Extracting oil palm crown from worldview-2 satellite image

Abstract

Oil palm (OP) is the most commercial crop in Malaysia. Estimating the crowns is important for biomass estimation from high resolution satellite (HRS) image. This study examined extraction of individual OP crown from a WorldView-2 image using twofold algorithms, i.e., masking of Non-OP pixels and detection of individual OP crown based on the watershed segmentation of greyscale images. The study site was located in Beluran district, central Sabah, where matured OPs with the age ranging from 15 to 25 years old have been planted. We examined two compound vegetation indices of $(NDVI+1)*DVI$ and NDII for masking non-OP crown areas. Using kappa statistics, an optimal threshold value was set with the highest accuracy at 90.6% for differentiating OP crown areas from Non-OP areas. After the watershed segmentation of OP crown areas with additional post-procedures, about 77% of individual OP crowns were successfully detected in comparison to the manual based delineation. Shape and location of each crown segment was then assessed based on a modified version of the goodness measures of Möller et al which was 0.3, indicating an acceptable CSGM (*combined segmentation goodness measures*) agreements between the automated and manually delineated crowns (perfect case is '1').