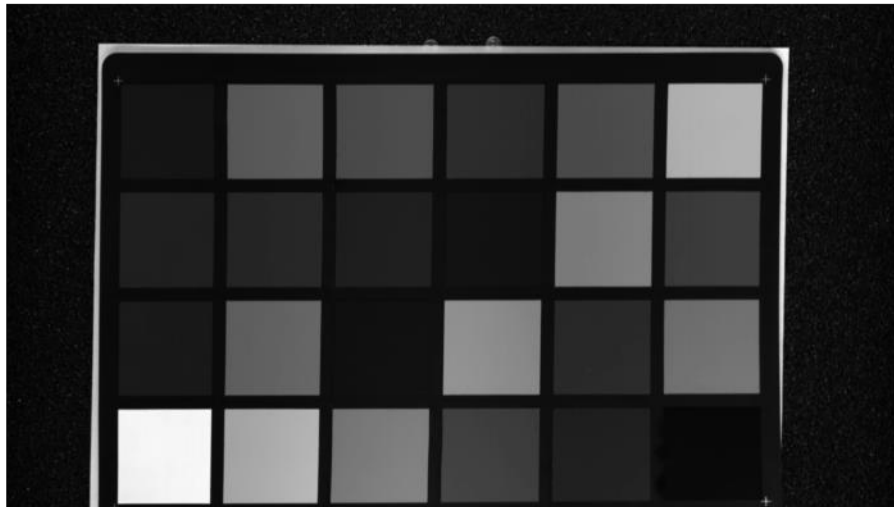


Task 1: Colab/Python and spectral files.

Colorchecker (scanner) without white correction:

Grayscale image:

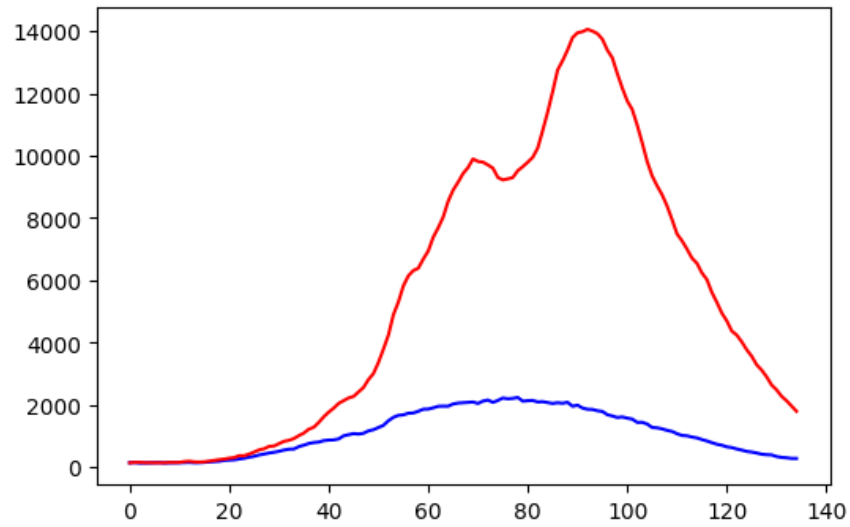


RGB image:

```
ch_1 = 64 # Wavelength 630.31  
ch_2 = 44 # Wavelength 529.72  
ch_3 = 23 # Wavelength 430.78
```



Plot pair of spectra in one plot:



Colorchecker 2 lamps (Specim IQ) without white correction:

Grayscale image:

