GNR 602 Advanced Satellite Image Processing

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Course Project

Contributions : -

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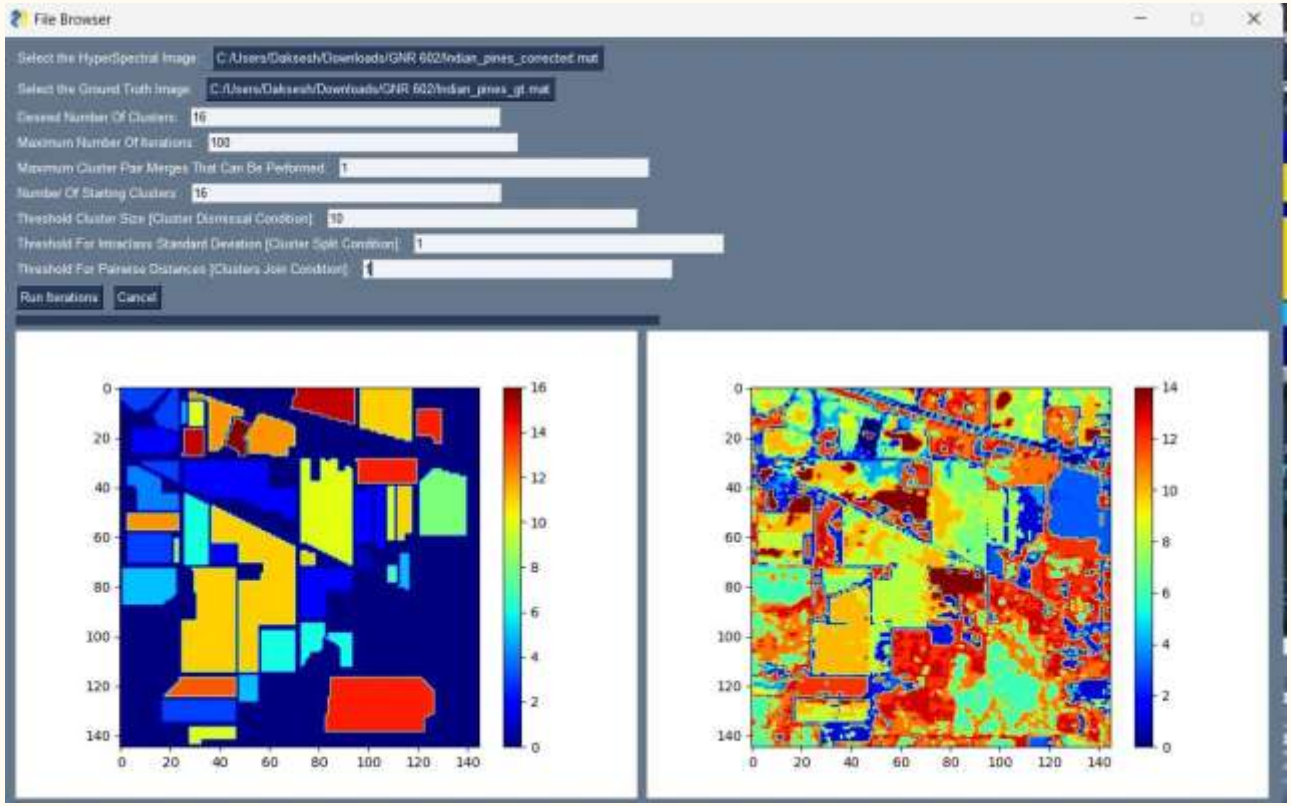
Problem Statement

Classify a remote sensed, Hyperspectral image using frequency band specific intensity using ISODATA classifier. Generate an image each for each features to obtain pixel clustered image. Use these as features for classification

Implementation details

- Language : python3
- IDE used : VSCode
- Libraries used : numpy, matplotlib.pyplot, tqdm, scipy.io (loadmat)

