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Commentary

Improved Image Resolution Using Spatial Frequency for Remote Sensing Applications

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DESCRIPTION

Remote sensing can be defined as that part of science which collects information regarding the earth, sea surfaces, earth's atmosphere, clouds among other envirnomental factors using devices that are kept in satellites or aircraft without any direct physical contact. In all RS techniques, the interaction of Electromagnetic Radiation (EMR) with various objects, atmosphere, earth surface, etc. not only can provide distance information but also can extract information such as direction, wavelength and the polarization of the reflected electromagnetic wave. Thus, RS can provide both distance information and also the characteristics associated with the objects/materials. When it comes to satellite RS techniques one or group of satellites containing the RS instruments are employed to obtain information about an object or phenomenon related to earth's surface.

The geometry of the orbit and the period are two distinct parameters that are used to classify satellites. In RS, Geostationary orbits, sun-synchronous orbits, and equatorial orbits are the three types of orbits commonly used. Based on the application one of the satellite orbits will be considered. The rate at which the information about the entire earth is gathered depends on the characteristics related to sensors and orbit. There are two ways in which the sensors used in RS techniques can interact with earth, passively and actively. In the case of passive RS sensors, illumination of the earth's surface is due to the solar radiation and the reflection from the surface is detected by the sensor. A near-visible and near-infrared region in the electromagnetic spectrum will be utilized. The power of the reflected radiation by the passive sensor depends on several characteristics of the earth such as temperature, surface composition, roughness and so on. Some of the satellites like GEOEYE, LANDSAT, PLEIADES and EROS employ passive sensors.

On the other hand, active sensors produce their own energy for illumination and detect the reflection from this illumination rather than solar radiation. Most of the active sensors work in the microwave region of the electromagnetic spectrum making it possible to penetrate the Earth's atmosphere and illuminate the object or phenomenon. Light Detection and Ranging (LIDAR), scatterometer, Synthetic Aperture Radar (SAR), In the case of both active and passive sensors, certain terms need to be understood before going deep into the various RS techniques. As mentioned earlier, the basic operation in RS is to measure the radiation reflected by the earth's surface which is done with the help of devices known as sensors. The sensor measurements are direct result of the interaction between radiation and several physical aspects of earth and these measurements will be associated with some coordinate system creating a function for representing the image. When it comes to RS sensors, one of the main important parameters that need clarity is resolution.

CONCLUSION

There are different types of resolution associated with sensors such as spatial resolution, radiometric resolution, spectral resolution, temporal resolution. In simple words, resolution means how much amount of information can be gathered by the sensor or how much amount of detail is present in the image so obtained from the sensor. That is, higher the resolution higher will be the details in the image. The spatial and spectral resolutions are of utmost importance as far as the thesis is concerned, as a result they are explained here and the remaining resolutions. Spatial resolution can be defined as the geometrical property of the imaging system in many ways. It can be thought of as the ability of the sensor to distinguish two closely separated objects. It can also be defined as the ability to evaluate the frequency of repetitive targets. In some context spatial resolution is defined as how good the spectral properties of small targets can be measured.

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