# IMAGE INTERPRETATION ELEMENTS

## IMAGE TONE (COLOUR)

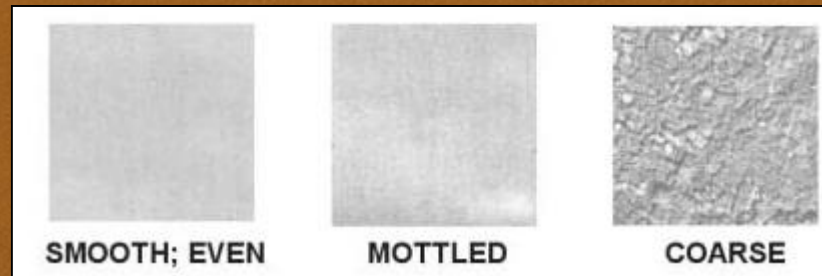
- Denotes the lightness or darkness of a region within an image
- For B/W Images: Light; Medium Gray; Dark Gray; Dark
- For Colour / CIR Image: Tone simply refers to colour (Pale Green; Dark Blue; ....)
- Image tone is influenced by Intensity of Radiation; Angle of Illumination; and Processing of Films



# IMAGE INTERPRETATION ELEMENTS

## IMAGE TEXTURE

- Refers to the apparent roughness or smoothness of an image region
- Caused by pattern of highlighted and shadowed areas created when an irregular surface is illuminated from an oblique angle
- Ex: A mature forest is rough in texture where as a mature wheat crop is smooth in texture
- Image texture depends on: Nature of surface; Angle of illumination

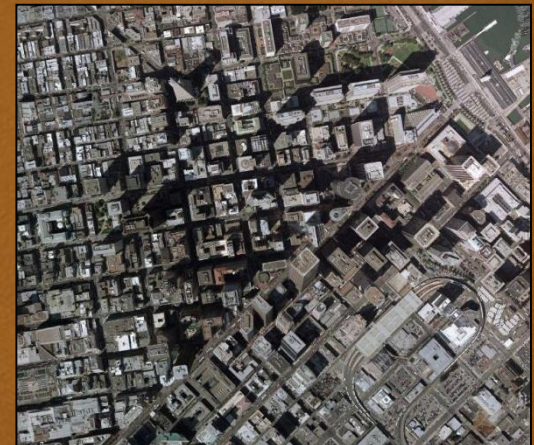
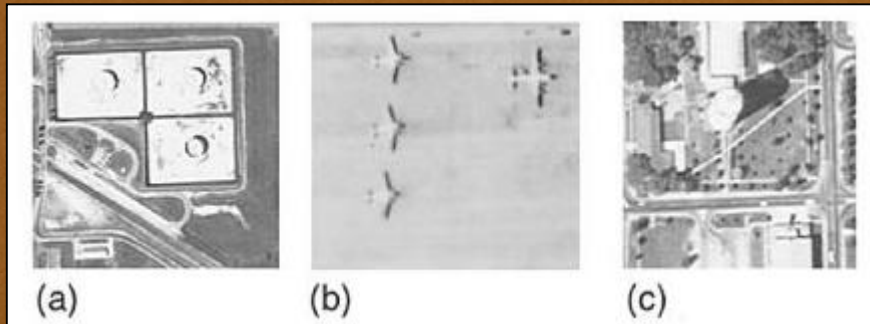




# IMAGE INTERPRETATION ELEMENTS

## SHADOW

- An object when illuminated at an angle, casts a shadow that may reveal characteristics of its size (or) shape, that would not be obvious from the overhead view alone
- Shadows can provide information about an object's height and shape





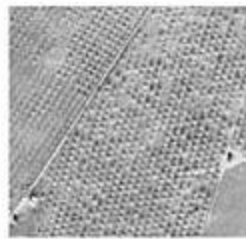
# IMAGE INTERPRETATION ELEMENTS

## *PATTERN*

- Arrangement of individual objects into distinctive recurring forms that facilitate their recognition on aerial imagery
- Pattern usually follows a functional relationship between the individual features
- Man-made features, such as cities tend to have very regular patterns, while natural features do not have regular patterns



(a)



(b)



(c)



(d)



# IMAGE INTERPRETATION ELEMENTS

## *ASSOCIATION*

- Specifies the occurrence of certain objects or features, usually without strict spatial arrangement implied by a pattern
- You can identify an object by what is surrounding it, or what it is associated with



# IMAGE INTERPRETATION ELEMENTS

## SHAPE

- The general outline of objects can help you determine what they are
- Some objects have very distinct shapes while others are more difficult to distinguish
- Man-made features tend to have straight edges while natural features do not





