JADAVPUR UNIVERSITY
COMPUTER AIDED DESIGN CENTRE
Faculty Council of Engineering and Technology
Kolkata - 700 032

Certificate course on

Remote Sensing Image Classification (Pixel-based, Sub-pixel and Object-based)

Image classification is perhaps the most frequently performed digital image processing by the image analysts. In pixel-based classification, individual image pixels are analysed by the spectral information that they contain. This is the traditional approach to classification since the pixel is the fundamental (spatial) unit of a satellite image. Sub-pixel classification considers the geographic space as continuous phenomena (field). It tries to quantify the amount of a feature or material within a pixel. The entire pixel or a part of it may be occupied by a material. Therefore, it calculates the percentage or amount of that material within a pixel. The object-oriented approach aggregates the pixel by means of image segmentation, i.e., it divides the image into groups of pixels (called objects) aggregating them according to criteria linked not only to the spectrum (spectral bands), but also to the shape and homogeneity. Then for the classification the characteristics of the whole object are used.

This course has been designed to cover all of the classification techniques. The course has been designed primarily for the research scholars, teachers, and working persons.

The CAD Centre is the pioneer institute in the field of Geoinformatics. It maintains a state-of-the-art infrastructure for its courses. The Centre has engaged highly experienced faculty members from academic sector as well as industry. Some of our faculty members are well known figures in the field of Geoinformatics and have published huge number of books, monographs, and research articles internationally.

Course Duration: 40 hrs

Class Duration: Theory Sessions: 2 hrs each; Practical Sessions: 2 hrs each

Eligibility: BE/BTech in Engineering or equivalent; BSc in any discipline; BA/B.Sc. in Geography/Environmental Studies; 3-years Diploma in Engineering. All should have basic knowledge of remote sensing and GIS.

Participants must have mobile devices running Android 4.0.3 or above; laptop/desktop computer with Windows; and stable internet connectivity. Google Meet should be preinstalled in the mobile device.

Participants must have the following software installed in their computer:

1. ERDAS Imagine (2014 onwards)
2. ArcGIS (10.2 onwards)
3. QGIS (3.0 onwards)
4. eCognition Trial
   (downloadable from: https://geospatial.trimble.com/ecognition-trial)

Please note that CAD Centre, JU does not provide any software.

Course Contents

Topic	No. of Theory Classes	No. of Lab Classes	Total No. of Classes
Introduction to image classification, pixel-based classification, unsupervised pixel-based classification in ERDAS	1	2	3
Supervised pixel-based classification and accuracy assessment in ERDAS	1	2	3
Sub-pixel classification in ERDAS	0	2	2
Artificial intelligence (AI) and Machine Learning(ML), types of ML, ML in GIS, types of ML applications in GIS, examples of ML applications in GIS, categories of ML tools and algorithms in GIS, object-based vs. pixel-based classification	1	0	1
Unsupervised pixel-based classification in ArcGIS & QGIS: concept and practical implementations	0	2	2
Supervised pixel-based Image classification (maximum likelihood, random tree, decision trees algorithms) in QGIS and ArcGIS: concept, technical considerations, workflow and practical implementations	1	2	3
Supervised object-based image classification with Support Vector Machine (SVM) algorithm in QGIS and ArcGIS: concept of segmentation and segment mean shift function, overview of SVM Classifier, practical implementations	0	2	2
Random forest supervised object-based image classification in QGIS and ArcGIS: concept and practical implementations	0	2	2
Object-based classification in eCognition	0	2	2
TOTAL	4	16	20

Examination: One theory test of 50 marks and one practical test of 50 marks at the end of the course. Pass marks is 40%. The candidate requires securing 20 marks individually in theory and practical test.

Certificate: Completion certificate (in printed form) will be provided at the end of the course.