EGU22-8914, updated on 14 Aug 2022
https://doi.org/10.5194/egusphere-egu22-8914
EGU General Assembly 2022

ViCTool: An open-source tool for vegetation indices computation of aerial raster images using python GDAL

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For precision agriculture (PA) applications that use aerial platforms, researchers are likely to be interested in extracting, study and understanding biophysical and structural properties in a spatio-temporal manner by using remotely sensed imagery to infer variations of vegetation biomass and/or plant vigor, irrigation strategies, nutrient use efficiency, stress, disease identification, among others. This requires measuring spectral responses of the crop at specific wavelengths by using, for instance, Vegetation Indices (VI). However, for the analysis of this spectral response and its heterogeneity and spatial variability, a large amount of aerial imagery (data) must be collected and processed using a photogrammetry software. Data extraction is often performed in a Geographic Information System (GIS) software and then analyzed using (in general) statistical software. On the one hand, a GIS is used for the collection of resources to manipulate, analyze, and display all forms of geographically referenced information. In this regard, Quantum GIS (QGIS) is one of the most well-known open-source software used which provides an integration of geoprocessing tools from a variety of different software libraries. QGIS is widely used to obtain VI computations through the raster calculator, although, this computation is performed with band rasters manually provided by the user; one by one, which is time-consuming. On the other hand, QGIS provides a Python interface to efficiently exploit the capabilities of a GIS to create similar plugins, but this can be a non-trivial task. In this work, we developed a specific and QGIS independent semi-automatic tool called **ViCTool (Vegetation index Computation Tool)** as a free open-source software (FOSS) for large amount of data extraction to derive VIs from aerial raster images in a certain region of interest. This tool has the option of extracting several multispectral and RGB VIs employing Blue, Green, Red, NIR, LWIR, or Red edge bands. The user must provide the input folder path containing one or more raster band folders, the shapefile with the regions of Interests, an output path to store the output VI rasters, and the file containing the VI computations. ViCTool was developed using Python PyQT for designing the User Interface (UI) and Python GDAL for raster processing to simplify and speed up the process of calculating a large amount of data intuitively.