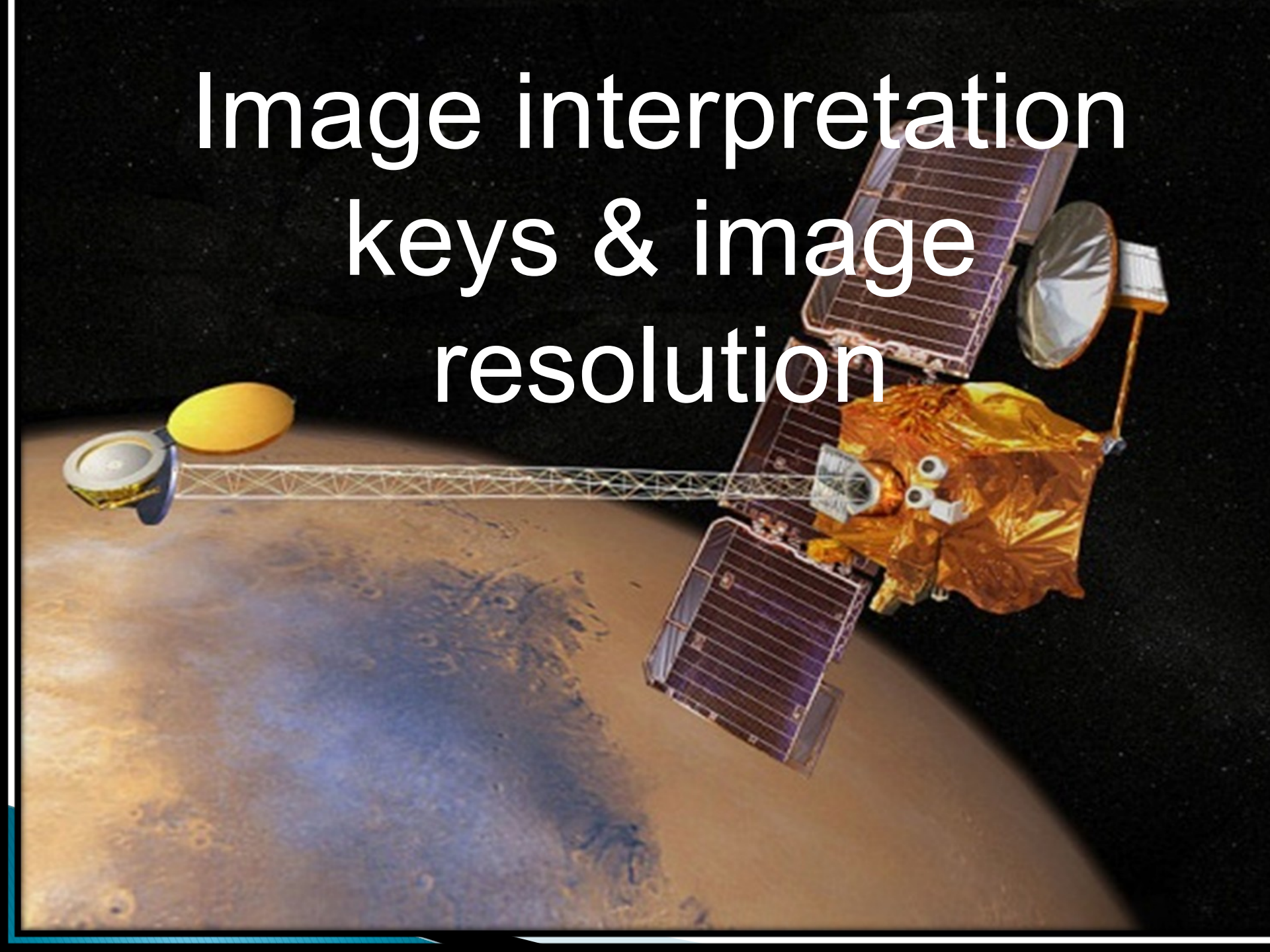
Image interpretation keys & image resolution



CONTENTS

- Introduction
- Image interpretation keys
- Image resolutions
- Conclusion
- Reference

Introduction

- Remote sensing is the process of sensing and measuring objects from a distance without directly coming physically into contact with them. According to the physics of remote sensing, different surface objects return different amounts of energy in different wavelength of the electromagnetic spectrum. Remote sensing through airborne and satellite based across covers surveying and monitoring which are essential for the planning and management of national resources

