

Use of Remote Sensing & GIS Technique in Rooftop Mapping and PV Module Layout Design

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Abstract

Summary:

In this study, ArcGIS 10.3.1 software is used to calculate the height of a building by using high resolution imagery of 1.28m spatial resolution, of Worldview-3 sensor. Correlation coefficient, R for the study comes out to be 0.98732. Solar generation of a rooftop has also been calculated. The study aims to propose a method for significant reduction in time and cost involved in a site visit for the installation of photovoltaic modules on a roof in any Rooftop Solar Power Project.

Full Description:

This study includes rooftop mapping using a high resolution optical imagery without involving any field measurements. Shadow of the building is used to find its height from the imagery. 3D Models for Rooftop mapping are prepared using geographical information system (GIS) and Remote Sensing. Occlusions and shadows, which lead to poor distinction of neighboring buildings, can have a significant impact on 3-dimensional (3D) modelling.

The study was performed to find out the shadow-free rooftop area, using a 1.28m spatial resolution optical imagery, in New Delhi region. Photovoltaic (PV) Module layout design was prepared after using different software including AutoCAD, Arc GIS, Google Earth and Sketchup. After solar irradiance calculations, shadow free area i.e. photovoltaic (PV) layout of the rooftops can be used for effective and efficient installation of PV modules. Calculation of correlation coefficient (R) proves that 97.48% (i.e. $R^2 = 0.9748$) of the variability in true height of the buildings can be predicted by the variability in calculated height of the buildings by this method.