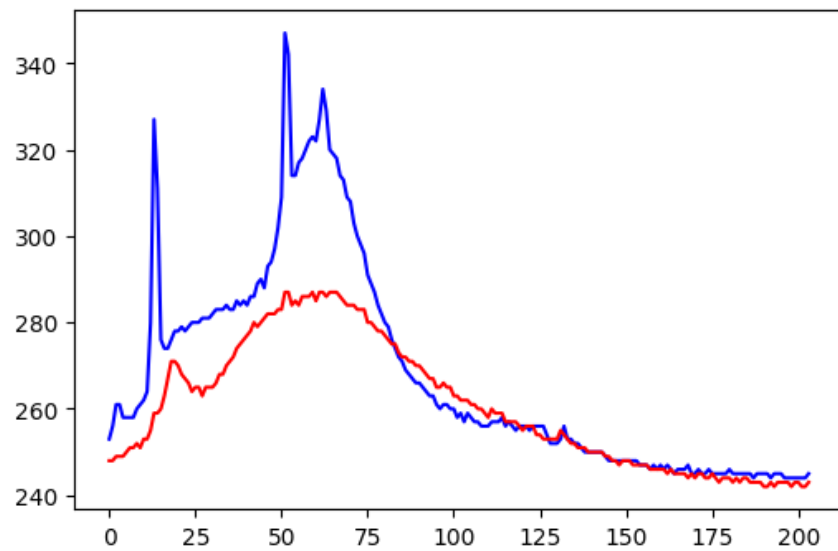


RGB image:

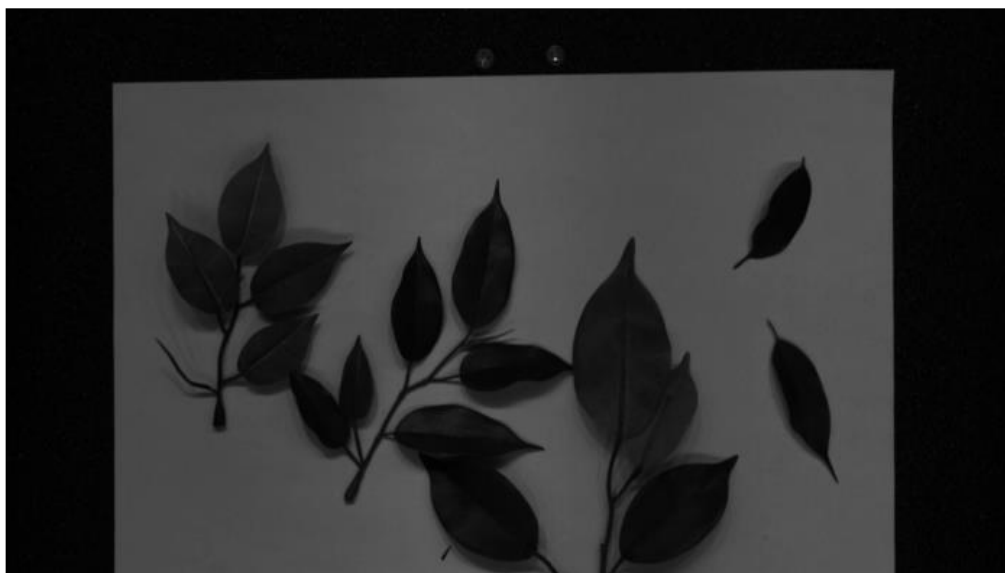
```
ch_1 = 80 # Wavelength 631.15
ch_2 = 47 # Wavelength 530.96
ch_3 = 13 # Wavelength 431.97
```



Plot pair of spectra in one plot:

