



The Eye in the Sky

7th Inter IIT Tech Meet, IIT Bombay

Preamble



“Man must rise above Earth, to the top of the atmosphere and beyond, for only thus will he fully understand the world in which he lives”

- Socrates (circa 399 BC)

Have you ever experienced a feeling that you are being watched? Well, you might not be wrong. Advances in remote sensing technologies have made it possible to capture imagery with resolutions as high as 0.41 metres on earth. In other words, today’s satellites have the power to ‘see’ and distinguish objects that are as little as 16 inches apart from one another on the ground. India also has a series of earth observation satellite indigenously built by ISRO for India.

As Uncle Ben from the Marvel Universe rightly quotes “With great power comes great responsibility”, we have a huge responsibility on our shoulders to make good use of such high quality data. Classifying a satellite imagery into different classes such as agricultural lands, settlements, roads, water bodies etc. has always been a challenging task for scientists. Identifying the category, a particular area on earth would belong to, by looking at its satellite image is no easy task. In earlier days, dedicated personnel were assigned this herculean job of image interpretation. However today with the satellite data being available in humongous amounts and considering the subjective nature and accuracy of human interpretations,



scientists have sought to automate this process of image classification. Classified satellite image maps have been used for studying, monitoring and analyzing the earth's surface over time. Popular real world applications of Image Classification include identifying, monitoring and analyzing disaster affected regions for effective disaster management; studying and understanding urban encroachment and its consequences and monitoring for changes in hostile territories.

Problem Statement

Participating teams are invited to propose and implement a satellite image classification technique for a given data set of satellite imagery. We expect a well structured report detailing the approach used for classification and its implementation.

Participating teams would be provided with a satellite imagery dataset for classification. They would also be provided with the training data set to be used. Teams are expected to brainstorm, ideate, experiment and code image classification techniques to get the best results. The goal of this challenge is to create awareness about the research problem of satellite image classification among the student community and provide them a platform to showcase their ideas and innovations.

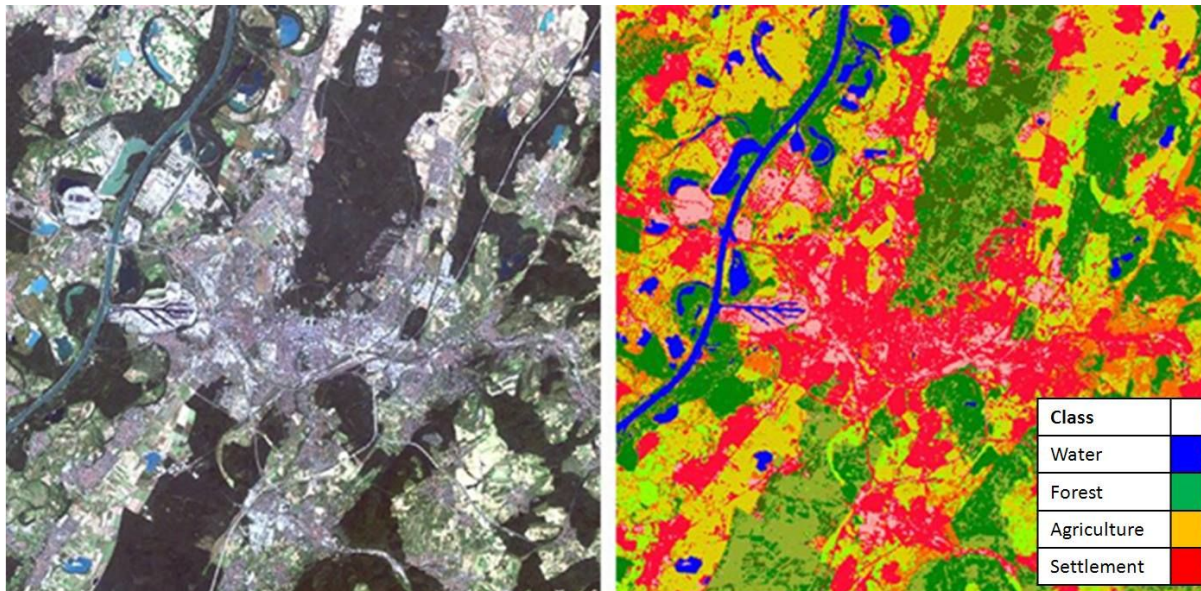


Fig. Example of a Satellite Image Classification



Timeline & Submission Details

- Training dataset is made available [here](#)
- Test data will be provided on 18th November 2018
- Report + Source code should be submitted to interiit.tech@iitb.ac.in with subject “[The Eye in the Sky] Entry from IIT <name>”. This email should be sent by Contingent Leaders/ General Secretary Technical Affairs or Equivalent by 23:59 hrs of **10th December 2018**

Submission Guidelines

1. Participating teams are expected to use any of the following programming languages for implementation:
 - a. Python
 - b. Java
 - c. Matlab
 - d. C
 - e. C++
 - f. R
2. Participating Team may use standard machine learning frameworks such as TensorFlow, Caffe, Theano, Keras, PyTorch, etc
3. The source code should be appropriately commented and must be accompanied by a ‘Read-Me’ file containing instructions to run the code. The “Read-Me’ files must also specify any additional packages/resources if used. Please provide the link to download the same
4. Participating Teams are expected to submit a single .zip file containing the following:
 - a. Source Code Files
 - b. Read Me File
 - c. Classified Output Images from the Test Dataset (.jpg)
 - d. Report (.pdf)
5. Naming Convention: The .zip file must have the same name as your csre-iit-<name>.zip.
6. The report is expected to follow the given format:
 - a. Team Details
 - i. Names and Contact details of the participants
 - b. Introduction
 - i. Describe the problem statement and the need for satellite image classification.
 - c. Classification Approach
 - i. Motivation



- ii. Methodology
- iii. Implementation
- d. Results
- e. Accuracy
 - i. Confusion Matrix
 - ii. Kappa Coefficient
 - iii. Overall Accuracy
- f. Conclusion

Judging Criteria

- 60% weightage is assigned to accuracy which would be the primary evaluation criterion for validating the image classification technique used by the teams. The Kappa Coefficient, Confusion Matrix and the Overall Accuracy would be the primary parameters for evaluation.
- 30% weightage will be assigned to the quality of research, novelty and innovation in the classification technique used would be other parameters for evaluation.
- 10% weightage is assigned to the presentation, demo and the knowledge of the teams in the subject addition to the above mentioned parameters.

The event is categorised as **Mid Prep** and shall yield a maximum of **250 points** towards overall tally.

Qualifying score: 0

Rules and Regulations

- Max Team size : 3. A maximum of 3 Participants will be awarded participation/merit certificates
- The submissions will be scrutinized for forgery. Any sort of ethical misconduct will not be tolerated and will result in the disqualification of the team
- In case of any dispute, the decision of the judges or the expert panel will be final and binding on all
- The team must adhere to the spirit of healthy competition