EVI index field classification

World From Space task

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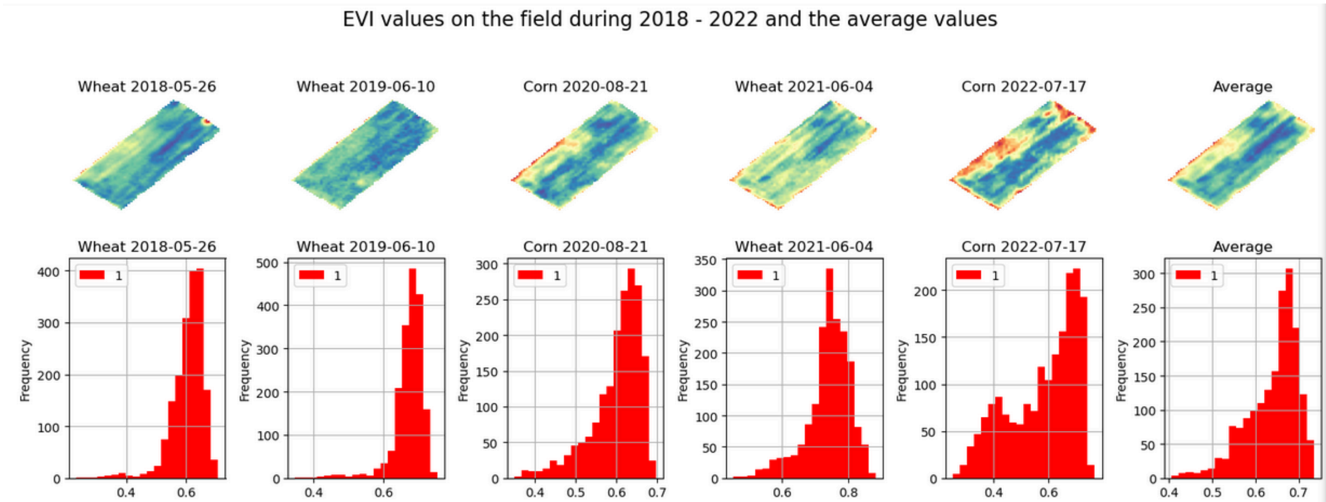
Assignment

I got 5 raster images of the field during 2018 and 2022 seasons (in tiff.) with EVI vegetation data. The task (in short) was to create a new (tiff.) image which represents the average EVI variability and classify the image into 5 classes.

Work description

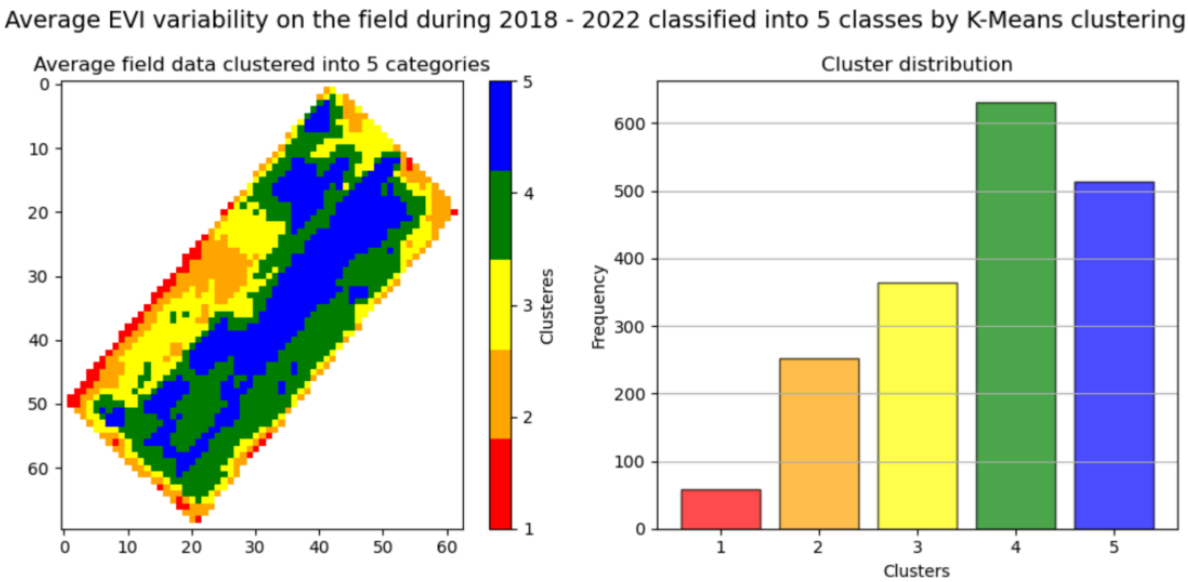
I used Python and the Rasterio library to load and visualize the input images. “Spectral” color map gives nice visualization results. I created a histogram for each input image divided into 20 bins to see the distribution of EVI values. Using Numpy arrays I calculated the average of the images and saved it as a new image. Then I classified this average image into five classes using K-Means clustering method via Scikit-learn Python library. I also tried a different classification based on even distribution of the value intervals. At the end I created a histogram of the distribution of the values and printed out the intervals used by each method. I also visualized the data using Matplotlib Python library.