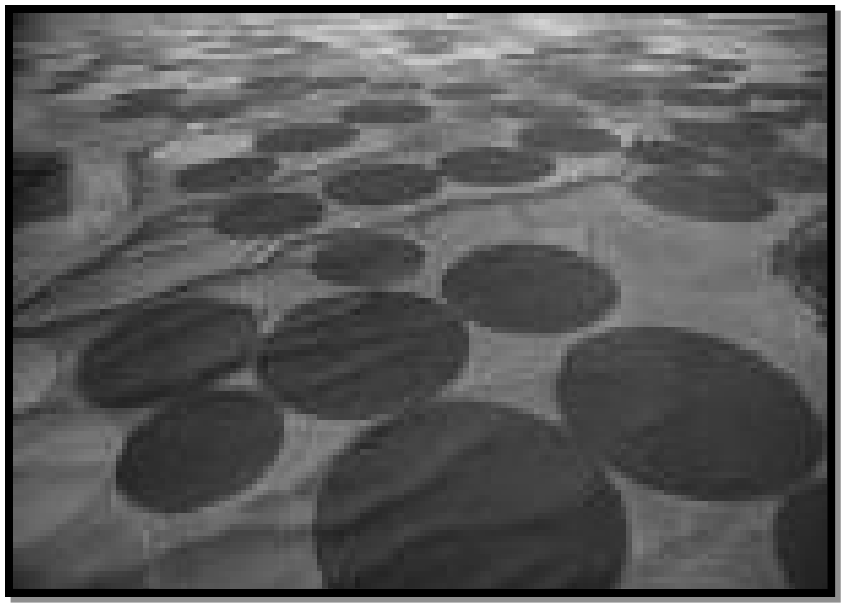
Image interpretation keys

- A systematic study of aerial photographs and satellite imageries usually ,involves several characteristics of features shown on an image and it depend upon field of application.
- Most of the application consider the following basic characteristics or variation in them ,which aid the visual interpretation process of satellites imagery
- Although there is a difference of opinion on the number of elements ,there is namely tone,size,shape,texture,pattern,location,association,shadow and resolution

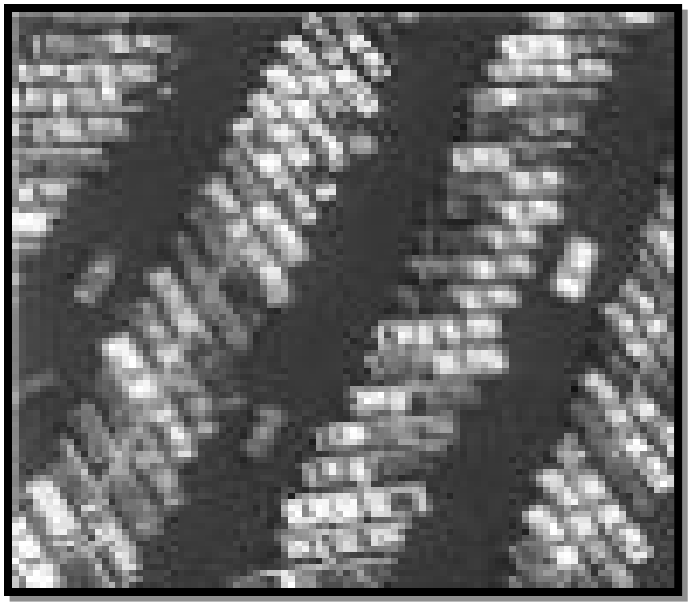
IMAGE INTERPRETATION KEYS

Tone:- refers to the relative brightness or colour of objects in an image. Generally, tone is the fundamental element for distinguishing between different targets or features. Variations in tone also allows the elements of shape, texture, and pattern of objects to be distinguished.

