RECOGNITION OF TEOTIHUACAN POTSHERDS

Tepalcatl project: Early Postdoc.Mobility SNSF

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OUTLINE

• Introduction
• Current data
• Research work
• Challenges
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Introduction: Motivation

• Analyzing ceramics, and **potsherds** in particular.

• One of the most abundant and studied objects in Archaeology.

Images from the project Urban Archaeology by INAH

Aztec deities. Image from [1].

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• Analyzing ceramics, and potsherds in particular.

• One of the most abundant and studied objects in Archaeology.

• Information about daily practices of ancient groups.

• Thousands of potsherds in a common excavation site.

Introduction: Challenges

- Storage vs further use.
- Small potsherds (∼5 to 20%) of a complete piece.
- Diagnostic?
- 3D scanning.

Examples of size of potsherds. Image from [2].

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Scanning process. Image from [3].

Introduction: Motivation

- Can we help here?

Aztec deities. Image from [1].

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Current Data: Source

- 3D scans of potsherds from Teotihuacan.
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• 3D scans of potsherds from Teotihuacan.

• Teotihuacan: city of gods (where men can become gods).
• Developed between 1st and 7th century C.E.
• Most important cultural, commercial, religious, and political center at the time.
• Aztecs claimed to descend from them.
• Mainly known through oral traditions (not official records).
Current Data: Examples

Plate
Pot
Bowl
Crater
Censer
Vase
Vase support

Curved
Highly curved
Curved with slight border
Curved with clear border
Convex
Flat

Current Data: Dataset

67 diagnostic potsherds:
- Plate
- Pot
- Bowl
- Crater
- Censer
- Vase
- Vase support

140 non-diagnostic potsherds:
- Curved
- Highly curved
- Curved with slight border
- Curved with clear border
- Convex
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Research Work:

- Scanning.
- Description.
- Similarity Analysis.
- Retrieval and classification.

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Evaluation of local 3D shape descriptors e.g., SISI, LD-SIFT, 3DSC, SHOT

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HoSO descriptor [5].

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Table III. Average Classification Accuracy Obtained by Each Local Descriptor and Each Classification Approach Using Bag-of-Words with Vocabularies of 100 Visual Words

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>kNN</th>
<th>SVM-Linear</th>
<th>SVM-Polynomial</th>
<th>SVM-Gaussian</th>
<th>Neural Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>SISI</td>
<td>0.266</td>
<td>0.329</td>
<td>0.314</td>
<td>0.324</td>
<td>0.305</td>
</tr>
<tr>
<td>LD-SIFT</td>
<td>0.362</td>
<td>0.433</td>
<td>0.391</td>
<td>0.443</td>
<td>0.366</td>
</tr>
<tr>
<td>FPFH</td>
<td>0.213</td>
<td>0.167</td>
<td>0.233</td>
<td>0.219</td>
<td>0.342</td>
</tr>
<tr>
<td>3DSC</td>
<td>0.391</td>
<td><strong>0.529</strong></td>
<td>0.443</td>
<td>0.510</td>
<td>0.418</td>
</tr>
<tr>
<td>USC</td>
<td>0.522</td>
<td>0.514</td>
<td>0.519</td>
<td>0.557</td>
<td>0.472</td>
</tr>
<tr>
<td>SHOT</td>
<td>0.541</td>
<td>0.443</td>
<td>0.452</td>
<td>0.457</td>
<td>0.499</td>
</tr>
<tr>
<td>RI-3DSC</td>
<td>0.411</td>
<td>0.362</td>
<td>0.386</td>
<td>0.381</td>
<td>0.331</td>
</tr>
<tr>
<td>HoSO</td>
<td><strong>0.589</strong></td>
<td><strong>0.519</strong></td>
<td><strong>0.591</strong></td>
<td><strong>0.591</strong></td>
<td><strong>0.521</strong></td>
</tr>
</tbody>
</table>

Note: Best results are highlighted in bold.

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  - Diagnostic potsherds are easier.
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- New research questions and challenges.
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- Design/develop actual browsing tool.
- Beyond visual analysis (documentation).
- Test on newly discovered examples.
- Disseminate.
Thank you.

Q&A
cvml.unige.ch/edgar