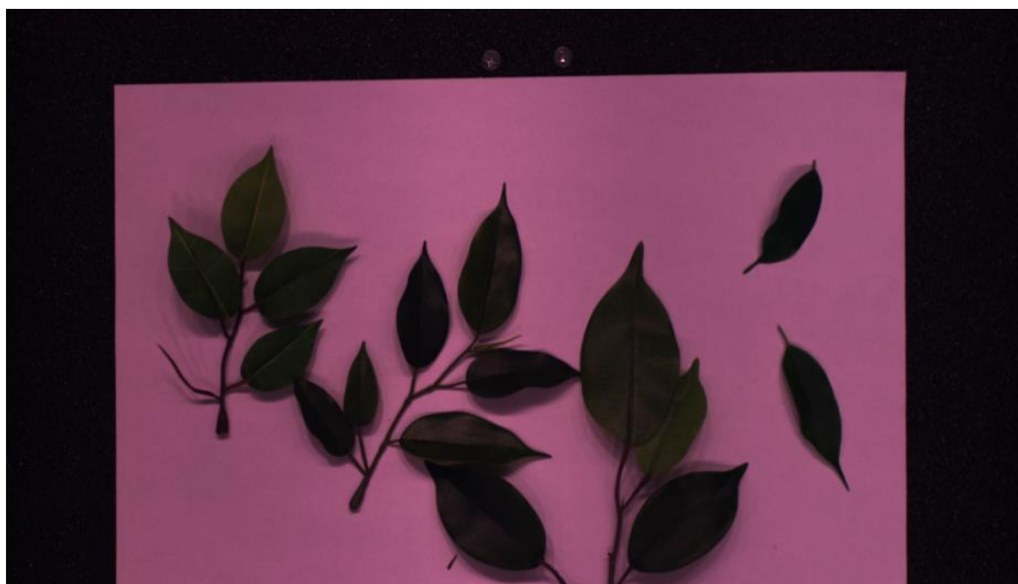


Live and plastic leaves (scanner) Grayscale image without white correction:
Grayscale image:

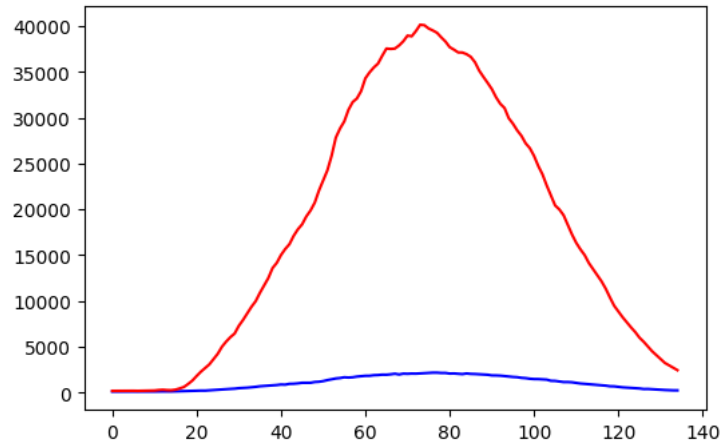


RGB image:

```
ch_1 = 64 # Wavelength 630.31  
ch_2 = 44 # Wavelength 529.72  
ch_3 = 23 # Wavelength 430.78
```



Plot pair of spectra in one plot:



Task 2: Open ENVI from Japanese spectral camera(Japanese spectral camera)

Let's find the number of Bands first:

```
[6] open_path = "/content/drive/MyDrive/ASI/Lab 2/task 2/colorChecker_nir.nh7"
# Read raw
fopen = open(open_path, "rb")
raw_image = numpy.fromfile(fopen, dtype=numpy.uint16) #uint16 float32 #count=spatial_pixels*sample_lines*spectral_bands 'u2' numpy.uint16
fopen.close()
print(raw_image.shape)

samples = 1280
lines = 1024
x= raw_image.shape

(197918720,)
```

```
[7] band_count= 197918720 / (samples*lines)
print(band_count)

151.0
```

Let's check expected and actual size is same or not. Besides plot a Grayscale Preview and a spectra of a particular point in the image:

```
▶ samples = 1280
lines = 1024
bands = 151
print('Expected size:', samples*bands*lines)
print('Actual szie:', raw_image.shape)

spectral_image = numpy.reshape(raw_image, (lines, bands, samples))

plt.imshow(spectral_image[:,40,:], cmap="gray")
plt.show()
plt.plot(spectral_image[100,:,100])
plt.show()

Expected size: 197918720
Actual szie: (197918720,)
```

