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Interactive Presentations (IP)

Author: Ms. Vishnu Priya Akabote
R V College of Engineering, Bengaluru, India, vishnupriya6917@gmail.com

Mr. Shubham Das
R V College of Engineering, Bengaluru, India, shubhamdastwo@gmail.com
Ms. Tunga Giniwar
R V College of Engineering, Bengaluru, India, tungaginiwar@gmail.com
Ms. Jayashali L V
R V College of Engineering, Bengaluru, India, jayashalilv@gmail.com

MEASURING THE THERMAL FOOTPRINT OF BUILDINGS USING SATELLITE

Abstract

In the discipline of remote sensing, extracting and detecting building boundaries from high-resolution photos has long been a topic for discussion. In the past, various approaches to the extraction of buildings, including geometric, radiometric, object-based, and edge detection, have been discussed and put into practice. To collect information on a building's thermal efficiency, thermal imaging of buildings utilising satellite technology is the main goal of our research. The outcomes from this research can serve as a general indication to help planning authorities improve the procedures involved in urban planning while taking into account all conceivable environmental, social, and urban needs and requirements. There have been many satellites launched specifically to detect the thermal footprints of buildings for environmental monitoring. Many of them carry sensors with thermal bands that have a low temporal and spatial resolution (100m for Landsat 8) e.g., Landsat, MODIS, Sentinel-3, and AVHRR. The new satellites launched build small-sat constellations with thermal imaging sensors and tackle the limitations of existing thermal imaging capabilities via satellite. A few of these satellites concentrate on thermal imaging such as Albedo Texas which intends to provide thermal imagery with 2m resolution, Satellite VU from London aims to monitor the thermal footprint of any building on the planet and Constellr intends to provide global daily monitoring of Land Surface Temperature with a spatial resolution better than 50m. Our focus is to identify buildings and industries that are significantly contributing to the heat generation and increasing the global heat footprint and determine where changes need to be implemented. The data acquired will help us in identifying areas of a city that are particularly vulnerable to heat stress, landslides, drought, or any other natural calamities. With this information in hand with us, using them we can target interventions and prioritize them for green infrastructure projects that increase vegetation cover, decrease impervious surface area and cool down the urban environment. Government agencies and municipalities can use the data to investigate water pollutants to monitor changes in land use, which can provide insight into how climate change is affecting ecosystems and biodiversity. Overall thermal imaging of buildings using satellites can be used for energy efficiency, urban planning, emergency response, and environmental monitoring.