# Processing of Thermal Imagery by using Pixel Block Intensity Modulation and adding spatial details to Thermal Image

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# Abstract: There is always a need to get the thermal information from the satellite at very fine spatial resolution. In Remote Sensing the fine resolution satellite data upto some extent is available in reflectance band but it is not possible to get such a fine resolution in Thermal Band from the satellites. Moreover there is a trade-off between the spatial and temporal resolution *i.e.* the finer spatial resolution data is available after a longer time (coarse temporal resolution) as compared to the coarse spatial resolution data (finer temporal resolution).

Downscaling serves the purpose of this trade off and determination of the temperature of small area from the thermal imagery of large area.

**Problem**: The cloud cover present in the atmosphere adds problem to the situation, as suppose that at the time of revisit of a satellite there are clouds in the atmosphere so there exists a problem with the sensor to capture the exact data and thus the waiting time to get the exact thermal data is also increased. The daily data of thermal band is helpful in irrigation scheduling and improves the estimation of crop water requirement. It plays a vital role in the field of evapotranspiration (ET), land surface temperature determination (LST), vegetation phenology and other fields such as surface urban heat islands (SUHI) analysis.

**Method**: The methodology adopted for downscaling is PBIM (Pixel Block Intensity Modulation) which helps to get fine resolution thermal image. The original image is first of all upscaled and then downscaled, when the results are found good the downscaled to the desired resolution. Moreover the validation & accuracy assessment is done to between the original and downscaled image.

**Major result:** The result obtained is that Landsat TM band6 data is downscaled from 120m resolution to 30m spatial resolution with the spatial details clearly visible on the thermal band image which is the highest in case of the resolution of reflectance band image.

**Conclusion:** This technique is independent of the sensor used and is not limited to the datasets. The visibility of the image looks like that of a reflectance band image but the properties of thermal bands are remaining preserved.

***Keywords***: Thermal image, Downscaling, Dice Coefficient, PBIM, RMSE, SSIM.

**Proposed Presenter:** 1. Dr. R D Garg (1.oral 2.poster)

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