

Final Project

100 Points

Overview: The goal of the final project is to use the Segmentation Models library to build and compare two different semantic segmentation models. You can choose to compare two different base architectures using different or the same encoder. Alternatively, you could choose to train the same architecture but with different encoders. Another option is to train the same architecture, but with the encoder pre-trained and frozen, pre-trained and unfrozen, or initialized with random weights.

You must propose a specific research question and design an experiment to answer this question. The instructor must approve your proposed research question.

You will need to determine the following:

1. The semantic segmentation dataset to use (the instructor can help you find an appropriate dataset).
2. The training routine including number of training epochs, mini-batch size, loss metric, optimizer, learning rates, schedulers, metrics to monitor, etc.

Deliverables

1. An .ipynb file that contains all of the code to implement your experiment.
2. A research article, delivered as a Word document or PDF, with associated figures and tables that explain your experiment and presents and discusses your results.

Grading

1. Your code is correct and commented throughout, and the experiment is correctly implemented. (20 Points)
2. Research paper
 - a. The paper includes an Introduction section that clearly explains the purpose of the study. (Up to 10 Points)
 - b. A Background section is provided that describes the architectures/encoders implemented. You should also discuss at least five other related studies. (Up to 10 Points)
 - c. A Methods section that clearly explains the methods used to conduct the experiment including input data characteristics, data partitioning, architecture configuration, training and assessment routines, and assessment metrics. (Up to 15 Points)
 - d. A Results and Discussion section that is aligned with your research question. (Up to 15 Points)
 - e. Quality figures and tables should be included throughout to enhance the text. They should be polished and of publication quality. All figures and tables must include captions and be cited in the text. (Up to 10 Points)
 - f. A Conclusion that clearly summarizes the findings. (Up to 5 Points)
 - g. Include a reference section and citations throughout. (Up to 5 Points)
 - h. Overall, the paper should be polished, coherent, and grammatically/stylistically professional. (Up to 10 Points)

Note: You can choose to use your own data for this final project. However, please discuss the data/project with the instructor beforehand to make sure they are suitable.

Note: You can propose an alternative final project. If so, you will need to submit an official proposal to the instructor that describes the research question being explored, the input data being used, and the general methods to implement. Alternative final projects must be approved by the instructor.