ZEROCOSTDL4MIC: AN OPEN PLATFORM TO SIMPLIFY ACCESS AND USE OF DEEP-LEARNING IN MICROSCOPY

Romain F. Laine[1,2], Lucas von Chamier[1], Guillaume Jacquemet[3], Ricardo Henriques[1,2,4]

1. MRC-LMCB, UCL, London, UK, 2. The Francis Crick Institute, London, UK, 3. Turku Bioscience Centre, University of Turku, Turku, Finland, 4. Instituto Gulbenkian de Ciência, Oeiras, Portugal

Email: r.laine@ucl.ac.uk

KEY WORDS: Deep Learning, microscopy, image analysis, segmentation, denoising, image-to-image translation, object detection

ABSTRACT:

Deep Learning (DL) methods are powerful analysis tools for microscopy. However, the need to access computational resources and the complexity in setting these up often lead to an accessibility barrier for most biology-focused laboratories. Here, we present ZeroCostDL4Mic, a DL platform which considerably simplifies access and use of DL for microscopy [1,2].

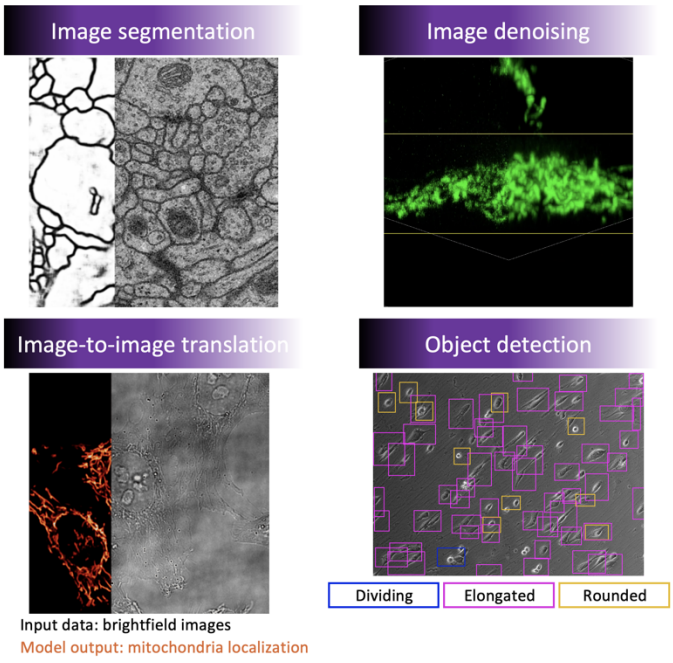

Figure 1: Some of the image analysis tasks enabled by ZeroCostDL4Mic.

For this, we exploit the computational resources provided by Google Colab: a free, cloud-based service accessible through a web browser.

ZeroCostDL4Mic allows researchers without coding expertise to use some of the most powerful DL networks available today, for e.g., segmentation, denoising, artificial labelling, super-resolution microscopy, object detection and image-to-image translation.

Importantly the platform allows the user to perform every step of the process necessary to DL: training and use of the models, quality control of the network output as well as integration within larger analysis pipelines.

[1] von Chamier L., Laine R.F. *et al*. ZeroCostDL4Mic: an open platform to simplify access and use of Deep-Learning in Microscopy. http://biorxiv.org/lookup/doi/10.1101/2020.03.20.000133

[2] https://github.com/HenriquesLab/ZeroCostDL4Mic