

Exercise 2: Analyzing Vegetation Indices

Introduction

In this exercise, we will compute and analyze vegetation indices using Python libraries. Please use the Jupyter Notebook provided to complete this exercise.

Info

All parts in the code that require your input for completion are marked with flag “#TODO”.

Tasks

1 Setup

Open the file `ex2.ipynb` (available on Moodle) using Jupyter.

2 Compute the Normalized Difference Vegetation Index (NDVI) of sentinel images

- 2.1 Download the Sentinel-2 images. The zip file contains 5 folders with files of 5 different Sentinel images acquired at different timestamps. The folder names have the following structure: `image_year_month`.
- 2.2 Compute the NDVI indices of each image and save it to disk
- 2.3 Visualize the NDVI image of the sentinel image taken in Aug 2021

3 Compute and visualize the average NDVI values of 4 regions in the 5 sentinel images provided

- 3.1 Compute the average NDVI of 4 regions (defined by bounding boxes) in the 5 sentinel images provided. The bounding boxes of the 4 regions (areas covered by vineyards, tress, buildings and a sports field) are specified in the Jupyter Notebok for the exercise. The sentinel images were taken on Oct 2020, Feb 2021, Apr 2021, Jun 2021, and Aug 2021. Use the function `crop_image` to crop the regions using the bounding boxes
- 3.2 Visualize the average NDVI values of the 4 regions as time series, using matplotlib. It can help to see the code example presented in slide 4 of the exercise 2 (available on moodle)

Q In general, which months have the lowest and highest NDVI values?

Q Which regions have the lowest and highest NDVI values overall? Why do you think that happens?

Q What can you observe when comparing NDVI values of vineyards and trees over time? Why do you think the time series of those regions differ more in certain months than in others?