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DIFFERENT IMAGE ANALYTICS FOR FARMER ADVISORIES - CASE STUDY OF AGRI-GIS IN INDIA

Abstract

Today, space-based EO data, meteorological observations and positioning information, integrated with ground data and maps, plays an important role in bringing logical decision-making, intelligence and wisdom in society - even at grass-root level. The recent development in Spatial Analytics is spurred by larger developments in Data Science, Artificial Intelligence and Deep Learning. Data Analytics is key to obtain Insights and we see that spatial Insights will drive the vision for all of us for using more spatial data, EO images, maps, geotagged data in real-time and arrive at key answers to questions that citizens, society, government, industries, researchers may have for their contributions for the betterment of humanity and our Earth.

Image Analytics pertains to logic-based and rule-based automated extraction of meaningful information from images and is driving the Big Data of GIS amenable to Deep Learning processes where the volumes of image data itself provide triggers to further analysis and spectral signature libraries to automatically classify and segment the newer images and detect changes over time – this autonomous classification algorithm can be easily derived from the existing images that are available globally.

The Centre for Spatial Analytics and Advanced GIS (C-SAG; www.csag.res.in) is developing an Agri-GIS based on EO images, meteorological data, Positioning data, various maps and different field data sets – a farmer focussed advisory system. Agri-GIS is developed in 613 villages of S Odisha in India and covers almost 80,000 farmers. One of the important elements of the Agri-GIS is the continuous Image Analytics for real-time information on crops and natural features. C-SAG uses a variety of EO images from different satellites – Sentinel, Landsat, IRS Resourcesat – panchromatic, multi-spectral and SAR image data.

C-SAG has developed various automated Image Analytics methods for pattern analysis, feature extraction, classification – examples being for paddy crop mapping, water body monitoring, vegetation assessment, crop assessment etc and have further fused them at plot-level to be able to extract these information at individual plot level of use to farmers. We also develop a crop recognition method for automated crop identification from field photographs based on leaf structure, stem dimensions, clusters etc – these are useful to correlate with satellite images and use for machine learning from images.

The paper will address the different image analytics methods developed and applied and how these information become a part of Agri-GIS advisories. The paper will also highlight the integrated spatial analytics that are finally applied in Agri-GIS – a major component of which is the Image Analytics.