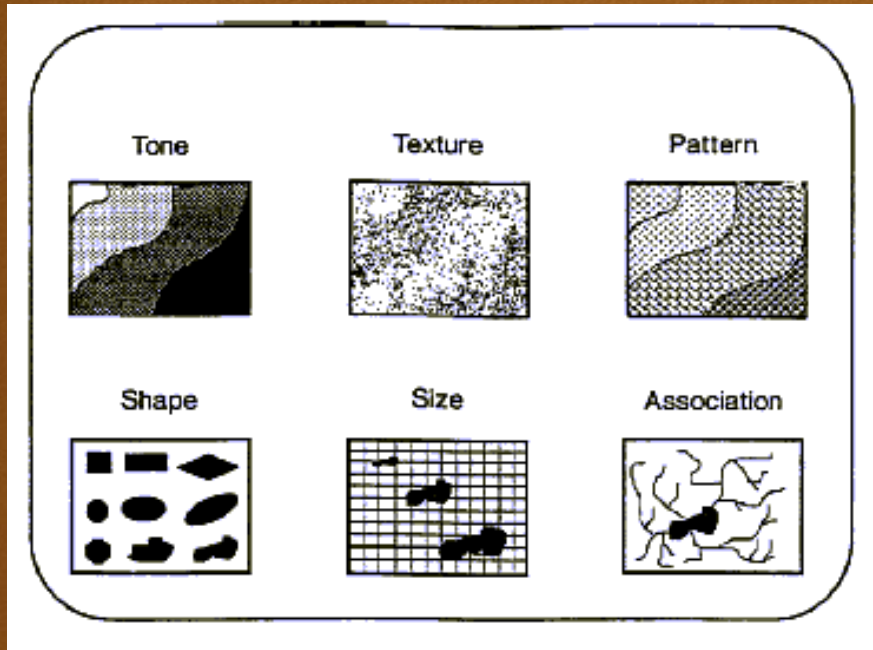
# IMAGE INTERPRETATION ELEMENTS

## SIZE

- The size of an object can help you interpret what it is
- Size is important in two ways
  - 1) Relative size of an object (or feature) in relation to other objects on the image details image scale and resolution
  - 2) Absolute measurement of size of an object can confirm its identification, permit derivation of quantitative measurements (length, area, ...)



# IMAGE INTERPRETATION ELEMENTS





# IMAGE INTERPRETATION TASKS

## CLASSIFICATION

- Assignment of objects, features, or areas to 'classes' based on their appearance on the image
- Can occur at three levels of confidence
- Detection → Determination of the presence or absence of a feature
- Recognition → Assigning an identity to an object
- Identification → Specify an object (or, feature) with enough confidence and detail to place it in a very specific class

## ENUMERATION

- Listing or Counting discrete items visible on an image
- Ability to conduct enumeration depends on ability to accurately identify / classify the objects

# IMAGE INTERPRETATION TASKS

## MEASUREMENT

- Measurement (Mensuration) has two components

- 1) Photogrammetric Measurement → Measurement of distances, heights, areas, or volumes of features

Applied to photographs (or) satellite images

- 2) Photometric Measurement → Measurement of intensity of light in visible region

Densitometers are used to examine the scene brightness


If the measurement is outside the visible spectrum, radiometry principles are applied