Results

I used two clustering methods: K-Means and equal clustering. Turns out that the basic results are moreless the same. But the K-Means clustering method gives a more detailed picture of the situation and so it provides a slightly better solution. So let's focus on the K-Means method.

We can see the classes of EVI index visualized in 5 classes from red (the lowest) to blue (the highest). So the blue and green parts of the field are considered to be the best for growing crops. These parts create an “L” shape. In a simplified way we can say that the whole southeastern half of the field and also the northern third of the northwestern half gives good results. While the two thirds of the northwestern half of the field and also the whole field margins provide worse results.

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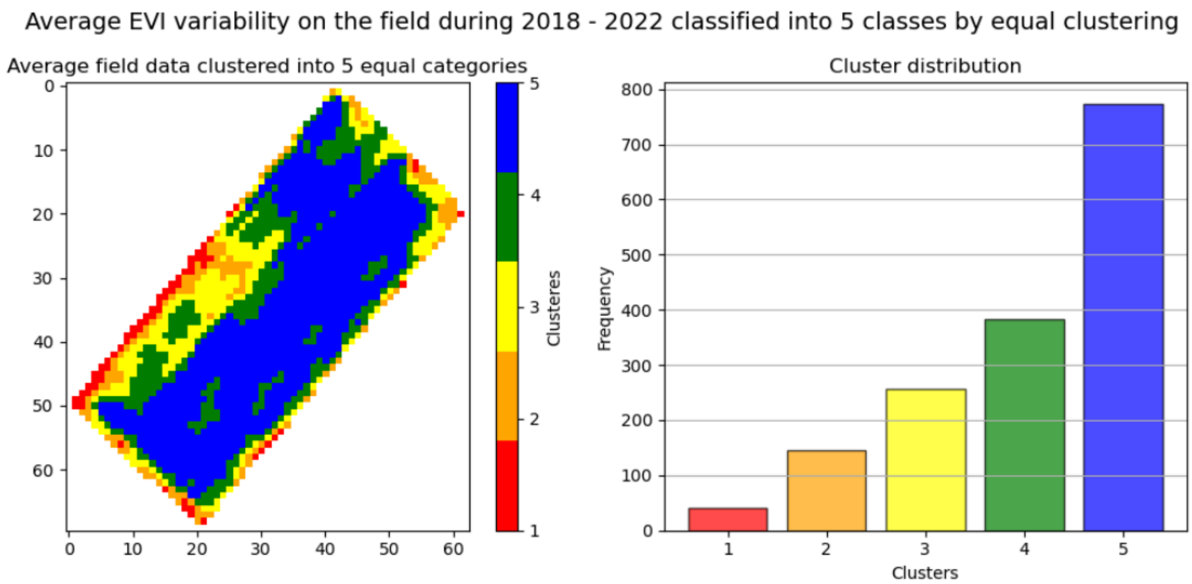
Cluster Intervals and Colors (K-Means clustering):
Cluster 1: Interval = (0.471, 0.512), Color = red
Cluster 2: Interval = (0.512, 0.582), Color = orange
Cluster 3: Interval = (0.582, 0.636), Color = yellow
Cluster 4: Interval = (0.636, 0.68), Color = green
Cluster 5: Interval = (0.68, 0.699), Color = blue
```




```
Cluster intervals and colors (equal clustering, size 0.046):
Cluster 1: Interval = (0.47 to 0.52), color = red
Cluster 2: Interval = (0.52 to 0.56), color = orange
Cluster 3: Interval = (0.56 to 0.61), color = yellow
Cluster 4: Interval = (0.61 to 0.65), color = green
Cluster 5: Interval = (0.65 to 0.70), color = blue
```

Other ideas

I am not a farmer so my insight is limited. But there are some thoughts to consider.:

The input images are from different seasons of the year (from May to August) so it can affect the results.

Also the crops grown on the field are not the same through the years. There is corn twice and wheat three times. This can also affect the results.

We have no data for the height profile of the field. And it can be very important if there are big differences between different parts of the field.

The EVI index should be strongly influenced by the weather. So different weather conditions through the years and seasons would lead to different results.