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Webinar

Remote and Interactive Image Processing Programming Laboratories with Jupyter

Wed. 30 June 2021 at 18:00 CEST (local time in Lausanne)
https://events.vtools.ieee.org/event/register/274436 (free)

Abstract. University computer laboratories as we knew them are dead. The widespread availability of networked computing resources among students (smartphones, tablets, and laptops), combined with the existence of enabling technologies like Jupyter, can no longer be ignored when allocating resources for higher education in STEM.

For us at the EPFL's Biomedical Imaging Group (Prof. Michael Unser), this realization sinked in just months before the pandemic unraveled and effectively rendered the traditional format impossible. Since then, we have been simultaneously developing and running the graded laboratory sessions for our popular basic and advanced image-processing (IP) courses (up to 280 students) as online experiences on an institute-wide JupyterLab instance (Noto at EPFL). The students become experts in the implementation and application of concepts like image wavelet transforms, morphological operators, interpolation, and neural networks for pixel classifications, and do so working at their own pace and anytime. This has resulted in excellent feedback from students and teaching assistants alike.

In this presentation, I will outline the pedagogical goals, technical work and results of this project. Among others, this will cover the development of polyglot notebooks (JavaScript + Python, harnessing the SoS framework) and a dedicated image processing JavaScript library to enable care-free realistic pixel-by-pixel IP algorithm development, the design of an interactive image viewer for Jupyter Notebooks (harnessing ipywidgets and Matplotlib), the development of a grading library for image and signal processing exercises with plagiarism detection (relying on the nbgrader framework), and our analysis of the student feedback to date.

Speaker. Dr. Pol del Aguila Pla is a research staff scientist at the Center for Biomedical Imaging (CIBM) in Switzerland, and a postdoctoral researcher at the EPFL's Biomedical Imaging Group in Lausanne, Switzerland. Besides caring for his research in inverse problems and mathematical imaging, Pol invests his time on improving higher education of image and signal processing through digitalisation strategies and the development of high-quality materials. Dr. del Aguila Pla holds Ph.D. and M.Sc. degrees in Electrical Engineering from the KTH Royal Institute of Technology in Stockholm, Sweden, and a M.Sc. degree in Telecommunications Engineering from the Universitat Politècnica de Catalunya (UPC - BarcelonaTech) in Barcelona, Catalonia.