

Classroom exercise in the acquisition, processing, and analysis of multispectral images

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In a single classroom-sized experiment: learning the entire remote sensing workflow of acquiring, importing, processing and analyzing multispectral images with MATLAB. Students in remote sensing classes often get in touch with pre-processed multispectral data, whereas they rarely encounter raw multispectral data to be acquired, processed and analysed. Therefore, we developed a new exercise in the Environmental Remote Sensing Lab, using a relatively inexpensive multispectral array consists of four MAPIR Survey2 cameras by Peau Productions, Inc., recording NDVI Red+NIR (650 and 850 nm), Blue (450 nm), Green (550 nm) and Visible Light RGB (\sim 370–650 nm). We use the four cameras to build a multispectral array, possibly mounted on drones, to determine various types of minerals, vegetation, and man-made materials on the ground. At the beginning of the experiments, the students use the four cameras to acquire images, for example of different types of plants or rocks. Afterwards, the students develop a MATLAB script to import the 16-bit raw images of the various wavelengths, run several routines of image enhancement, rectification and registration, and calculate image ratios such as the Normalized Difference Vegetation Index (NDVI). Next, we will use the four cameras to build a multispectral array mounted on drones to determine various types of rocks and minerals on the ground.