



Challenges for searching and browsing 3D heritage collections

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Access?



Potential users
(beside the scholar)

**Exhibition designer – design an
exhibition around a theme
Conservator – understand the
state of an artefact(s)**





Amateur archaeologist – support to identify findings

Non-expert tourist – learn more about
particular objects





Artisan crafter – find inspiration for designs

Requirements

Searching vs. Browsing

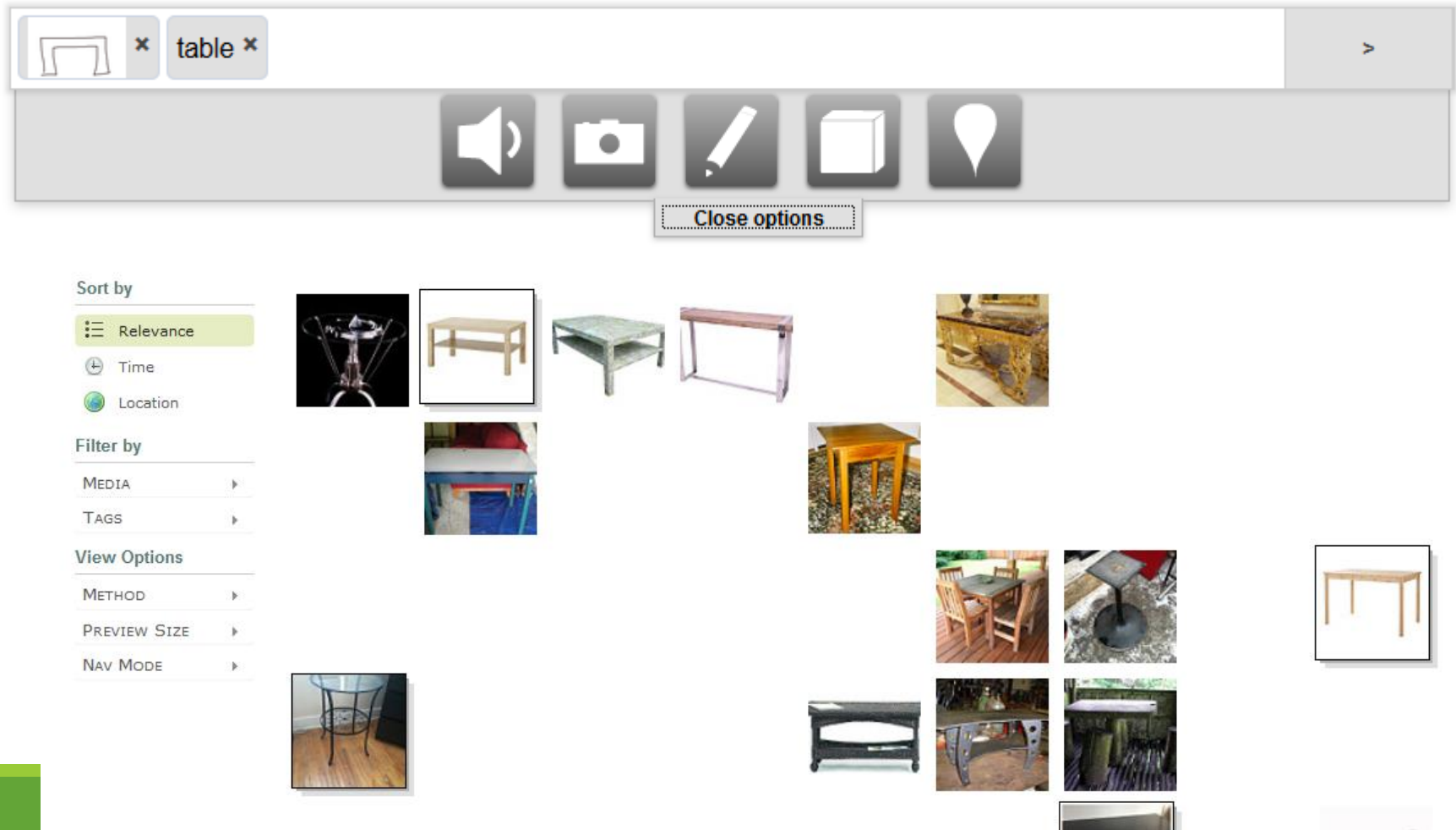
Some users have a better idea of what they are looking for

Searching and browsing technologies

State of the art

- 3D is starting to be included in repositories.
- Relevant projects: I-SEARCH, AIM@SHAPE, 3D-COFORM, CARARE, 3D-ICONS.
- Data services: Europeana, ADS, Archeogrid.
- Systems work with specific datasets which have been organised to support searching and browsing.