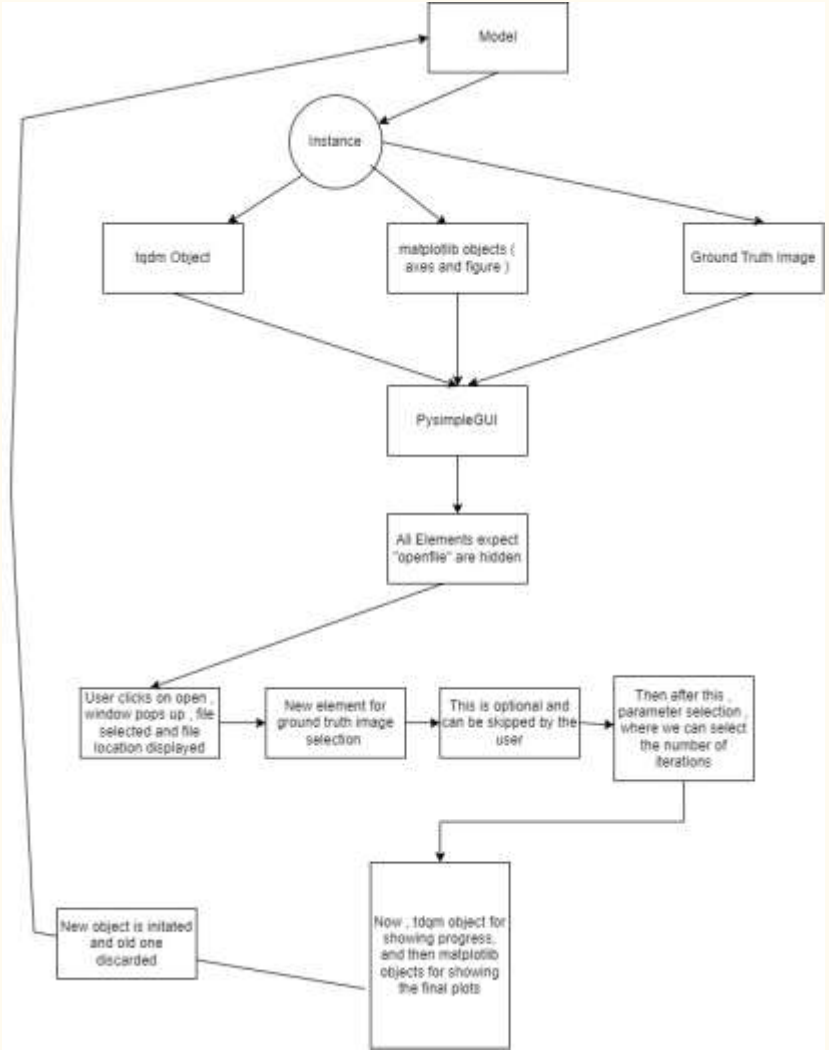
GUI model


File Browser
Select the HyperSpectral Image
C:/Users/Daksesh/Downloads/GNR 602/Indian_pines_corrected.mat
Select the Ground Truth Image
C:/Users/Daksesh/Downloads/GNR 602/Indian_pines_gt.mat
Desired Number Of Clusters:
16
Maximum Number Of Iterations:
100
Maximum Cluster Pair Merges That Can Be Performed:
1
Number Of Starting Clusters:
16
Threshold Cluster Size (Cluster Dismissal Condition):
10
Threshold For Intraclass Standard Deviation (Cluster Split Condition):
1
Threshold For Pairwise Distances (Clusters Join Condition):
Run Iterations
Cancel

Roadmap

- Import the dataset from corrected Indian Pines (5.7 MB) [Used]
- Assign parameters for cluster sizing and program implementation
- Generate pixel clusters using ISODATA Classifier
- Create a feature vector and normalize it for better results.