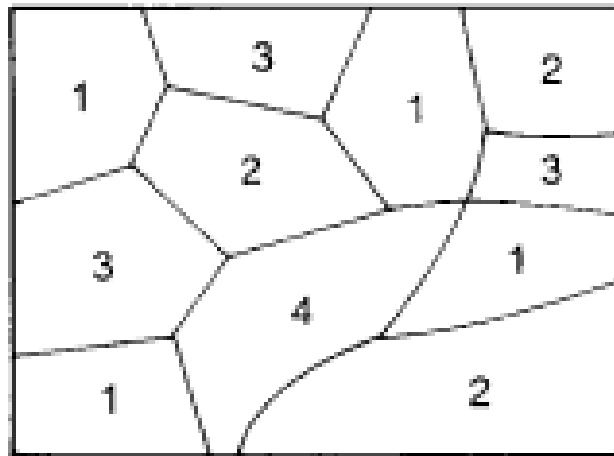
# IMAGE INTERPRETATION TASKS

## *DELINEATION*

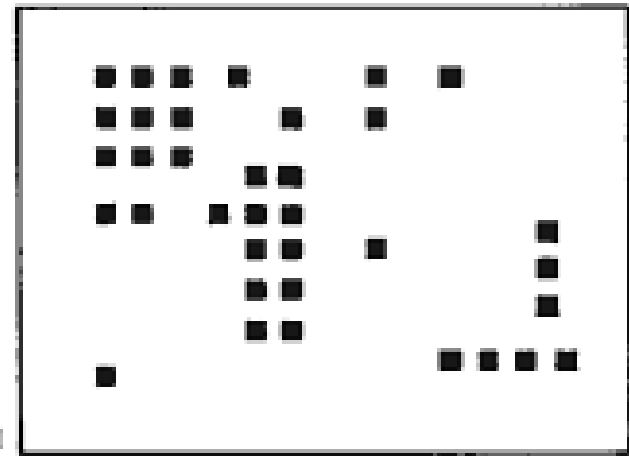
- The process of outlining (making boundaries) of features as they are observed on remotely sensed images
  - Delineation is the process of identifying the edges or boundaries between separate areas
  - *Problems during delineation* 

---
- 1) Selection of appropriate levels of generalization (when boundaries are intricate)
  - 2) Placement of boundaries when there is a gradation (rather than a sharp edge)

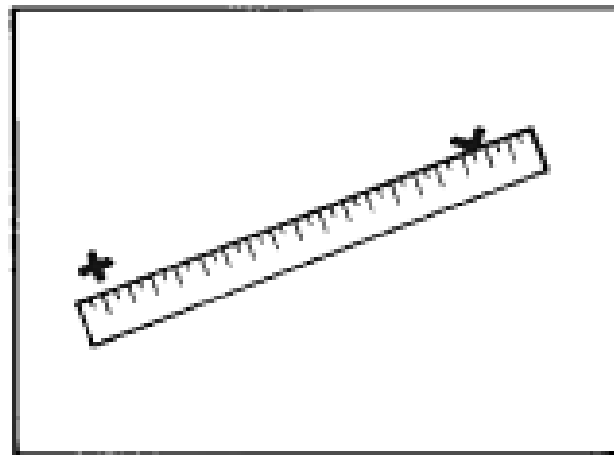
(a)



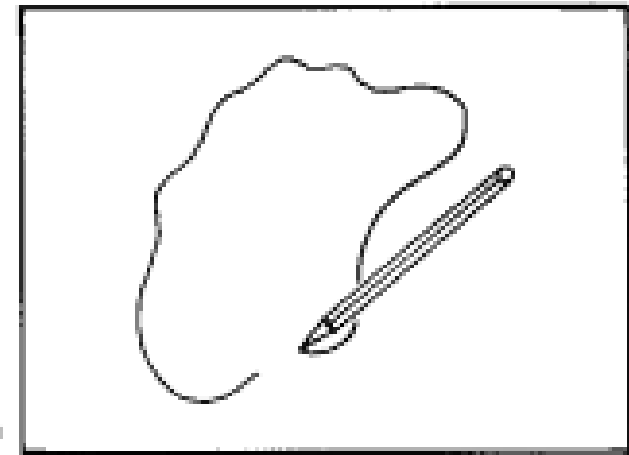
(b)



(c)



(d)





# IMAGE INTERPRETATION KEYS

- Reference material designed to permit rapid and accurate objects or features represented on aerial images
- A KEY consists of TWO parts
  - 1) A collection of annotated or captioned images, or stereograms
  - 2) A graphic or word description, possibly including sketches and diagrams
- Image interpretation keys are valuable aids for summarizing complex information portrayed as images
- Image Interpretation Keys serves two purposes
  - 1) Means of training inexperienced personnel
  - 2) Reference aid for experienced interpreters

# IMAGE INTERPRETATION KEYS

**Table 7.5.2 A sample of LANDSAT image's interpretation key**

	band 4	band 5	band 6	band 7	457(BGR)	457(RGB)
Snow	PW	PW	PW	PW	PW	PW
Cloud	W	W	W	W	W	W
Haze	W	W	-	-	W	W
Forest	DGR	BL	W	W	R	G
Grass	GR	DG	W	W	P	BY
Bare land	GR	W	W	W	W	W
Wet land	GR	W	GR	DGR	LB	RP
Urban	GR	W	GR	DGR	LB	RP
Water	DGR	BL	BL	BL	B	BP
Shadow	BL	BL	BL	BL	BL	BL

PW: pure white

R: red      G: green

LB: light blue

W: white

B: blue

RP: reddish purple

DGR: dark gray

P: pink

BY: brandish yellow

GR: gray

BL: black

BP: blueish purple



# IMAGE INTERPRETATION KEYS

**Table 7.5.1 Interpretation keys for forestry**

species	crown shape	edge of crown	tone	pattern	texture
ceder	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 ceder	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 wider crown	circular with zigzag edge	dark and clear	irregular	coarse
deciduous	irregular shapes	unclear	lighter	irregular	coarse

(by country of Japan Association of Forestry)

QUESTIONS ??