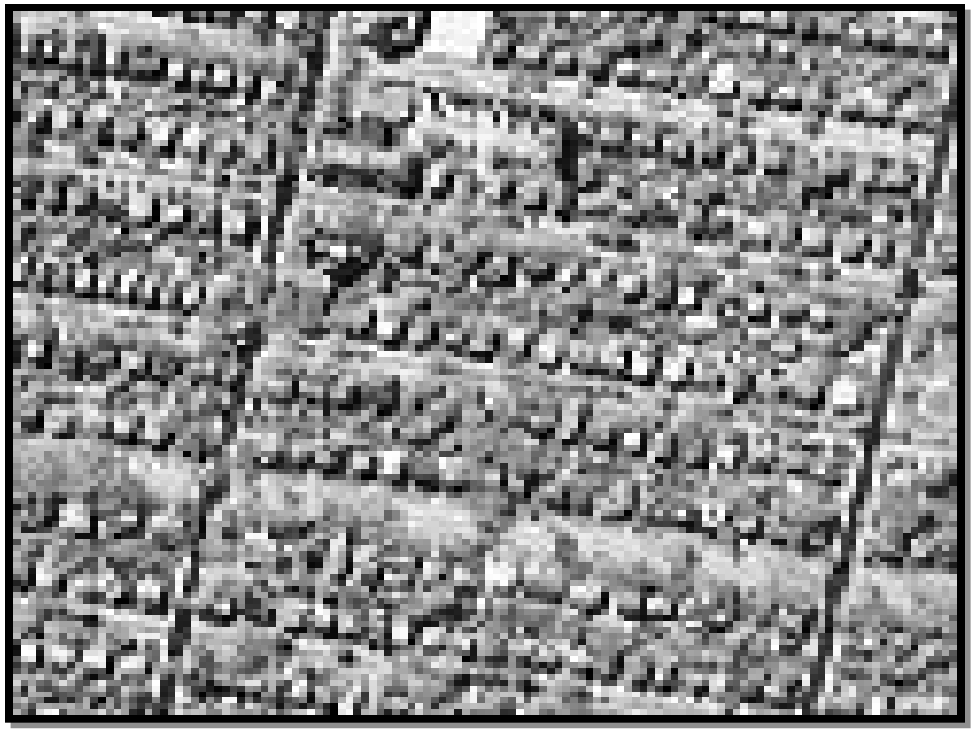
Shape:- refers to the general form, structure, or outline of individual objects. Shape can be a very distinctive clue for interpretation. Straight edge shapes typically represent urban or agricultural (field) targets, while natural features, such as forest edges, are generally more irregular in shape, except where man has created a road or clear cuts. Farm or crop land irrigated by rotating sprinkler systems would appear as circular shapes



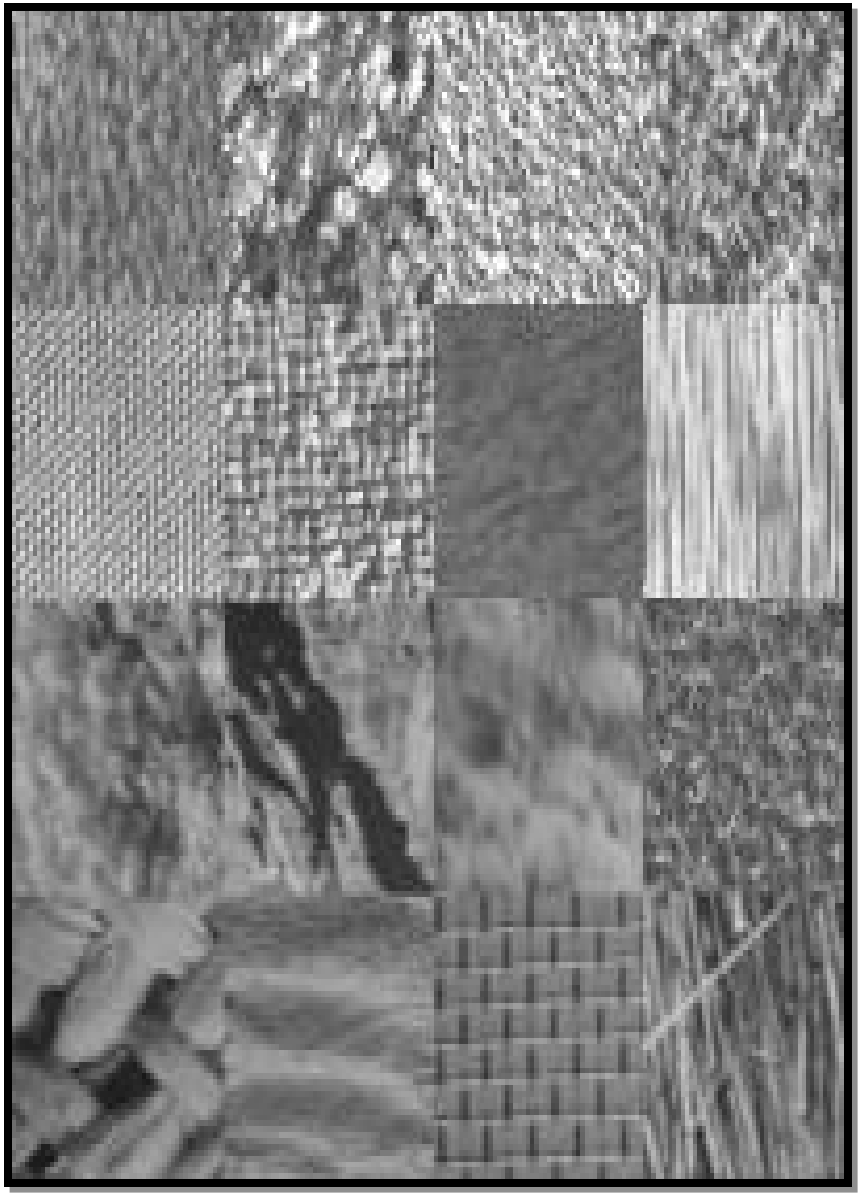
Size:- of objects in an image is a function of scale. It is important to assess the size of a target relative to other objects in a scene, as well as the absolute size, to aid in the interpretation of that target. A quick approximation of target size can direct interpretation to an appropriate result more quickly. For example, if an interpreter had to distinguish zones of land use, and had identified an area with a number of buildings in it, large buildings such as factories or warehouses would suggest commercial property, whereas small buildings would indicate residential use.



