MTP Report

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SAR image is clustered into three major scattering groups by GMM-based clustering approach. We obtain three cluster centres from the GMM clusters(surface, volume, dihedral).

Inorder to further cluster into 6 classes, two variations are possible 1. clustering the three clusters separatelyint o subclasses, 2. clustering the whole image with 6 classes. Clustering separately is quite simple with wishart clustering.

Inorder to cluster into 6 classes(3 for volume,2 for surface,1 for dihedral), we need 6 initial cluster centre to begin with. Algorithm to cluster the whole image:

1. At first, average covariance matrices, are computed by averaging all covariance matrices,within each of the clusters that are obtained by GMM algorithm.

2. For each cluster, we separate the pixels into two using the cluster centre.

3. We obtain subcluster centres by averaging all covariance matrices within each of the subclusters.

4. For volume, we use three initial clustercentres (original cluster centre and two subcluster centres)

5. For surface, we use two initial clustercentres - two subcluster centres obtained. we omit the surface cluster centre.

6. We leave dihedral cluster centre as it is.

7. Using these 6 covariance matrices as initial cluster centres.We do Wishart clustering for 6 classes.

8. We compute a distance between every pixel to these 6 initial cluster representatives. The distance measure for cluster assignment of every pixel is derived from Wishart distribution.

9. Each pixel is assigned (re-assigned) to a cluster, whose representative centre is at the minimum distance from the pixel. This step can be iterated till some stopping criterion is met.

Instead of using GMM clusters, we can use wishart refined clusters (doing wishart clustering for 3 classes on the GMM output). After obtaining the refined three clusters we can continue to cluster them into 6 classes using the above mentioned algorithm.

A total of 4 variations are possible,

1. using GMM clusters directly, clustering using wishart clustering , on the whole image with 6 initial cluster centres.

2. using GMM clusters directly, clustering using wishart clustering , on the 3 clusters separately.

3. using wishart refined clusters, clustering using wishart clustering , on the whole image with 6 initial cluster centres.

4. using wishart refined clusters, clustering using wishart clustering , on the 3 clusters separately.
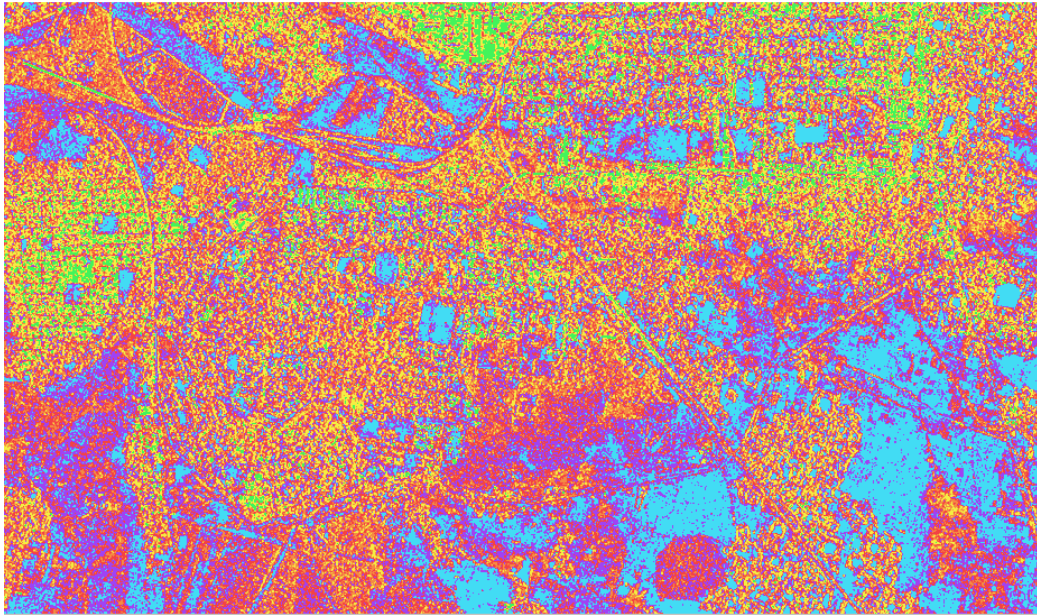
Figure 1 Clustered image of Kharagpur region.

Figure 1: Clustered image of Kharagpur region.