

010170559_IHW

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GEOMATICS ENGINEERING DEPARTMENT

GEO 468E: SPECIAL TOPICS IN REMOTE SENSING

INDIVIDUAL HOMEWORK

M. Talha UYSAL - 01017559

In this work, a Pleiades-1A image is used.

Pleiades-1A Bands

Band

Wavelength (nanometers)

P

430-830

Blue

0.45-0.51

Green

490-610

Red

600-720

Near Infrared (NIR)

750-950

```
[1]: #import required packages
import numpy as np
import rasterio
import skimage.io as sio
from matplotlib import pyplot as pyp
%matplotlib inline
```

```
[2]: #a simple function to show images and export them
def preview(img, title):
    fig = pyp.figure(figsize=(5, 5))
    fig.set_facecolor("white")
```

```
pyp.imshow(img)
pyp.title(title)
pyp.savefig("output\{}.png".format(title))
pyp.show()
```

Index 1: Green Normalized Difference Index

The Green Normalized Difference Vegetation Index (GNDVI) is a vegetation index for estimating photosynthetic activity and is a commonly used vegetation index to determine water and nitrogen uptake into the plant canopy.

Name

Normalized Difference NIR/Green Green NDVI

Abbreviation

GNDVI

Formula

$(\text{NIR} - \text{GREEN}) / (\text{NIR} + \text{GREEN})$

Wavelengths

490:570,780:1400

Visualisation of required spectral range

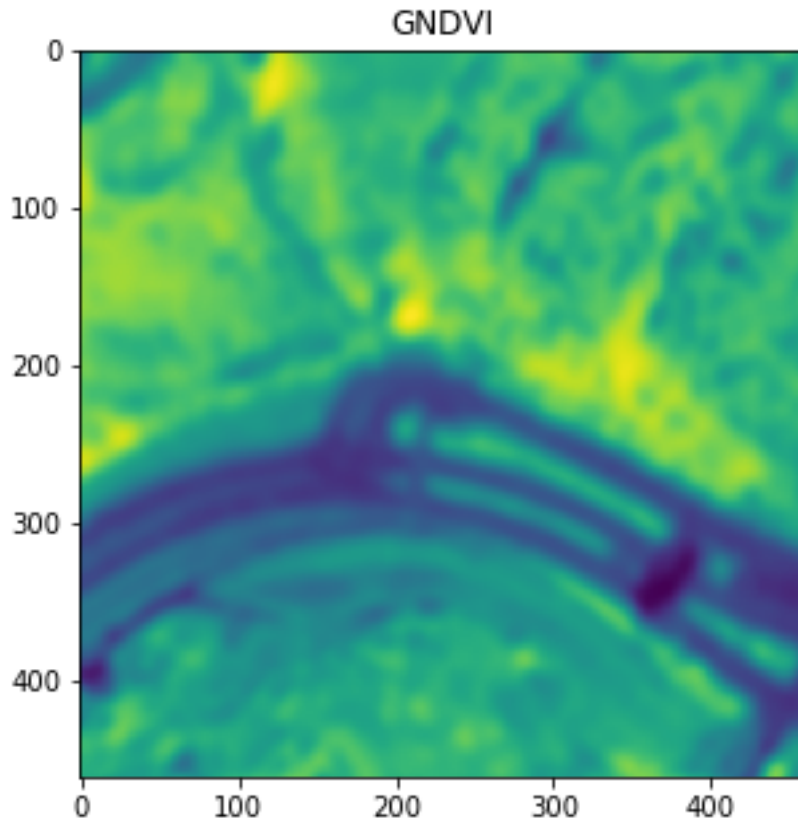
```
[3]: #open the base image
img = sio.imread("img\IMAGE_01.TIF",plugin='tiffle')

#define required bands. (red->img[:, :, 0], green->img[:, :, 1], blue->img[:, :, 2],
↳ nir->img[:, :, -1])
green = img[:, :, 1]
nir = img[:, :, -1]
```

```
[4]: #convert the bands to float32 and define the desired index by using its formula
green2 = green.astype(np.float32)
nir2 = nir.astype(np.float32)

gndvi = (nir2-green2) / (nir2+green2)
```

```
[5]: preview(gndvi, "GNDVI")
```



Index 2: Simple Ratio NIR/RED Difference Vegetation Index, Vegetation Index Number (VIN)

This is a quick way to distinguish green leaves from other objects in the scene and estimate the relative biomass present in the image. Also, this value may be very useful in distinguishing stressed vegetation from non-stressed areas.

Name

Simple Ratio NIR/RED Difference Vegetation Index, Vegetation Index Number (VIN)

Abbreviation

DVI

Formula

NIR / RED

Wavelengths

640:760,780:1400

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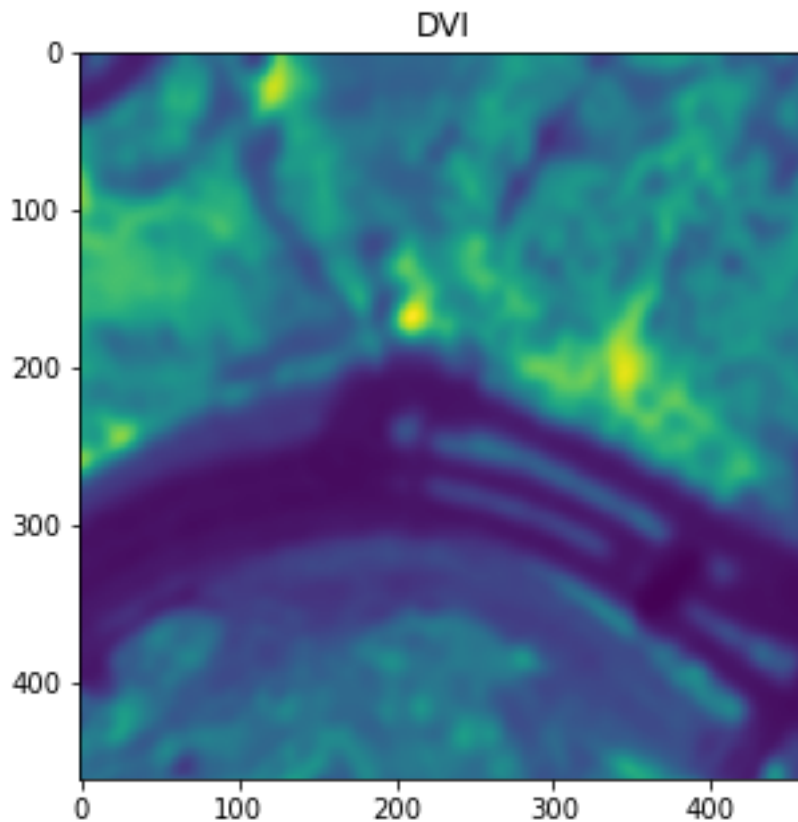
<td>Jordan 1969

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Visualisation of required spectral range

```
[6]: #define required bands. green and nir were already defined before.  
red = img[:, :, 0]  
  
#convert the bands to float32 and define the desired index by using its formula  
red2 = red.astype(np.float32)  
  
dvi = nir2 / red2
```

```
[7]: preview(dvi, "DVI")
```



References:

GNDVI - ArcGIS Pro | Documentation

IDB - Index: Normalized Difference NIR/Green Green NDVI

IDB - Index: Simple Ratio NIR/RED Difference Vegetation Index, Vegetation Index Number (VIN)

Vegetation Indices Basics | SR – NDVI – PRI | hiphen