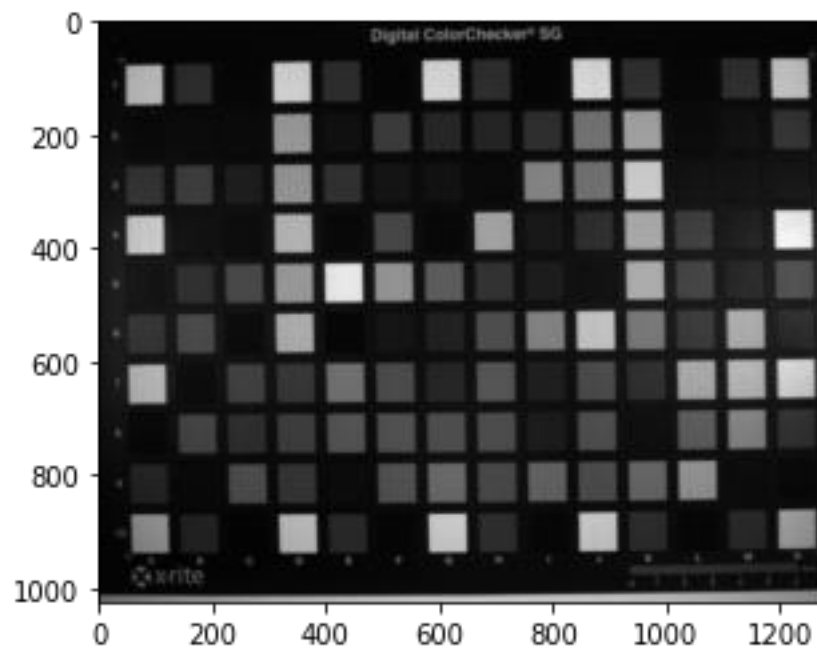


Fig: Grayscale preview

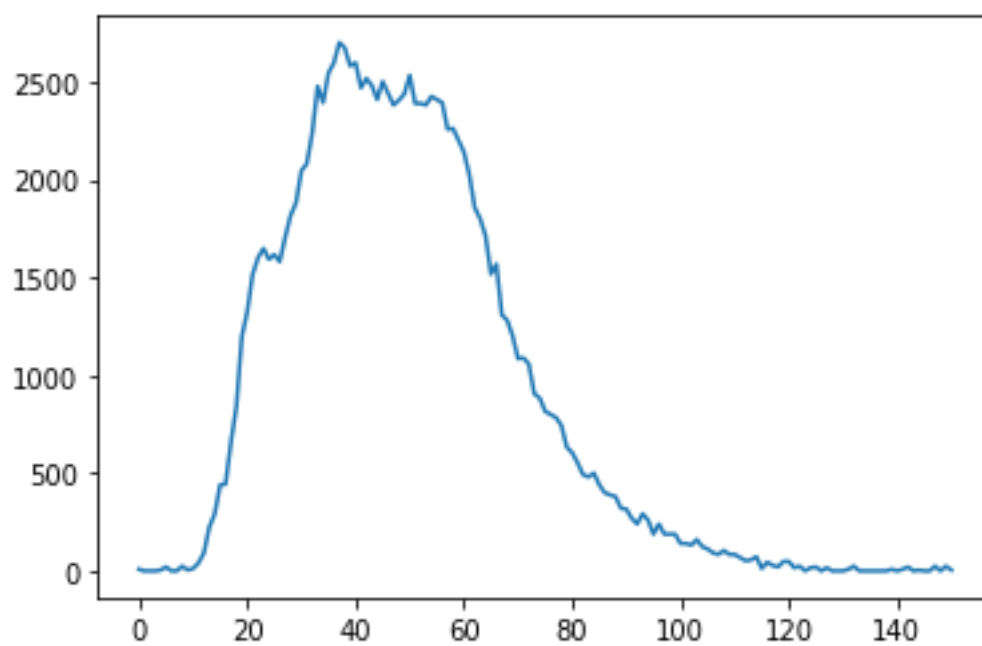


Fig: Spectra plot of a random point from the image.

Task 3: Open ENVI from other byte order. Image of coin (Senop camera)

Let's find the number of Bands first as task 2:

```
Task 3

open_path = "/content/drive/MyDrive/ASI/Lab 2/task 3/ext/HSI_snapshot__20212101144836.dat"
# Read raw
fopen = open(open_path, "rb")
raw_image = numpy.fromfile(fopen, dtype='>u2') #uint16 float32 #count=spatial_pixels*sample_lines*spectral_bands '>u2' numpy.uint16
fopen.close()
print(raw_image.shape)

samples = 1024
lines = 1024

(18874368,)

[17] band_count= 18874368 / (samples*lines)
print(band_count)

18.0
```

Let's plot a Grayscale preview of the coin image:

```
samples = 1024
lines = 1024
bands = 18

spectral_image = numpy.reshape(raw_image, (bands, lines, samples))
print (spectral_image.shape)

plt.axis('off')
#plt.rcParams['figure.dpi']=150
plt.imshow(spectral_image[2,:,:], cmap="gray")
plt.show()
```



Fig: Grayscale preview of coin image.

