## 2D and 3D Machine Learning, Deep Learning and OBIA

### GLSI Fusion Model – Spectrum Preserving Fusion of Remotely Sensed Images

- An Image Fusion technique that addresses the challenges of –
  - Varying bands in the images being fused
  - Variety of sources of images being fused
  - Preserving the Spectral responses of input in fused output images
- An Object based Image Fusion technique
- Key Researchers: Mayank Goyal, Ankush Khandelwal and K S Rajan
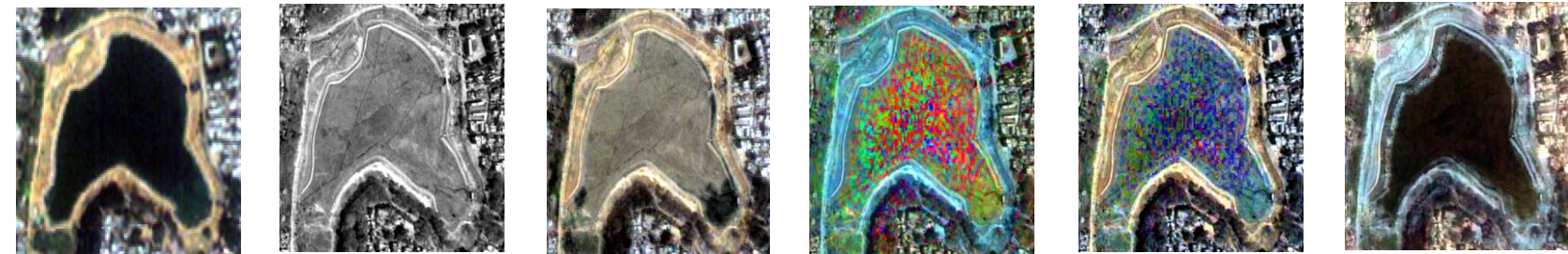


Input MS Image    Input Pan Image    PC based Fusion    Brovey Fusion    IHS Fusion    e-GLSI Fusion
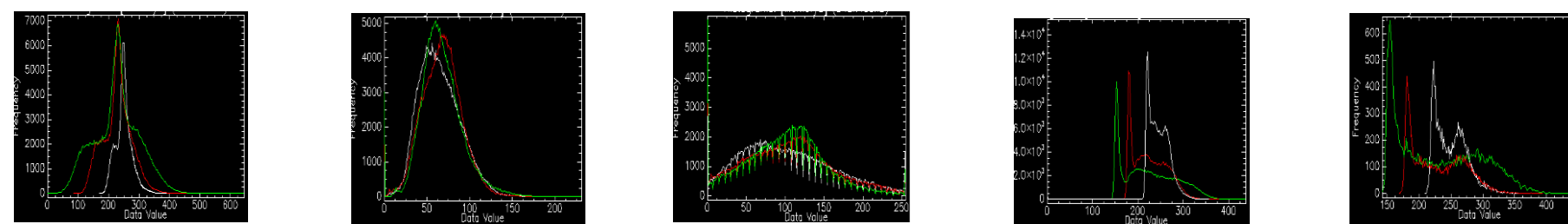


PC Fusion    Brovey Fusion    IHS Fusion    e-GLSI Fusion    Original MS Image

### Semi-Automatic Extraction of Buildings using Active Contour Model

- Chan-Vese segmentation
- and Object Based
- Image Analysis
- Works for large and
- moderate size buildings
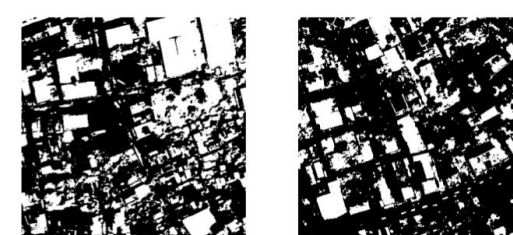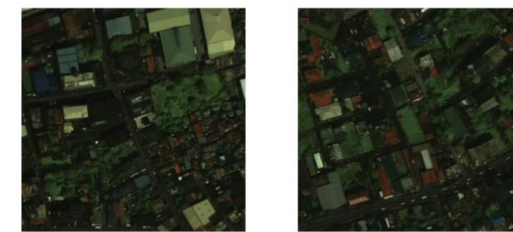- Key Researchers: Sandeep



Fig 2a: Scene 1    Fig 3a: Scene 2
Fig 2b: CV output of scene    Fig 3b: CV output of scene 2

