

Few-Shot Learning for Matching Relief-Printed Patterns on Medieval Ceramic Sherds

Key Words: Few-shot learning, Similarity learning, Deep clustering, Texture transformer models

Context:

Archaeologists often face challenges in matching the relief-printed patterns found on ceramic sherds discovered during excavations. Identifying sherds created with the same patterning tool (wheel) plays a crucial role in understanding ancient trade networks and provides valuable insights into past civilizations. Traditional methods involve manually stamping the motifs followed by a meticulous visual analysis to verify if these patterns were produced by the same wheel, a process that is not only time-consuming but also labor-intensive. Recent advances in artificial intelligence present a unique opportunity to revolutionize fields like archaeology by automating recognition processes, thereby accelerating discoveries and improving analysis precision.

This internship is a continuation of the PRIA REMIA research project (Pattern Recognition through Artificial Intelligence), developed in partnership between the PRISME laboratory, LIFO, and the Archaeological Service of the City of Orléans. In this context, we aim to develop an automated/intelligent system to assist archaeologists in identifying relief-printed decorations on medieval ceramic shards.

Internship Objectives

In this context, the internship aims to build on previous work in preprocessing and segmentation by proposing innovative approaches. The primary tasks will focus on:

- Exploring state-of-the-art methods in few-shot learning, similarity learning, deep clustering, and texture transformer models.
- Developing a novel method for identifying and clustering ceramic sherds decorated with the same wheel.
- Integrating the developed solution into the existing system.
- Drafting documentation for the developed solution.

Required Skills

- Strong programming skills in Python, including proficiency with deep learning and machine learning frameworks (e.g., PyTorch, TensorFlow, Scikit-learn).
- Familiarity with Deep Learning & Computer Vision, including Vision Transformers, Contrastive Learning, Similarity Learning, Clustering, and Texture Analysis.
- Solid understanding of mathematics, especially in linear algebra and optimization.
- Strong analytical, modeling, and writing skills.

Contact

To apply, please send your CV and a cover letter/email to Mr. Yassine NASSER (yassine.nasser@univ-orleans.fr).

Other Information:

Type of contract: Internship

Required degree level: Bachelor's + 4 or equivalent

Preferred degree: Master's in IA, mathematics, applied mathematics, or computer science, or equivalent, with a strong motivation for applied research.

Position: Research Intern

City: Orléans

Laboratory Location: [Polytech Orléans - Galilée Site](#)

Desired start date: 01-03-2025

Contract duration: 5-6 months

Application deadline: 31-01-2025

Security defense:

The internship will take place in a restricted area (ZRR). Access authorization to the laboratory is granted by the head of the university, following favorable ministerial advice, as defined in the decree of July 3, 2012, related to PPST. A negative ministerial opinion for a position in a ZRR would result in the cancellation of the recruitment.