Fast Algorithm for Hourly Solar Energy Map Approximation using Satellite Image Processing and Applications

S. Chuai-Aree[1], S. Siripant[2], W. Jäger[3], and H. G. Bock[4]

Abstract: Solar energy plays an important role in tropical region in last five years especially in Thailand. The way to predict hourly solar energy map approximation is quite important for energy management. This paper proposes the method for fast algorithm for hourly solar energy map approximation using satellite image processing. The hourly satellite image has been processed using fast image processing for sunlight directly and cloud cover of each region. The solar energy map is hourly generated and can be accumulated for daily, monthly and annually production. The software can export the solar energy potential of each specific region in data file for further use. The solar energy map can be used to consider the solar photovoltaic installation for solar rooftop and solar farm installation. Solar energy map approximation is validated by the automatic weather station (AWS) from available station data in Thailand. The investigated software is implemented using object pascal language and visualizaed by OpenGL library. The solar energy map can be exported to visualize in Google Earth 3D view.

[1] Department of Mathematics and Computer Science
     Faculty of Science and Technology, Prince of Songkla University
     181 Charoenpradit Road, Rusamilae District, Muang, Pattani 94000, Thailand
     somporn.c@psu.ac.th

[2] Advanced Virtual and Intelligent Computing (AVIC)
     Faculty of Science, Chulalongkorn University
     Phayathai Road, Phatumwan, Bangkok 13300, Thailand
     ssuchada@chula.ac.th

[3, 4] Interdisciplinary Center for Scientific Computing, University of Heidelberg
     Im Neuenheimer Feld 368, 69120 Heidelberg, Germany
     {*jaeger, bock*}*@iwr.uni-heidelberg.de*