

PROPOSED STUDY

Classification of experimental and archaeologic Cardiidae and Glycymeridae shell imprints by Machine Learning

Aim: predict the species of Cardiidae and Glycymeridae shells and the printing gesture from 3D imprint images

The impresso-cardial cultural complex is characterized by pottery decorated with multiple tools, including marine shells. On the basis of experimental material, by analogy of shapes and measurements, the operator is able to identify the types and sizes of the shells. A new 3D imaging analysis method has recently been developed to objectify this method. However, the analogy of the shapes to characterize the species and printing gesture is still directed by the operator (visual description) and the format of the imprint is still partially processed (length, width, depth) and manually executed.

The application of Artificial Intelligence to 3D models of ceramic imprints can be a totally objective method by taking into account the imprint in its entirety in order to recognize and classify by an automatic procedure the tool (i.e., shells species) and the printing gesture.

The objects of the investigations are experimental imprints of 3 different species of Cardiidae (*Acanthocardia tuberculata*, *Cerastoderma edule*, *Cerastoderma glaucum*) and 1 species of Glycymeridae (*Glycymeris glycymeris*), which are digitalised in 3D models. The students will dispose of a data set of approximately three hundreds 3D images.

The aim is to build a supervised classification model capable of predict the species and printing gesture of the bivalvia from the 3D images.

The main steps of the procedure will be the following:

1. Explore the dataset to determine the best data format for the analysis (e.g., Point Cloud) and possibly pre-process the data
2. Investigate supervised classification methods which are suitable to apply to the problem of species prediction (e.g., Neural Network, Support Vector Classifier, ...), select the best model and test its performances.
3. Once the model is validated for experimental imprints, the classifier will be tested on more complex data issued from archaeological samples.

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