Pattern:- refers to the spatial arrangement of visibly discernible objects. Typically an orderly repetition of similar tones and textures will produce a distinctive and ultimately recognizable pattern. Orchards with evenly spaced trees, and urban streets with regularly spaced houses are good examples of pattern.



Texture:- refers to the arrangement and frequency of tonal variation in particular areas of an image. Rough textures would consist of a mottled tone where the grey levels change abruptly in a small area, whereas smooth textures would have very little tonal variation. Smooth textures are most often the result of uniform, even surfaces, such as fields, asphalt, or grasslands. A target with a rough surface and irregular structure, such as a forest canopy, results in a rough textured appearance. Texture is one of the most important elements for distinguishing features in radar imagery.



Shadow:- is also helpful in interpretation as it may provide an idea of the profile and relative height of a target or targets which may make identification easier. However, shadows can also reduce or eliminate interpretation in their area of influence, since targets within shadows are much less (or not at all) discernible from their surroundings. Shadow is also useful for enhancing or identifying topography and landforms, particularly in radar imagery.

Association:- takes into account the relationship between other recognizable objects or features in proximity to the target of interest. The identification of features that one would expect to associate with other features may provide information to facilitate identification. In the example given above, commercial properties may be associated with proximity to major transportation routes, whereas residential areas would be associated with schools, playgrounds, and sports fields. In our example, a lake is associated with boats, a marina, and adjacent recreational land.

Site:-refers to the vocational characteristic of object such as topography, soil, vegetation and cultural features

IMAGE RESOLUTION

- Image resolution describes the detail of an image. The term applies to raster digital images, film images and other type of images. Higher resolution

  means more image details they are

1 Pixel resolution

2 Spatial resolution

3 Spectral resolutions

4 Temporal resolutions

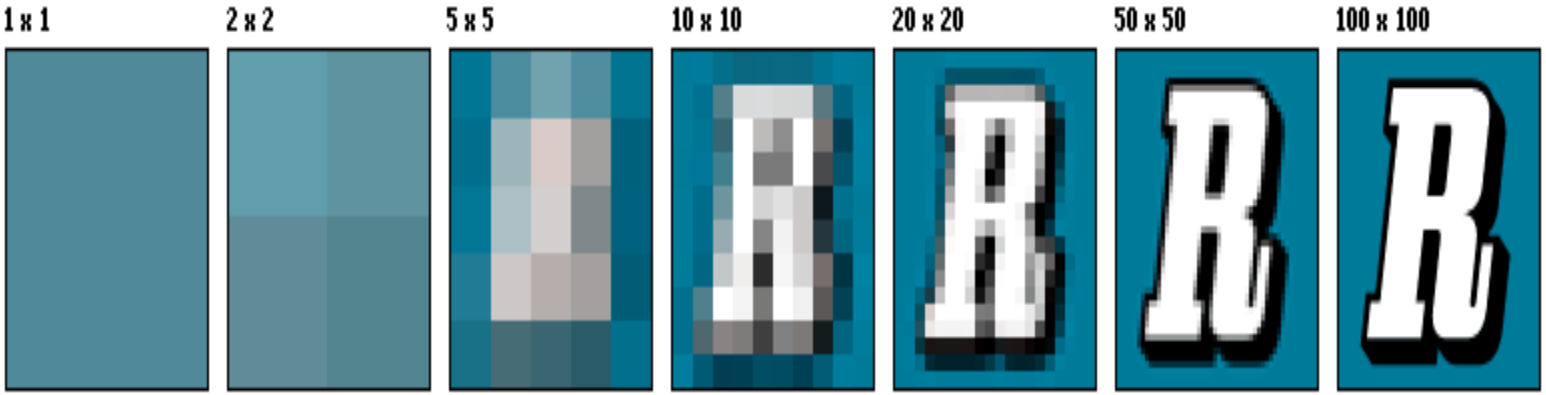
5 Radiometric resolutions

Pixel resolutions

- The term resolutions is often used for pixel count in digital imaging. An image of N pixels high by M pixels wide can have any resolutions less than n lines per picture height. But when the pixel counts are referred to as resolutions
- Another popular convention is to lite resolutions as the total number of pixels in the image. Typically given as number of megapixels

