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DEVELOPMENT OF A TRAINING PROGRAM FOR ENHANCING THE USE OF ICT TOOLS IN THE IMPLEMENTATION OF PRECISION AGRICULTURE

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Training package 2

Practical activity. Building an “Agricultural Database”.

Tutor instructions

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Note to the teacher: This document contains mainly the same information as the document 'Student guidelines', except for the answers in blue color.

1 Objective

The aim of this practical activity is to create an agricultural database, from data obtained in a vineyard field during the years 2018 and 2019, using the QGIS software.

Also in this practice you will learn to work and interpret data obtained from different sources such as cartographic maps, satellite images and vegetation measurements.

2 Guidelines

Open QGIS software. You will have a new blank map.

Load the following layers that you will find in your training directory:

- Vineyard plot (Vineyard plot line.shp)
- Ortofoto map (of25cv40jk0f277126ss1r101.jp2)
- Topographical map (bt5mv20sd0f277126st1r060.sid)
- 10 NDVI images, 5 obtained during 2018 (NDVI_2018_06_11.tif; NDVI_2018_07_01.tif; NDVI_2018_07_20.tif; NDVI_2018_08_11.tif & NDVI_2018_08_29.tif) and 5 during 2019 (NDVI_2019_06_10.tif; NDVI_2019_06_30.tif; NDVI_2019_07_22.tif; NDVI_2019_08_08.tif & NDVI_2019_08_31.tif)

Examine and try to understand the data loaded before.

Classify the different NDVI images in 5 equal classes and show the image with a spectral color ramp (from red to blue).

In order to classify the NDVI images the students must follow this process:

- 1- Open the Symbology properties panel (Right-click on the layer in the Layers list, select the menu item Properties in the menu that appears and select the "Symbology menu" at the extreme left).
- 2- Change the "Render type" to singleband pseudocolor.
- 3- Change the "Color ramp" to spectral (from red to blue)
- 4- Change the "Mode" to Equal interval and choose 5 classes.
- 5- Click in "Classify" and finally click "OK".
- 6- Repeat this process for each NDVI layer.


3 Exercise

Get a layer points from each of the coordinate lists you have in your training directory (Coordinates canopy measurements.csv & Coordinates Soil measurements.csv).

Once you create both layers, in your training directory you will find the data related with the points obtained. You will find a document with the canopy measurements obtained on the same dates as the vigor maps. Also you will find a document with the soil analysis for each sample point.


This data should be introduced in the layer points generated previously using a “Join” process.

In order to create a layer points from a list of coordinates the students must follow the steps explained below:

- 1- Click on the “Open Data Source Manager” button 
- 2- Select the “Delimited text” menu at the extreme left.
- 3- In the “File name” bar choose the document Coordinates canopy measurements.csv that you can find in your training directory.
- 4- Select Custom delimiters in the “File Format” menu.
- 5- Choose “Tab” and “Semicolon”.
- 6- In the “Record and Fields Options” choose “Decimal separator is comma”, “First record has field names” and “Detect fields types”.
- 7- In the “Geometry Definition” menu select “Point coordinates”. Furthermore, assign to the “X field” the X Coordinate and Y Coordinate to the “Y field”.
- 8- Then in the same menu we must select the “Geometry CRS”. We will select the EPSG: 25831 – ETRS89 / UTM zone 31N.
- 9- Click on the “Add” button and you will see the layer points created.
- 10- Finally, right-click on the layer created in the Layer list and select “Export” > “Save Feature As...” to save the created layer. In the menu we will select “Format” as ESRI Shapefile, we select the path where we will save the layer and we will select the EPSG: 25831 – ETRS89 / UTM zone 31N as “CRS”. Click “OK” and the layer will be saved.

Repeat this process with the coordinates of the file Coordinates soil measurements.csv that you will find in your training directory.

To do the Join between the layer points created previously with the information about the canopy measurements and the soil measurements we must follow the process explained below:

- 1- Open the layer created previously and drag the Canopy measurements.xlsx to the Map canvas.
- 2- Right-click on the layer created previously and select the Properties.
- 3- Select the “Joins” menu at the extreme left.
- 4- Click on the “Add new join” button . The “Add Vector Join” menu will appear.

- 5- Select the Canopy measurements.xlsx as “Join layer”.
- 6- Select Canopy measurement as “Join field”.
- 7- Select Canopy measurement as “Target field”.
- 8- Click on the “custom Field Name Prefix” and remove the information into the bar.
- 9- Click on the “OK” button.
- 10- Finally, right-click on the layer created in the Layer list and select “Export” > “Save Feature As...” to save the created layer. In the menu we will select “Format” as ESRI Shapefile, we select the path where we will save the layer and we will select the EPSG: 25831 – ETRS89 / UTM zone 31N as “CRS”. Click “OK” and the layer will be saved.

Repeat this process with the information about the soil measurements (Soil measurements.xlsx).

4 Questions

Answer the following questions using the material of the agricultural database built previously.

1. Which type of information can observe in the topographical map?

The topographical map shows the contour lines. With this information we can get an idea of the slope of the plot.

2. Do you think that the slope of the plot affected the results obtained in the soil samples? And the canopy vigor throughout the campaign?

Yes, in the soil samples obtained from the lowest part of the plot they show a greater quantity of organic matter and nutrients. In the vegetation measurements, a behavior similar to that observed in the soil samples is observed. In the lower areas of the plot, the vegetation shows greater vigor. This is due to the erosion and runoff that occurs due to the high slope of the plot.

3. Do you think that the vigor is maintained over time? What actions could be taken in the crop to achieve a homogeneous plot?

Yes, the vigor remains constant between 2018 and 2019. Selective pruning and variable rate fertilization could be carried out in order to homogenize the vineyard.