### Spatial Object Extraction from Very High Resolution Imagery

- **ROAD EXTRACTION – ASTM-R Algorithm**
- A minimal seed based learning algorithm that extracts road segments based on spectral and textural features
- Has ability to manage occlusions (partial or full) of the road
- Results show more than 75% road area extracted and more than 85% road network corectness
- Key Researchers: Sreekanth Reddy, Vinay Pandit, and K S Rajan



Fused Image    PAN Image    Road Ground truth    Road extracted by ATM-R    Road Extracted by ASTM-R

- **BUILDING EXTRACTION**

- Use of ICA approach in detecting built-up spaces from VHR images.
- Ability to eliminate natural entities as background.
- Key Researchers: Lipika,
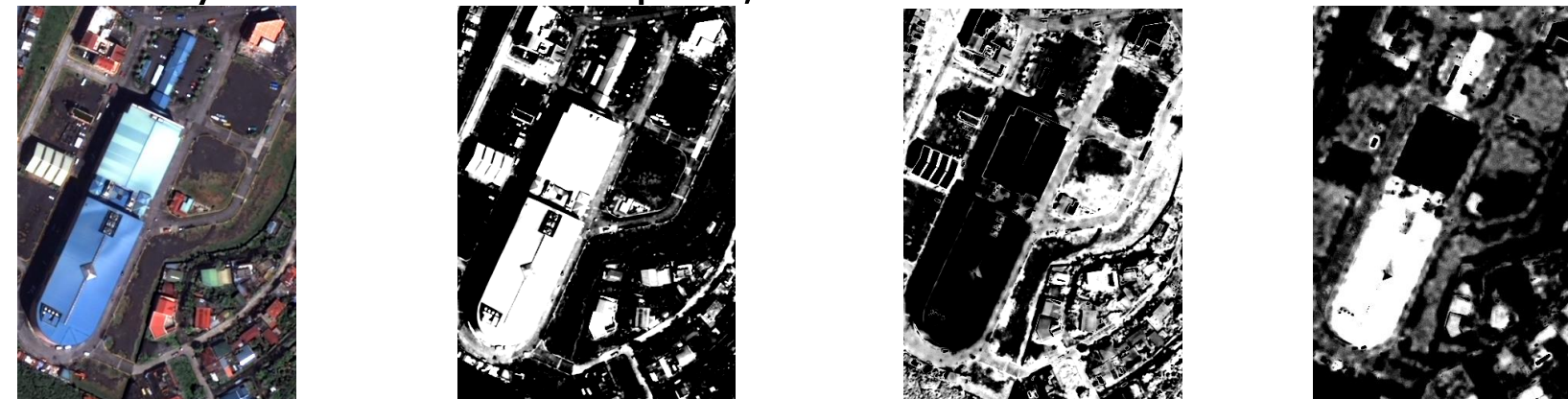


### LIDAR Data processing and Object Segmentation

- **BUILDING SEGMENTATION Algorithm**
- Based on Geometric and data characteristics
- Automated Extraction of Building footprints and Building walls
- Key Researchers: Gaurav parida and K S Rajan
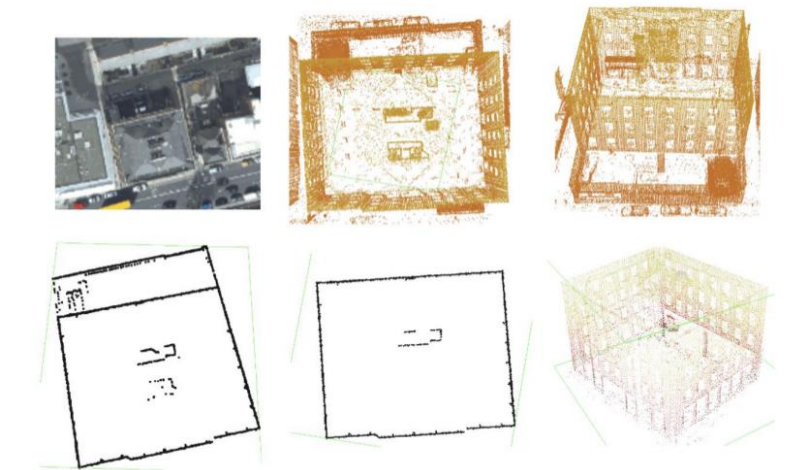


- **TREE SEGMENTATION**
- Terrestrial Lidar Processing for Tree identification and tree count
- Tree parameters extraction
- Biomass estimation of a forest
- Key Researchers: Suraj Reddy and K S Rajan



Tree of Interest    Segmented Supervoxels    Isolated tree