ISSN: 0974-2115
www.jchps.com Journal of Chemical and Pharmaceutical Sciences

A Class Based Knowledge Rule System for Measuring Climate Change

C. Rajabhushanam, M. Sriram, J. Sridhar
Department of CSE, Bharath University, Chennai.
***Corresponding author: E-Mail: sridhar.cse@bharathuniv.ac.in**

ABSTRACT

Most feature selection and feature extraction techniques in the available literature for post-classification studies of multi-spectral imagery, have detailed image fusion as the de-facto standard. However, fusing imagery from multi-disparate sources to output overall accuracy is prone to difficulties during empirical discrepancy of the logical structuring of data flow. This study circumvents the producers' accuracy problem, by employing a knowledge based rule system that supports decision making during each stage. In the first stage, we use Landsat 8 Satellite as the primary data source with bands 2, 3, 4, 5, and 8 ingested into the analytical engine. The second stage gleans spectral information for four available land cover classes, to produce a fuzzy classifier. Third stage uses Expert System knowledge and rules to make a logical structuring of each object in the imagery surrounded by a moving kernel that composes the individual classes into super classes and derived classes. This output is fed into the final knowledge Inference Engine to produce an overall accuracy, which is better than from Image fusion studies alone.

Objective: This study will provide a detailed survey of Expert Systems and Knowledge based Inference Engine Rules for interpreting real-time satellite imagery of environmentally sensitive areas. It will also suggest how to use or employ logical abstraction rules for classification of land cover regions and produce accurate measurement classes for proper government response and urban planning purposes.

KEY WORDS: Knowledge, Measuring, System.

1. INTRODUCTION

Inferring and classifying feature selection and extraction techniques from remotely sensed imagery datasets, results in a classification that is empirical (goodness methods) and not quantitatively studied for producing data at regional scales. With the wide availability of sub-30 meter resolution spatial data sets, one requires a detailed study report of object oriented methods in supervised segmentation rules against pixel based operations. Given a single source of multispectral data available per se, then determining the composition of sub-pixel land cover types is cumbersome and difficult to achieve without ground truth. But, with the advent of multi-source, multispectral and multi-temporal resolution data, computer based expert system knowledge approach is highly adaptable to infer complex yet ordinal, spatial imagery.

Various Authors have produced detailed studies using logical knowledge oriented rules and expert system based decision making, to illustrate the quantitative weightage with multi-source datasets. For example, fusing SIR –C (Shuttle Imaging Radar) and Landsat TM sensor data, Lidar and Landsat TM, Lidar and Spot imagery. However, the spatial coverage available with sub-10meter study areas does not discriminate environmentally variant features such as emergent herbaceous vegetation, and urban developed lands. Using the high temporal resolution of Landsat 8 sensor coupled with spectral availability in the visible, near-infrared, short-infrared, and thermal-infrared bands, is a strong proposition for logically inferring a rule based knowledge system.

Study Area: Areas extending from Pulicat Lake (Latitude: 13°42'44.15", Longitude: 79°55'47.94") to Kanathur Reddikuppam (Latitude:12°49'44.15", Longitude: 80°15'13.05") are preselected as an initial Region of Interest (ROI) for the temporal sequence dates – (02132005, 02142008, 02092011, and 09092014). There are a multitude of land cover types and land use categories within the ROI. The intent is to produce areas having heterogeneity in alike categories that will output neighboring clusters, while also preserving homogeneity within the same class variances. Primary features chosen are – Semi-urban, Urban, Agricultural, and Water.

Proposed Research Approach: The essential handling units of object-orientedscene examination are segments (least of 2*2 pixels), i.e., image objects and not singular pixels. Favorable circumstances of item situated examination are important parameter calculations, an expanded uncorrelated element space utilizing essential pointers, for example, shape, and topological elements (nearest neighbor and super questions) and the nearby connection between real-world objects and picture objects.

The topological connection of single adjoining pixels is given certainly by the raster, the topology and association of contiguous image objects that must be expressly actualized keeping in mind the end goal to address kernel based methods. The shape of super-objects can be changed taking into account sub-objects. Rather than handling all regions of an image with the picked algorithm, separated strategies can be connected to distinctively delineate super-objects. To empower this restricted use of master calculations is a particular quality of multi-spectral, transient information object-oriented image analysis. For fruitful Feature Extraction, an iterative use of region labeling and contouring is utilized.

Image objects as processing units can continuously change their classes, classification and mutual inclusions. The local image analysis based on a hierarchical object space network leads from mainly data-driven analysis to scene understanding i.e., knowledge based.

This study will provide the following:

- Understanding of Landsat 8 sensor spectral properties
- Understanding of the appropriate spatial scales and their implications
- Identification of the appropriate contextual, local, focal, and global hierarchical elements.
- Consideration of the ingesting system starting with the sensor up to fuzzy concepts for the derived classes.

This work focuses on the knowledge based expert rule inferring engine, i.e., application driven approach to address the items listed above. Studying an image at various levels of scale instead of an analytical based methodology with different resolutions, is a direct segmentation approach to understanding properties within an image. Only by representing scene based semantics on image objects of the appropriate scale, enable one to discover individual image objects. Image objects must be linked to allow low and high level spatial context.

