Image Preprocessing in GIS

Errors in collected Data

-) Radiometric errors change in value(Digital Number DN) error in an image).
- Geometric errors change the position of a DN value

Errors

Internal (systematic/predictable) can be modelled ; find the model and correct the error

External(Non –systematic/ non-predictable)

Approximate the reality

Radiometric Correction

Correcting the data for sensor irregularities and unwanted sensor or atmospheric noise, and converting the data so they accurately represent the reflected or emitted radiation measured by the sensor.

Geometric Correction

Correcting the geometric distortions due to sensor-earth geometry variations,and conversion of the real data to real world coordinates on the surface.

Sources of radiometric errors

System errors(mechanical, electrical or communication failures)

- Dropouts
- Stripping/banding
- Line-start

Dropped Lines

Possible cause:

- Failure of a detector
- Bad transmission

- Storage defect

Dropped Lines(correction)

Correction is a cosmetic operation, no data available, based on spatial auto-correlation of continuous physical phenomena

- Replacement(line above, below)
- Average line above and below
- Correlation

Sources of Geometric Errors

Systematic distortions:

Due to sensor and platform motion, and the geometric relationship of the platform with the earth: Scan skew, mirror rotation , Earth curvature

Non-Systematic distortion or random error:

Due to altitude and altitude of platform

- Scan Skew : It is caused by the forward motion of the platform during the time required for each mirror sweep.
- The ground swath is not normal to the ground track but is slightly skewed , producing cross-scan geometric distortion.
- Earth Curvature : It is the curvature of the earth surface over the swath causes greater effect.At the edges of the swath the earth surface is having stretched areas.
- Earth rotation : Earth rotates west to east and satellite moves east to west.