Color Filtering System for Quantifying the Percentage of Afforestation Through Satellite Images: A Statistical Analysis

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There is a local law that requires the condos to cover at least 12% of their land with green space. However, the inspection is ineffective and insufficient. Therefore, this research aimed to develop an algorithm, using openCV and SkImage, and determine it's accuracy and reliability. I Adopted The Satellite Images of Google Maps as Basis To The Analysis. The First Step was to Delimit which Area Should Be Analyzed. Initially, the Contours Were Delimited using the Google Maps' measure distance tool and it was filled in to determine the area of interest, but a mean accurracy of just 84.1% was observed. Thus the contours were deleted from the fill, increasing the mean accuracy to 95.3% and redrawing the Contours In A Much Cleaner Way Using Photoshop, an accuracy of 98.8% was achieved. The Second Step was to identify the green spaces. An image of a reference tree needs to be provided. Colors on computers are represented by 3 values. Thus, the minimum and maximum values found in the reference tree are stored and the pixels inside the analysis area within this range are selected as green areas. To define the accuracy of the method, the results of the algorithm in analyzing 10 terrains were compared with the manual analysis made with Measure Distance Tool. The uncertainty of Google Maps' measurements was calculated and applied to the manually extracted data. Among the color spaces studied, the HLS presented the best accuracy, despite the majority use of HSV in the literature. The fix for HUE component discontinuity issue in HLS and HSV was implemented Using it, the algorithm presented an accuracy of 82.08% ± 2.17%. Further studies using convolutional neural networks to identify the non-linear color pattern of green spaces can satisfactorily increase the accuracy.