The individual image blobs becomes a hierarchical image object classifier. When image objects of different scale at the adjoining spatial context are linked, a focal understanding of the classes and methods to be employed within the observed feature space become meaningful. Now, each object is characterized not only by its spectral, shape, or texture features, but also by its nearest neighbors and derived super classes. With object-oriented segmentation and mutual inclusions between objects and classes, such a topology is visualized as an object oriented spatial semantic network.

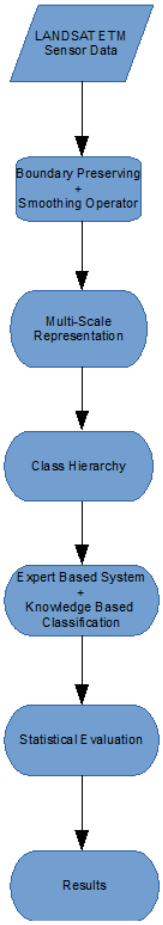

Figure.1.class based approach for image data synthesis

REFERENCES

Achudhan M, Prem Jayakumar M, Mathematical modeling and control of an electrically-heated catalyst, International Journal of Applied Engineering Research, 9 (23), 2014, 23013.

Gopalakrishnan K, Sundeep Aanand J, Udayakumar R, Electrical properties of doped azopolyester, Middle - East Journal of Scientific Research, 20 (11), 2014, 1402-1412.

Gopinath S, Sundararaj M, Elangovan S, Rathakrishnan E, Mixing characteristics of elliptical and rectangular subsonic jets with swirling co-flow, International Journal of Turbo and Jet Engines, 32 (1), 2015, 73-83.

Hofmann P, Blaschke T, Strobl, Quantifying the robustness of fuzzy rule sets in object-based image analysis. International Journal of Remote Sensing, 32 (22), 2011, 7359-7381.

Ilayaraja K, Ambica A, Spatial distribution of groundwater quality between injambakkam-thiruvanmyiur areas, south east coast of India, Nature Environment and Pollution Technology, 14 (4), 2015, 771-776.

John Richards A, Xiuping Jia. Remote Sensing Digital Image Analysis, An introduction. Springer, 2006.

Kerana Hanirex D, Kaliyamurthie KP, Kumaravel A, Analysis of improved tdtr algorithm for mining frequent itemsets using dengue virus type 1 dataset: A combined approach, International Journal of Pharma and Bio Sciences, 6 (2), 2015, 288-295.

Lingeswaran K, Prasad Karamcheti SS, Gopikrishnan M, Ramu G, Preparation and characterization of chemical bath deposited cds thin film for solar cell, Middle - East Journal of Scientific Research, 20 (7), 2014, 812-814.

Premkumar S, Ramu G, Gunasekaran S, Baskar D, Solar industrial process heating associated with thermal energy storage for feed water heating, Middle - East Journal of Scientific Research, 20 (11), 2014, 1686-1688.

Qihao Wang., Scale Issues in Remote Sensing. John-Wiley & Sons, 2014.

Srinivasan and Richards JA, Analysis of GIS Spatial Data Using Knowledge-based Methods. International Journal of Geographic Information Systems, 7 (6), 1993, 479-500.

Srinivasan. An Artificial Intelligence Approach to the Analysis of Multiple Information Sources in Remote Sensing. Ph.D Thesis. The University of New South Wales, Kensington, Australia, 1990.

Sundar Raj M, Saravanan T, Srinivasan V, Design of silicon-carbide based cascaded multilevel inverter, Middle - East Journal of Scientific Research, 20 (12), 2014, 1785-1791.

Thomas Blaschke, Stefan Lang, Geoffrey J. Hay. Object-Based Image Analysis. Spatial Concepts for Knowledge-Driven Remote Sensing Applications. Springer, 2008.

Thooyamani KP, Khanaa V, Udayakumar R, Application of pattern recognition for farsi license plate recognition, Middle - East Journal of Scientific Research, 18 (12), 2013, 1768-1774.

Thooyamani KP, Khanaa V, Udayakumar R, Efficiently measuring denial of service attacks using appropriate metrics, Middle - East Journal of Scientific Research, 20 (12), 2014, 2464-2470.

Thooyamani KP, Khanaa V, Udayakumar R, Partial encryption and partial inference control based disclosure in effective cost cloud, Middle - East Journal of Scientific Research, 20(12), 2014, 2456-2459.

Thooyamani KP, Khanaa V, Udayakumar R, Using integrated circuits with low power multi bit flip-flops in different approch, Middle - East Journal of Scientific Research, 20 (12), 2014, 2586-2593.

Thooyamani KP, Khanaa V, Udayakumar R, Virtual instrumentation based process of agriculture by automation, Middle - East Journal of Scientific Research, 20 (12), 2014, 2604-2612.

Thooyamani KP, Khanaa V, Udayakumar R, Wide area wireless networks-IETF, Middle - East Journal of Scientific Research, 20(12), 2014, 2042-2046.

Udayakumar R, Kaliyamurthie KP, Khanaa, Thooyamani KP, Data mining a boon: Predictive system for university topper women in academia, World Applied Sciences Journal, 29 (14), 2014, 86-90.

Wharton SW, A spectral knowledge based approach for urban land-cover discrimination. IEEE Transactions on Geoscience and Remote Sensing, 25 (3), 1987, 272-282.