Hyperspectral Image-Based method for Spectral Diversity
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INTRODUCTION

• Imaging spectroscopy gives spectral signatures that can be used to distinguish species and communities of species in the ecosystem.

• To assess ecosystem biodiversity, hyperspectral images are a valuable tool. A clear advantage is its help to plan more efficiently the collection of field data, taking into consideration that the actual process of collecting data is very expensive in time and resources. [2]

OBJECTIVES

• Capture spectral heterogeneity from hyperspectral images in the terrestrial tropical forest area of Guanica, Figure 1, using clustering and unmixing method and then use the result for prediction of plant species richness. [3]

THEORETICAL BACKGROUND

• In this work by diversity we mean spectral diversity as computed from images and biodiversity the species biodiversity.

• Two methods are used for computing spectral biodiversity indicators from hyperspectral images. Hierarchical agglomerative clustering (HAC) and vector quantization (VQ). The image preprocessing steps and the procedure for calculating biodiversity is shown in Figure 2.

RESULTS AND DISCUSSION

• This Section presents the experimental results for Guanica forest hyperspectral AISA images with 128 bands acquired during 2007 and 2013.

• There are 30 field plots each spanning an area of 20 meters x 20 meters. Therefore, the image of 2007 was subsetted to have circular plots of diameter 20 pixels and 2013 image has circular plots of diameter 10 pixels. Some of the plots are shown in Figures 3.

• As shown in Figure 3, 2007 image plot sizes are 20 x 20 pixels circular plots and the plots of the 2013 images are 10 x 10 pixels.

• Table 1 gives the correlation results for 2007 plots using HAC and VQ. Each of these methods of initial pixel groupings is followed by spectral unmixing. Table 2 gives the correlation results for 2013 image with the same methods.

CONCLUSIONS

• It can be seen that vector quantization produces better results in both images. Because of lower resolution HAC does not perform very well with the 2013 image.

• Figure 5 shows entropy values computed at each pixel, higher values indicate a more spectrally diverse neighborhood, while lower values indicate lesser spectral diversity.

REFERENCES


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