

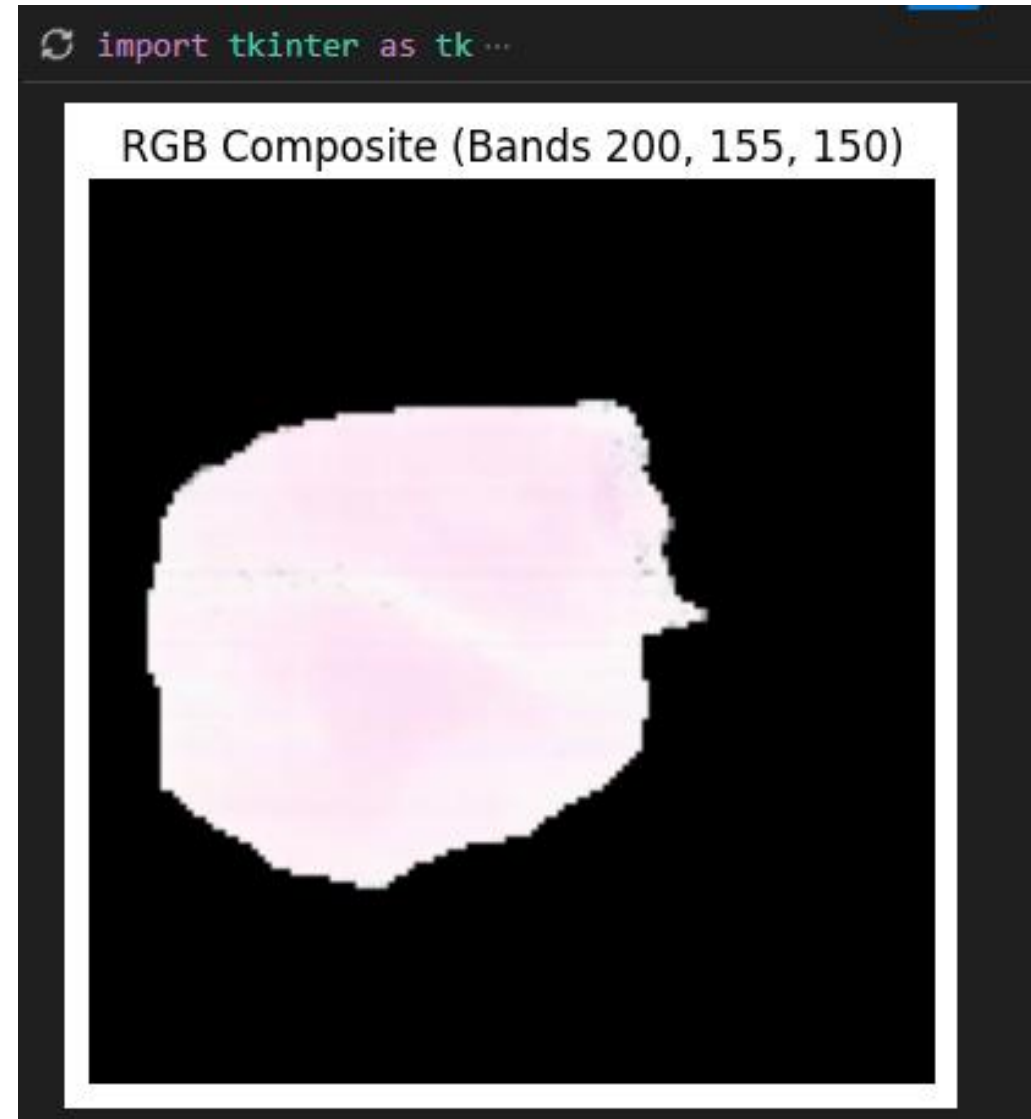
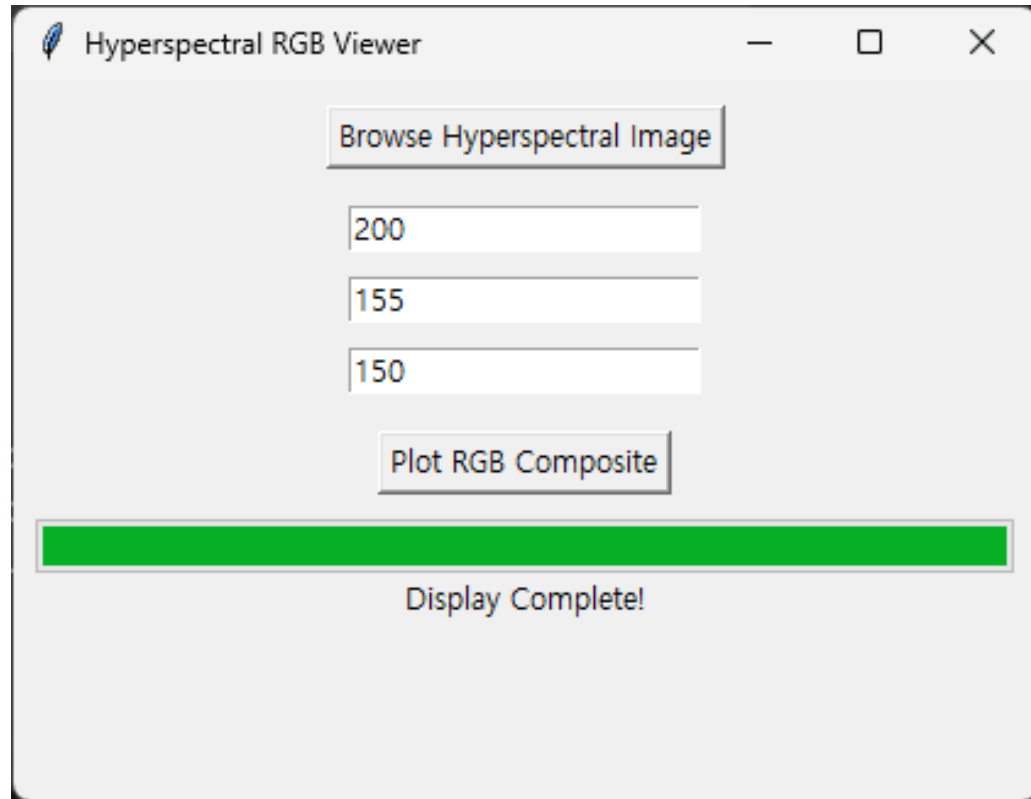
W6 exercise 3

The screenshot displays a JupyterLab environment with the following components:

- EXPLORER:** Shows a project structure with files like `2025RS_Class4.py`, `exercise.py`, `exercise2.py`, and `Week6_assignment.py`.
- Code Editor:** Contains the Python code for `Week6_assignment.py`, which implements a GUI for viewing hyperspectral images.
- Terminal:** Shows the execution output, including the command `python Week6_assignment.py` and the resulting `File Selected` message.

```
1  #%%
2  import tkinter as tk
3  from tkinter import filedialog
4  import threading
5  from tkinter import ttk
6  import rasterio
7  import numpy as np
8  import matplotlib.pyplot as plt
9
10 def browse_file():
11     global image_path
12     image_path = filedialog.askopenfilename(title="Select a file")
13     progress['value'] = 0
14     progress_label.config(text="File Selected")
15
16 def plot_rgb():
17     def task():
18         r_band = int(r_entry.get())
19         g_band = int(g_entry.get())
20         b_band = int(b_entry.get())
21
22         with rasterio.open(image_path) as dataset:
23             data = dataset.read()
24             red = data[r_band-1, :, :]
25             blue = data[b_band-1, :, :]
26             green = data[g_band-1, :, :]
27
28             rgb = np.dstack((red, green, blue))
29             rgb_norm = rgb/np.max(rgb)
30
31             plt.imshow(rgb_norm)
32             plt.title(f'RGB Composite (Bands {r_band}, {g_band}, {b_band})')
33             plt.axis('off')
34             plt.show()
35
36         progress["value"] = 100
37         progress_label.config(text="Display Complete!")
38
39     threading.Thread(target=task).start()
40
41 root = tk.Tk()
42 root.title("Hyperspectral RGB Viewer")
43 root.geometry("500x350")
44
45 browse_button = tk.Button(root, text="Browse Hyperspectral Image", command=browse_file)
46 browse_button.pack(pady=10)
47
48 r_entry = tk.Entry(root)
49 r_entry.pack(pady=5)
50 r_entry.insert(0, "200")
51
52 g_entry = tk.Entry(root)
53 g_entry.pack(pady=5)
54 g_entry.insert(0, "155")
55
56 b_entry = tk.Entry(root)
57 b_entry.pack(pady=5)
58 b_entry.insert(0, "150")
59
60 plot_button = tk.Button(root, text="Plot RGB Composite", command=plot_rgb)
61 plot_button.pack(pady=10)
62
63 progress = ttk.Progressbar(root, orient="horizontal", length=400, mode="determinate")
64 progress.pack(pady=0)
65
66 progress_label = tk.Label(root, text="Progress")
67 progress_label.pack()
68
69 root.mainloop()
70
71 # %%
```

W6 exercise 3



W6 exercise 4

Run Cell | Run Below | Debug Cell

```
###
import tkinter as tk
from tkinter import filedialog
import threading
from tkinter import ttk
import rasterio
import numpy as np
import matplotlib.pyplot as plt
```

```
def browse_file():
    global image_path
    image_path = filedialog.askopenfilename(title="Select a Hyperspectral Image", filetypes=[("TIF Files", "*.tif")])
    progress['value'] = 0
    progress_label.config(text="File Selected")

def calculate_band_math():
    def task():
        band1_number = int(band1_entry.get())
        band2_number = int(band2_entry.get())

        with rasterio.open(image_path) as dataset:
            data=dataset.read()
            band1 = data[band1_number-1, :, :]
            band2 = data[band2_number-1, :, :]

            math_result = (band1 - band2)/(band1 + band2 +1e-6)

            plt.imshow(math_result, cmap='gray')
            plt.colorbar()
            plt.title(f"Band Math: (Band {band1_number} - Band {band2_number})/(Band {band1_number} + Band {band2_number})")
            plt.axis('off')
            plt.show()

        progress['value'] = 100
        progress_label.config(text="Calculation complete!")

    threading.Thread(target=task).start()
```

```
root = tk.Tk()
root.title("Hyperspectral Band math Calculator")
root.geometry("500x350")

browse_button = tk.Button(root, text="Browse Hyperspectral Image", command=browse_file)
browse_button.pack(pady=10)

band1_label = tk.Label(root, text="Enter Band 1 Number :")
band1_label.pack()
band1_entry = tk.Entry(root)
band1_entry.pack(pady=10)
band1_entry.insert(0, "217")

band2_label = tk.Label(root, text="Enter Band 1 Number :")
band2_label.pack()
band2_entry = tk.Entry(root)
band2_entry.pack(pady=10)
band2_entry.insert(0, "213")

calc_button = tk.Button(root, text="Calculate Band math", command=calculate_band_math)
calc_button.pack(pady=10)

progress=ttk.Progressbar(root, orient="horizontal", length=400, mode="determinate")
progress.pack(pady=10)

progress_label = tk.Label(root, text="Progress")
progress_label.pack(pady=10)

root.mainloop()
```

W6 exercise 4

Hyperspectral Band math Calculator

Browse Hyperspectral Image

Enter Band 1 Number :
217

Enter Band 2 Number :
213

Calculate Band math

Calculation complete!

Band Math: $(\text{Band 217} - \text{Band 213}) / (\text{Band 217} + \text{Band 213})$

