

AI for the Paleography of Ancient Greek Papyri: Some Reflections from Eight Years of Collaboration between Computer Vision and Papyrology

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Thanks to a massive digitization effort, Greek papyri offer a rare opportunity to apply Computer Vision approaches, especially Handwriting Analysis, to drastically renew traditional paleographic studies. Many Computer Scientists are enthusiastic about testing their methods on this challenging material. However, collaboration between the two disciplines to achieve innovative meaningful results in both fields requires important methodological adjustments. Building on experience acquired over the last eight years, the talk will present critical reflections on the main steps in applying AI to papyrus images.

Before even starting

The first questions to ask are: What is the motivation for using AI? What do we hope to achieve? Is it to accomplish a repetitive task faster? To handle large datasets and find the needle in a haystack? To discover yet unknown features that would have escaped the human brain? The talk will present the current results for a repetitive task (drawing bounding boxes around Greek letters) and for identifying writers.

Building the dataset

If digital images of ancient artifacts are increasingly available online, a limitation comes from the fact that some collections are easier to use than others (clear copyright, high-resolution images, explicit metadata on the digitization process and the image itself). Therefore, the composition of a newly formed dataset may not be driven by scientific coherence to address a specific question with the best known evidence, but rather by what is easily at hand, the default choice. The criteria guiding the elaboration of three papyrus datasets will be presented.

Designing the experiment

In collaboration with computer scientists, discussions are needed for each step of the experiment. The temptation to use “already made solutions”, for instance, unwisely applied data augmentation, and to save time not checking the quality of preprocessing operations (like binarization) can lead to damaging the data and weaken, if not ruin, the experiment.

Interpreting the results

Until recently, good results in Computer Vision could be summarized as “better performance than the state of the art.” To the specialist in the Humanities, this does not constitute new knowledge about the objects of study. The recent trend toward exploring “error analysis” allows for a better understanding of the nature of the outcomes produced by AI, what it really achieved and what made it fail. Examples borrowed from Writer Identification will illustrate the potential of proper interpretation of results.

Publishing the results

The use of AI requires a shift in publication practices, beyond books and articles alone. Data needs to be released in accordance with the FAIR principles (Findability, Accessibility, Interoperability, and Reusability). But these noble principles may not be straightforward to implement. Moreover, the traditional process of evaluating the quality of a work by external experts (peer-reviewers, scientific publishers) still needs to be translated into digital equivalents. In the world of Open Science, the diversity of audiences that now have access to specialized data needs to be taken into consideration when communicating results.