



Flood Mapping Using Synergic Use of Optical and SAR Imagery

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The research aims to provide flood inundation mapping by synergic use of Sentinel-1 (SAR) and Sentinel-2 (optical) satellite imagery. We have applied our algorithm on Kerala region in India, which faced the worst flooding of century in August 2018. The main challenges addressed in the research is to select the suitable parameters for obtaining flooded and non-flooded regions. Major challenge arises due to very high cloud cover in the Sentinel-2 (optical) dataset.

The methodology involves preprocessing which includes subsetting, speckle filtering, and terrain correction of the SAR images. Further, various parameters like, RSWIR (Red Short Wave Infrared), NDVI (Normalized Difference Vegetation Index), optical bands B1(440 - 510 nm), B2 (520 - 590 nm), B3(630 - 685 nm), B4 (690 - 730 nm) and B5 (760 - 850 nm), VV polarization and VH polarization.

For the development of the proposed decision tree algorithm, the steps would include creating masks to make labels, finding correct parameters for decision making, training the classifier, and then creating overlays after for testing classifier. Masking would be done using statistical analysis consisting of interpretation of the standard deviation and histogram of the known affected regions to create labels for training the dataset. With the chosen machine learning algorithm, Decision Tree, using the optical and SAR parameters, every pixel of each image of dataset will be evaluated for the range of pixel values labeled as flooded from the labeled images. The ranges of pixel values for different attributes will together be used to decide if the region is flooded. A combination of these ranges, yielded from training on the dataset using the Decision Tree classifier will then be used to mask the regions in the map, which will then will be overlaid over Google Earth. Overlays on the Google Earth will allow the user to see and analyze the regions affected with flood.