# Mid-project Results

The ArchAIDE project aims to improve archaeological workflows for identifying pottery, by speeding up time consuming tasks, providing support for non-specialists, and helping students learn more about pottery recognition.

ArchAIDE is a three-year project and has now reached the midway point. This datasheet presents the results of the technical workpackages thus far.

The Creation and Population of the Application Database

A core component of the ArchAIDE project is the design and implementation of a database that will be the repository for all the background knowledge and data produced by the project. This database has taken into account the complex nature of data from different sources and multiple languages.
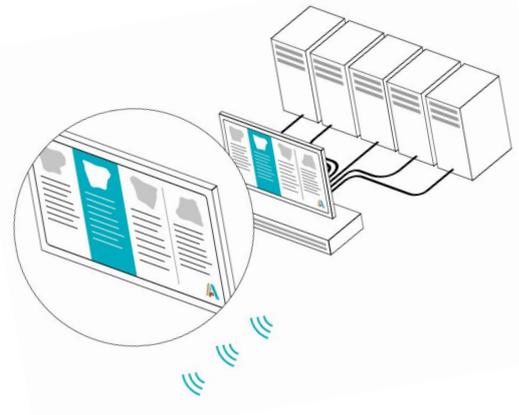
Technologies for the Digitisation of Catalogues

To help archaeologists identify sherds, a comparative collection is being created to populate the database that will form the basis of the ArchAIDE App. At the mid-point of the project the following pottery types have now been documented:

Terra Sigillata Italica
   (including stamps from the Kenrick catalogue)
Terra Sigillata Hispanica

Terra Sigillata from South Gaul
Roman Amphorae
Majolica of Montelupo

Data about these pottery types was derived in three ways:

1

Mapping existing structured digital data, including *Roman Amphorae: a digital resource* hosted by the Archaeology Data Service and the Ceramelex database created by the University of Cologne, to the ArchAIDE database.

2

Digitising existing catalogues and entering them into the ArchAIDE database. A text extraction tool was created allowing a user to scan a document, extract the text, and assign sections of text to the relevant fields in the database.

3

Photo campaigns have been carried out by the project partners in Ostia, Perugia, Spoletino and Barcelona to acquire images to train the neural network.

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Shape and Image-based Similarity Search and Retrieval

This focuses on the development of tools to assist in the automatic recognition of a sherd from a photograph, by comparing it to exemplars in the database and retrieving a curated list of results allowing the user to choose the most likely candidates.
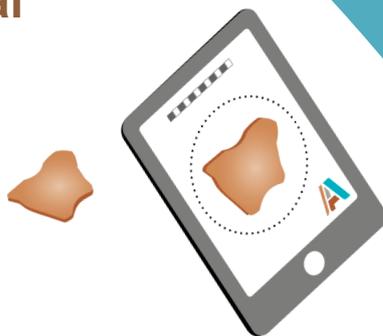
A neural network, which is a group of mathematical functions capable of expressing complex logic, is being created to carry out this task. There are two approaches corresponding with the two basic ways pottery is typically recognised: by shape and by decoration. The final goal in both types of recognition is to create the curated lists to be returned by the App.

Decorated Sherds (Majolica)

Training the neural network is challenging, as it requires a large number of classified sherd images. As there is no existing corpus, we first used a network trained using a general dataset of labelled images called *ImageNet*. We then adapted their usage to classify our pottery decoration images. Once classified, images of sherds can be used to teach the system to improve recognition parameters. This will be validated on further classified sherds to improve the neural network.

Sherd Profiles

When classifying by shape we have many drawings per sherd classification to train the network. However, we need to correlate a photograph of a sherd with a profile drawing from the database. To do this a tool within the App will allow users to draw a sherd profile to be extrapolated into a 3D model. The tool will then flatten the model into a black and white image like a traditional profile drawing and use this for training and classification.

The Mobile Tool and Front-end Desktop Application

ArchAIDE will produce a Mobile App and Desktop Application for archaeologists to use in the field and during the analysis stages of a project which will enable a user to search for, and identify sherds. At the mid-point of the project the following has been completed:

- After consultation with stakeholders, design specifications for the App and Desktop Tool have been created.

- A functional beta version of the App has been developed (currently for Android, with iOS by the end of the project).

- 2D acquisition and drafting components have been successfully implemented.

- The beta version of the App is currently being tested. Please get in touch if you would like to help!

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