

# U-NET Deep learning final project

Master's Degree in Intelligent Systems  
Computer Vision and 3-D Reconstruction

December 4, 2024

UNET is one of the cornerstones of computer vision-oriented deep learning models. In this final assignment, we will implement UNET from scratch using either PyTorch or TensorFlow/Keras. The final assignment does not include provided code, as we aim to assess each student's ability to create the entire pipeline independently.

We will work with an adapted version of the original dataset. Our task is to implement a U-NET model capable of segmenting cells. The assignment should be submitted as a notebook containing the following sections:

- Explanation of the UNET model or variation chosen
- Dataset (explanation of the contents and loading)
- Code of the UNET model
- Optimization algorithm and training of the model
- Evaluation of the model performance
- Visual evaluation of the performance (both graphs and images)
- Conclusions

You may deliver the task as a notebook with different .py files implemented by you. Remember to explain with detail each .py file that you use for the task.

## **Relevant links:**

- UNET paper: <https://arxiv.org/pdf/1505.04597>
- Dataset: [https://github.com/miquelmn/visio\\_per\\_computador/blob/master/in/DL/data.zip](https://github.com/miquelmn/visio_per_computador/blob/master/in/DL/data.zip)

**Extra tasks:**

- Use a different variation than the normal UNET (UNET with skip connections, UNET 3D, etc...)
- Different, more challenging dataset (include explanation over the choice and difference with the other one)
- Augmentation techniques (more than 1, add explanation for each one)