Task 4: Save ENVI spectral image with interleave = bil/bip

Grayscale preview of the color checker image:

```
open_path = "/content/drive/MyDrive/ASI/Lab 2/Task 4/ext/Colorchecker.raw"
# Read raw
fopen = open(open_path, "rb")
raw_image = numpy.fromfile(fopen, dtype=numpy.uint16) #uint16 float32 #count=spatial_pixels*sample_lines*spectral_bands '>u2' numpy.uint16
fopen.close()
print(raw_image.shape)

samples = 512
lines = 512
bands = 204

print((512*512*204))
spectral_image = numpy.reshape(raw_image, (lines, bands, samples))

plt.axis('off')
plt.imshow(spectral_image[:,40,:], cmap="gray")
plt.show()
#plt.plot(spectral_image[500,:,500])
#plt.show()
```

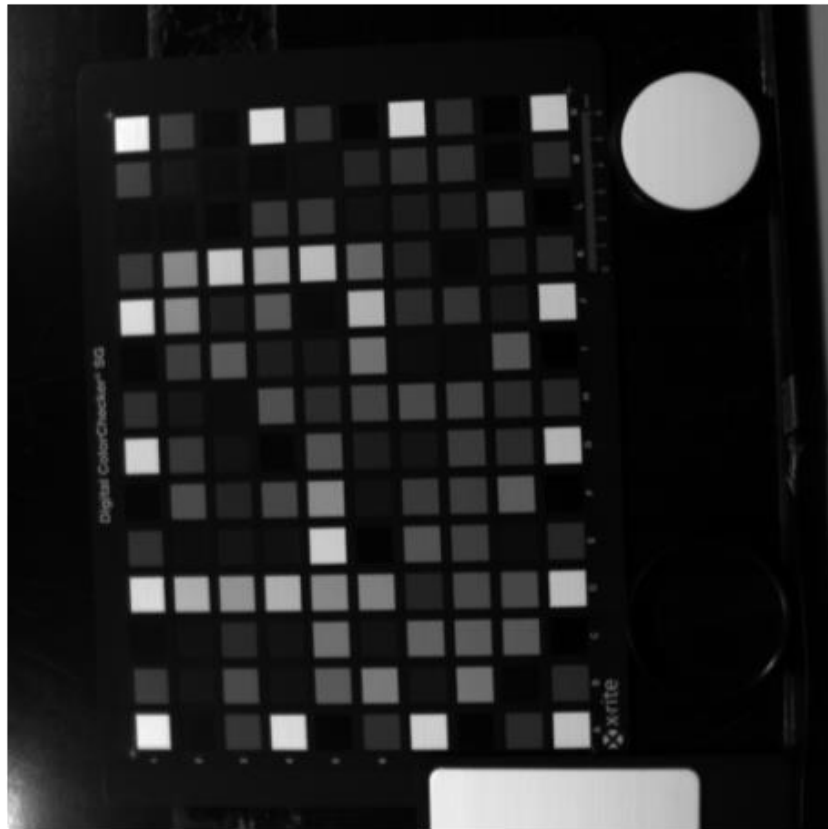


Fig: GrayScale preview

Change bil to bip in hdr file:

```
ENVI
description = {Data recorded with Specim IQ}
samples = 512
lines = 512
bands = 204
header offset = 0
file type = ENVI
data type = 12
interleave = BIP
sensor type = SPECIM IQ
byte order = 0
default bands = {70,53,19}
latitude = 0.00000000
longitude = 0.00000000
acquisition date = 29-09-2020
errors = none
binning = {1,1}
tint = 121
fps = 8.26446
wavelength = {
  397.32,
  400.20,
  403.09,
  405.97,
  408.85,
  411.74,
  414.63,
  417.52.
```

FreeLook Preview of new spectral cube RGB version:

