Assignment 5: U-Net Image Segmentation

Total marks: 100

Due date: 29th of Nov, 2023. (Midnight)

For this assignment, you need to complete the U-Net implementation code provided with this model, re-run the code for semantic segmentation, and submit the code with output traces for grading

a) Complete the U-Net code

   In the code provided, you will find the code block shown below. You only need to complete the missing code mentioned in the comment section. No other changes in the code are necessary. Make sure to use the down_block(), up_block(), and bottleneck() functions provided with this code to complete the model in Unet(). The first down block and last up block are coded for you as examples.   **70**

```python
def UNet():
    f = [16, 32, 64, 128, 256]
    inputs = keras.layers.Input((image_size, image_size, 3))

    p0 = inputs
    #p1 will go to the next down block and c1 will go to the matching up block
    c1, p1 = down_block(p0, f[0]) #128 -> 64

    #####################################################
    #************** Complete the model here *****************
    #Your code should be only in this block. Add the corresponding
    #down blocks, followed by the bottleneck block, followed by matching
    #up blocks.


    #####################################################
    u4 = up_block(u3, c1, f[0]) #64 -> 128

    #outputs = keras.layers.Conv2D(1, (1, 1), padding="same", activation="sigmoid")(u4)
    outputs = keras.layers.Conv2D(4, (1, 1), padding="same", activation="softmax")(u4)
    model = keras.models.Model(inputs, outputs)
    return model
```

b) Run the code

Train the model for 15 epochs (i.e. change the parameter so that the model trains for 15 epochs), run the whole code and submit the code with traces of outputs.   **30**

Deliverable:

- Implement the solution on Google Colab platform and upload **BOTH** the .py and .ipynb files on Moodle. Your program should contain the traces of your run.

Grading Criteria

1. Your code should run without an error. If it doesn't run, or part of the code doesn't run you will loose 30% of marks (for that part). For example, if part b) of your code doesn't run, you can receive maximum 49 marks (instead of 70) on part b).
2. **Late submission:** Since this assignment is verry easy no submission is allowed after the deadline. **So, if you miss the deadline, you will receive a zero.**