

Mini-Intro

CERAMIC RECORDING AND AUTOMATION CLASSIFICATION TEAM

Sponsor: Dr. Leszek Pawlowicz

Team Leader: Kimberly Allison

Team Members: Aadarsha Bastola, Alan
Hakala, Beatriz Ortega, Nick Wiley

Faculty Mentor: Vahid Nikoonejad Fard



Our Client

- ▶ Painted ceramics sherds are one the most important types of artifacts.
- ▶ Based on the designs present, they can assign a “type” to the ceramic, which in turn can yield information about it.
- ▶ Our client's research deals with the classification of the types of Tusayan White Wares.
- ▶ He has spent many years doing field surveys and excavations in Flagstaff.



Dr. Leszek Pawlowicz
Assistant Research Professor,
Department of Anthropology

Problem

- ▶ Archeologists cannot classify sherds consistently or reliably.
- ▶ 48% of sherd identifications are disagreed upon.
- ▶ It is common for more than half of an expert's assessments to change after a reexamination.
- ▶ Native American tribes are requesting sherds back to be reburied.

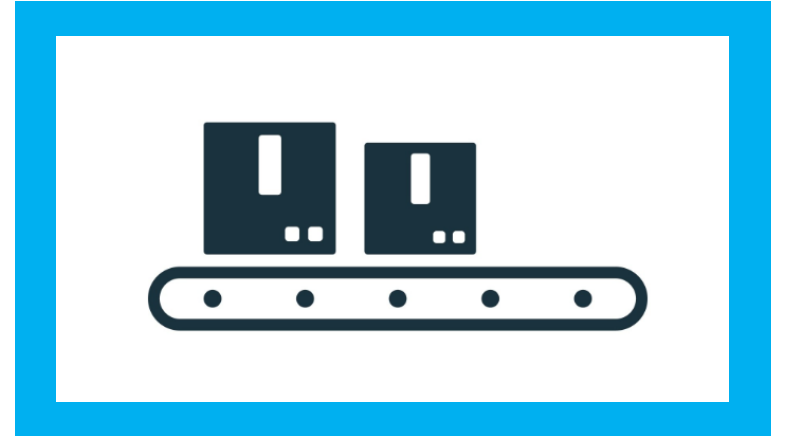


Examples of wholly intact artifacts identified by Leszek's CNN at NAU

<https://blogs.nvidia.com/blog/sherd-gpu-deep-learning-sorts-pottery-fragments/>

Solution

- ▶ Conveyor Belt
- ▶ Used in conjunction with app
 - ▶ Mass classification of sherds
 - ▶ Speed up large projects
- ▶ Return sherds to archeological sites faster



Solution

- ▶ Client is developing and training a **Convolutional Neural Network** for sherd classification
- ▶ The CNN has an accuracy comparable to professionals
- ▶ This is useful, but the CNN's **consistency** is more impressive.
- ▶ Regardless of accuracy identifications stay consistent
- ▶ Even if sherds are only available temporarily in a remote location, a **mobile app** will be developed to save sherd images and upload them to the CNN at a later time.



*Prototype of
mobile classification
app*

Plan For Development

Conveyer Belt:

- ▶ **Phase 1:** Design a GUI Application that uses Computer Vision to crop out only the shreds and save it with an associated metadata provided by the user
- ▶ **Phase 2:** Integrate CNN in the application so that the it can process sherds in batches of hundreds or thousands

Mobile App:

- ▶ Modify the application source code to add functions to upload results to a database and modify the results before uploading if there is error classifying by the CNN.

In Conclusion

Team **CRAFT** is working to help solve the widespread and formerly unavoidable inaccuracies and inconsistencies in archeological identification.

- 48% of identifications are disagreed upon

Researches in remote environments no longer must make rushed identifications in the field without resources

- In the long term team **CRAFT**'s solution will save time and money from avoiding misidentification.