

# IEEE ICETCI 2021 Competition

on

## MACHINE LEARNING BASED FEATURE EXTRACTION OF ELECTRICAL SUBSTATIONS FROM SATELLITE DATA USING OPEN-SOURCE TOOLS

### ***Problem Statement:***

The task of this competition is to develop a Machine learning-based software using open source tools for extracting 'Electrical Substations' from high resolution satellite data. The competition is based on the enhanced high-resolution satellite image chips that is provided to the participants. These image chips are containing different instances of 'Electrical Substations'. These image chips have to be used as training data for the Machine learning. The participants are expected to develop a 'Machine Learning' algorithm and code for extraction of all sub-station features from similar set of satellite images (but of different areas). The 'Starting Kit' will comprise of the 'Training Data' consisting of satellite image chips and polygon AOI of the substations ([please click the URL link given on the competition page for downloading the Starting Kit](#)). One set of 'Test Data' consisting of satellite data will be provided to the participants to evaluate the model and for testing the output of their algorithm and code. The 'Test Data' will be made available at a later stage of the competition.

Sample images and the extracted substations are shown in the Figure-1.



Figure-1. Upper images show samples of few substation showing the boundary, substation infrastructure, internal path and vegetations. Below images show extracted substation boundaries.

# **Guidelines for Participants**

## **After Downloading the Starting kit, the participant has to:**

- Write a Machine learning code in Python or any other Language for extracting Substation features from the satellite data chips and training dataset provided in the starting kit.
- The Code should be written using Open source libraries only. No Licensed software should be used for development.
- The code should be written in English language only.
- After writing the code, the participants have to run the code with the given dataset from training the Machine learning model.
- Once an accurate Machine learning model is made, the participants should check the results using Test Data.
- The Model should be optimized for extracting Substations with higher accuracy and computational speed after checking the results. The evaluators will also look at the accuracy of feature extraction by the software.

## **After completion of software development, the participant has to:**

- Participant shall Register in the 'Conference Website' in the online form provided. Registration is mandatory for the participants who are uploading the competition submissions. The format will be made available to all those who click the 'Upload Submissions' link.
- Scrutiny of the Registrations will be done for verification of the credentials.
- Participants shall upload the output of the feature extraction containing extracted substation from test data, in vector or raster format, along with source code stating all dependencies (Libraries/tools). Apart from this, a document containing complete list of Libraries and Tools used should be submitted in the pdf or word document.
- A short paper (PDF) describing the techniques employed in solving the problem shall be uploaded along with above mentioned outputs. The paper should be in IEEE conference format.
- Submission dates should be strictly followed. No exceptions will be made.

## **For shortlisting top 10 teams, the teams will be judged on all the qualifying criteria:**

- The participant is expected to submit the product, i.e. extracted sub-stations area either in raster or vector format. Evaluation will be done for correctness of identification of feature (substation) and exact demarcation substation boundary/extent.
- For Top 10 teams, Software code along with dependencies should be executable in Windows 10 (64 Bit) system ( ***Testing Environment***).
- Successful execution of the software code and 100% match of the output result with the uploaded output will only qualify the entry in the top ten. If any of the above is negative, the entry is disqualified.
- Software Model efficiency: Performance of the software speed and computation resource utilization will be evaluated.

- For Top 10 teams, an online presentation will be organized and the link for the virtual meeting will be sent to the registered email IDs. The participant should upload their PPT in the prescribed format.
- Final Top three winners will be decided by the evaluators and the Declaration of Winners and Prize Distribution will be done in the ICETCI 2021 conference during 25-27 August 2021.
- The First Prize Winner should submit a presentation and '**Final Paper**' on the conference website for possible inclusion in the conference proceedings based the peer review recommendations.

## **Rules for Competition**

- The competition is open to all.
- The link for training data (starter kit) is available on the competition page of the conference website. Please download and start working.
- The 'Test Data' to evaluate the model will be made available at the later stage of the competition (Refer to Schedule and Readiness given below).
- Registration and Competition Output Submissions should be done online on the conference website.
- The code should be written in English language only.
- The code should be executable in Windows 10 (64-bit).
- All the documents/ Presentations/ communications should be made in English Language only.
- Participants shall submit the Software Code stating all dependencies along with installation procedure document and Output files in the 'Conference Website' before deadline. Any submission coming after deadline will not be considered.
- The size of the upload should not be more than 5MB to 6MB.
- Results should be obtained with given datasets and as per the problem statement.
- For Top 10 teams an online presentation will be organized and the link for the virtual meeting will be sent to the registered email IDs. The team should upload their presentation in the prescribed template downloadable from the website.
- Final Top three winners will be decided by the evaluators. Declaration of Winners and Prize Distribution will be done in the ICETCI 2021 conference during 25-27 August 2021.
- The First Prize Winner should submit a presentation and '**Final Paper**' on the conference website for possible inclusion in the conference proceedings based the peer review recommendations.
- Submission dates should be strictly followed. No exceptions will be made.

## Very Important:

- Only Source codes along with Installation Procedure will be accepted. Code review may be done for scrutinizing the entries.
- The work submitted should have proper credits to the source codes/libraries reused from other studies. Using these tools without proper attributions will be considered as invalid entry.
- If it is found that two participants have submitted same source code, both the participants will be disqualified.
- If it is found that it is copied work, the participant team will be immediately DISQUALIFIED from the competition.
- Obfuscation of source code is not permitted.

## Schedule of the Competition

	Task	Date
1	Upload of Starting kit (Training data)	01 March – 05 March, 2021
2	Initiation of competition	15 <sup>th</sup> March, 2021
3	Availability of the 'Test Data' on the Conference Website.	ON or BEFORE 9 <sup>th</sup> June 2021
4	Registration and Submission by the participants of the Outputs and source code stating all dependencies (Open source only) and installation procedure.	ON or BEFORE 15 <sup>th</sup> June, 2021
5	Screening by Evaluators	16 <sup>th</sup> June to 15 <sup>th</sup> July, 2021
6	Presentation by top 10 selected entries	23 <sup>rd</sup> July, 2021
7	Declaration of Winners and Prize Distribution	25 <sup>th</sup> - 27 <sup>th</sup> August, 2021

### Organizers:

**Anju Bajpai, T P Girish Kumar, Ashish Shrivastava, D S Prakasa Rao, Subrata N Das, G Sreenivasan, C S Jha**

Regional Remote Sensing Centre-Central,  
National Remote Sensing Centre, Amravati Road, Nagpur

**Sangeeta Rajankar, Sapna Deotale, Dilip M Kolte**

Maharashtra Remote Sensing Application Centre,  
Government of Maharashtra, Nagpur

### Email:

etci2021.rcc@gmail.com  
bajpai.anju@gmail.com