

2026-T1 Recognition and Classification of Geometric Patterns on Ancient Greek Pottery

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T1A. B M Sketch-based Retrieval

Besides a query-by-example approach, we want to evaluate the possibility of proposing Geometric patterns based on a user sketch. To this end, an interactive canvas should support drawing and continuously propose completion hypotheses, based on the existing strokes and a reference database of shapes. Simultaneously a matching algorithm in the background should compute the closest-matching pattern classes or even real-world manifestations.

Functional Requirements

- FR1 **Sketch Interface** An editor should support the drawing of (rough) sketches, with the option to undo/redo strokes or erase parts.
- FR2 **Sketch Support** Concurrent with the drawing, hypotheses on potential sketch-continuations should be displayed.
- FR3 **Retrieval from Pattern Taxonomy** In fixed intervals (or when a substantial portion of sketch lines is added/removed), a retrieval event should be triggered in the background, which gives a ranked list of the closest matches. Matching can be achieved, e.g., using distances in embedding space. The results should be visualized in an interactive manner.
 - FR3a **Retrieval of real-world Examples (optional)** Besides the retrieval of similar drawing patterns, also samples depicted on real-world objects should be discoverable. This requires a bridging of the modal gap between drawing and photograph. Evaluate respective models for generating embeddings or computer vision methods for transforming the photographs in a corresponding fashion.
 - FR3b **Results Explanations (optional)** Depending on the technology used for matching, XAI methods for visualizing which parts of the sketch/result were responsible for the match (e.g., Grad-CAM) should be investigated.

T1B. B Multimodal Retrieval

Despite the core objectives of the RECONNECTION project being about the image (or 3D object)-based retrieval, reference literature contains vast amounts of textual descriptions corresponding to certain artifacts, or groups of artifacts. Currently this potential remains untapped, but it could be leveraged through NLP techniques processing said texts.

Functional Requirements

- FR1 **Data Acquisition** For an existing taxonomy of Geometric ornaments we have associated textual descriptions. The first step is to establish a mapping between bodies of texts and specific artifacts – descriptions can be about multiple artifacts and there can also be multiple descriptions for a single artifact.
- FR2 **Multimodal Retrieval** Conceptualize and evaluate how textual retrieval can be used in conjunction with image-based retrieval.