Below is an illustration of how the same image might appear at different pixel resolutions, if the pixels were poorly rendered as sharp squares (normally, a smooth image reconstruction from pixels would be preferred, but for illustration of pixels, the sharp squares make the point better).

Resolution illustration.png



Spatial resolutions

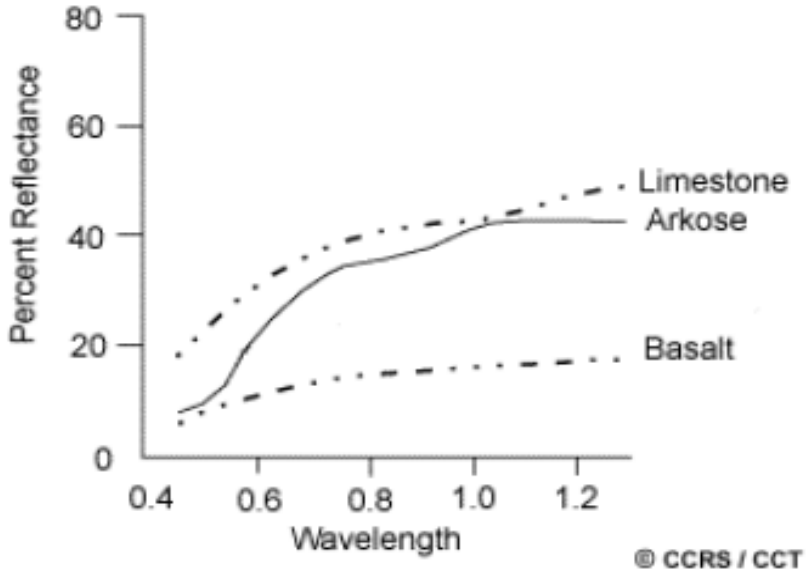
- The measure of how many closely lines can be resolved in an image is called spatial resolution, and it depends on properties of the system creating the image, not just the pixel resolution in pixel per inch.
- In GIS spatial resolution is measured by the ground simple distance of an image

Spatial resolution

Images where only large features are visible are said to have **coarse or low resolution.** In **fine or high resolution** images, small objects can be detected. Military sensors for example, are designed to view as much detail as possible, and therefore have very fine resolution. Commercial satellites provide imagery with resolutions varying from a few metres to several kilometres. Generally speaking, the finer the resolution, the less total ground area can be

SPECTRAL RESOLUTION

- Color images distinguish light of different spectra.
- Multi-spectral images resolve even finer differences spectrum or wave length than is needed to reproduce color



In Chapter 1, we learned about **spectral response** and **spectral emissivity curves** which characterize the reflectance and/or emittance of a feature or target over a variety of wavelengths. Different classes of features and details in an image can often be distinguished by comparing their responses over distinct wavelength ranges. Broad classes, such as water and vegetation, can usually be separated using very broad wavelength ranges - the visible and near infrared - as we learned in section 1.5. Other more specific classes, such as **different rock types**, may not be easily distinguishable using either of these broad wavelength ranges and would require comparison at much finer wavelength ranges to separate them. Thus, we would require a sensor with higher **spectral resolution**. Spectral resolution describes the ability of a sensor to define fine wavelength intervals. The finer the spectral resolution, the narrower the wavelength range for a particular channel or band.

TEMPORAL RESOLUTION

- Movie camera and high speed cameras can resolve events at different point in time.
- The time resolution used for movies is usually 15-30 frames/sec,while high speed cameras resolve 100-1000 frames one even more

RADIOMETRICRESOLUTION

- It determines how finely a system can represent and is usually expressed as a number of levels or a number of bits. The higher radiometric resolution the better sub difference of intensity or reflectivity can be represented at least in theory.

Conclusion

- i) Elements of image such as size, shape, pattern, texture, shadow, association and site helps in the identification of different object in a scene and it contain considerable information.

- ii) The technique of interpreting can easily understanding the identification of the images and interpreted the studies.

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Thank You!