

TREE SPECIES DETECTION USING FULL WAVEFORM LIDAR DATA IN A COMPLEX FOREST

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ABSTRACT:

The three-dimensional single tree extraction by applying pattern recognition based modified clustering approach on full waveform normalized raw LIDAR data has been presented in this research work. The LIDAR data of medium density (16 points m⁻²) was collected in August 2007 from the administrative forest district Hardt, Germany. The total study area is 1.75 ha and dominated by various deciduous tree species. The study plots selected contains multi-tier tree species of different age groups. Clusters of single tree extracted after running the algorithm were reconstructed using QHull algorithm. A validation procedure was devised and used for the accuracy assessment of the automatically detected tree species with respect to the forest inventoried data. The average producer's and user's accuracy for the total study area was around 56% and 41%, respectively. The results showed that the modified algorithm worked fairly well in the detection of evergreen conifers (79%) than the deciduous tree species (47%) beside the fact that conifers constitute roughly 18% of the total study area. The result showed that the algorithm for the upper tier trees species which are relatively mature and older worked better as compared to the tree species lying beneath the first-tier. The mixture of multi-storey tree species of varying age and height quintile with dense canopy cover was a limiting factor in the detection of single tree automatically in the presented work and shows the future scope of improvement in the algorithm applied.

TOPIC: Lidar and laser scanning

ALTERNATIVE TOPIC: Image processing and pattern recognition