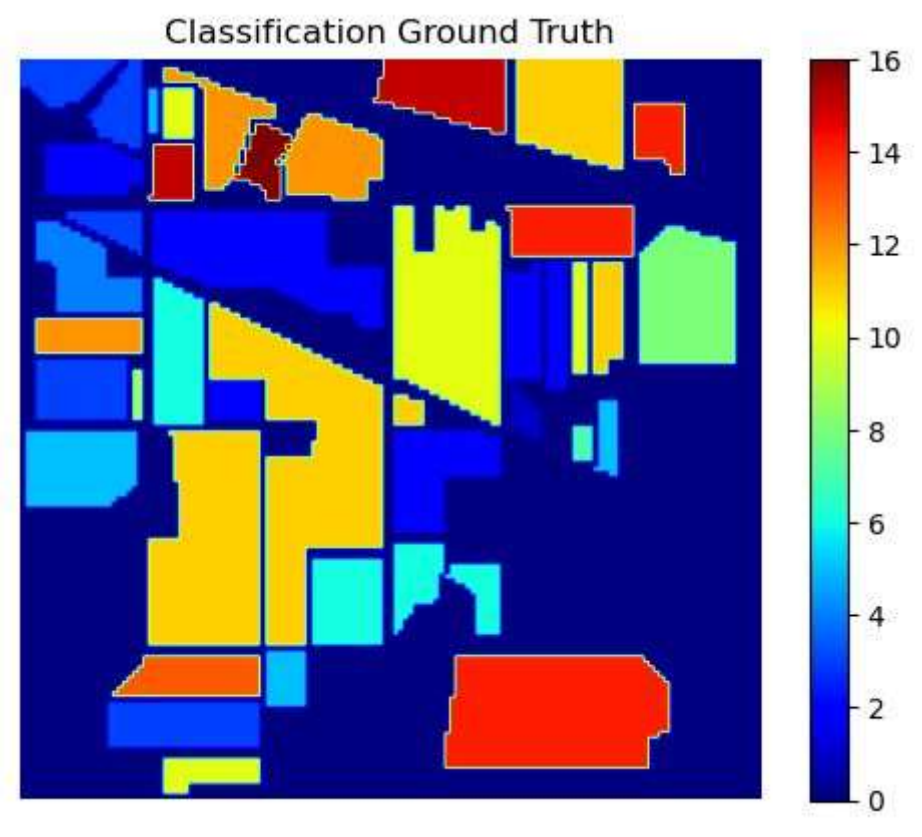
Project Flowchart



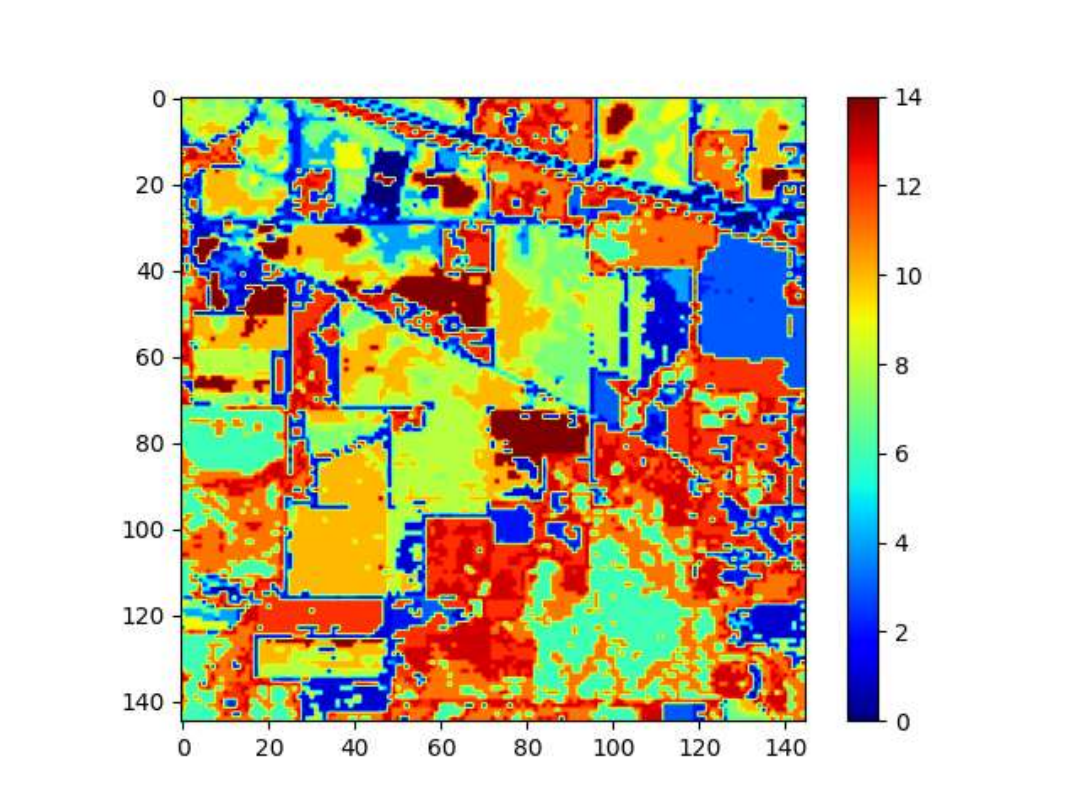
ISODATA classifier

- ISODATA computes class means consistently circulated in the data space before iteratively clusters the continuing pixels utilizing least distance approaches.
- Every iteration recalculates means as well as reclassifies pixels through respect to the new means, while in the K Means approach, the number of clusters K remains the same throughout the iteration, although it may turn out later that more or fewer clusters would fit the data better.
- This drawback can be overcome in the ISODATA Algorithm, which allows the number of clusters to be adjusted automatically during the iteration by merging similar clusters and splitting clusters with large standard deviations

Ground truth



Classified image



THANK YOU!

Demo