Multi-modal search engine



Metadata-based browsing and searching

The screenshot displays the AIM SHAPE Digital Shape WorkBench v5.0 interface. The top navigation bar includes links for Ontologies, Shapes, Tools, Workflows, and Glossary. The left sidebar contains sections for Shape Repository, Medical Shapes, and Virtual Manufacturing Repository, each with sub-links for browsing, uploading, and searching models. The main content area features a 'BROWSE BY CATEGORY' section with a grid of checkboxes for various model types, a 'DISPLAY OPTIONS' section for filtering and sorting results, and a pagination bar at the bottom showing the current page (1-12) and total results (1083).

Visualization Virtual Services
AIM SHAPE
Digital Shape WorkBench v5.0

Log in | Register

Ontologies Shapes Tools Workflows Glossary

Shape Repository

- Browse models
- Keyword search
- Geometric search
- Semantic search
- Upload Models
- Models & Group management
- Shape Ontology tutorial

Medical Shapes

- Browse medical models
- Upload medical models
- Medical Ontology tutorial

Virtual Manufacturing Repository

BROWSE BY CATEGORY

<input type="checkbox"/> All Categories	<input type="checkbox"/> Manifold Surface Mesh	<input type="checkbox"/> Non Manifold Mesh
<input type="checkbox"/> Point Set	<input type="checkbox"/> Manifold Surface BRep	<input type="checkbox"/> Centre Line Graph
<input type="checkbox"/> Non Manifold BRep	<input type="checkbox"/> Manifold Volume BRep	<input type="checkbox"/> Implicit Surface
<input type="checkbox"/> Implicit Curve	<input type="checkbox"/> Manifold Volume Mesh	<input type="checkbox"/> Parametric Curve
<input type="checkbox"/> Parametric Surface	<input type="checkbox"/> Multi Resolution Model	<input type="checkbox"/> Contour Set
<input type="checkbox"/> Motion Capture	<input type="checkbox"/> Raster Data 2D	<input type="checkbox"/> Movie
<input type="checkbox"/> Key Frame	<input type="checkbox"/> MRI	<input type="checkbox"/> Dynamic MRI
<input type="checkbox"/> Multi Dimensional Structural Descriptor		

Browse

DISPLAY OPTIONS

Show 12 models per page.

Sort by: Quality

Display:

- ☒ Single models and group representatives
- ☐ All models

DISPLAYING RESULTS 1-12 OF 1083 FOUND

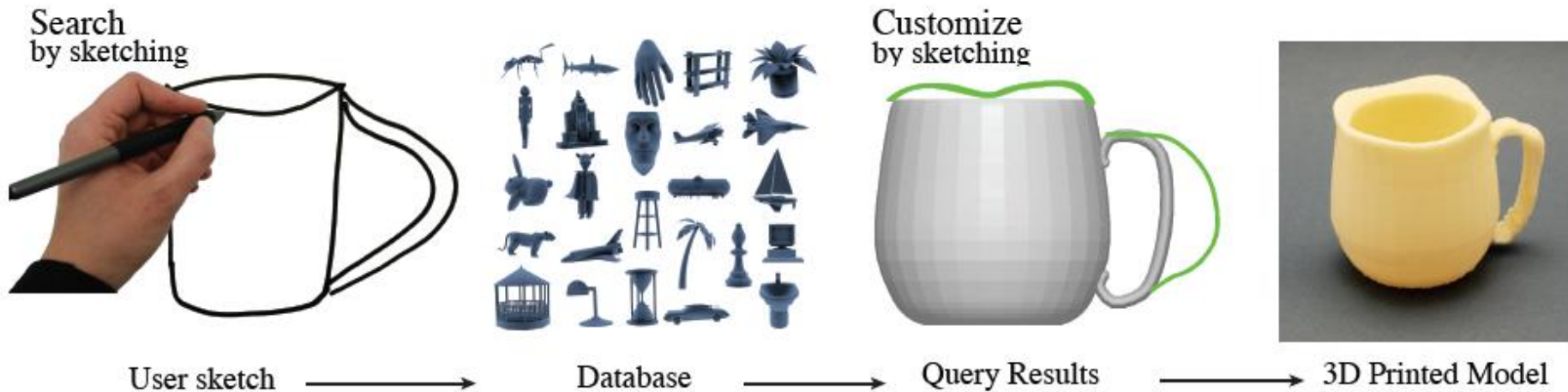
1-12 13-24 25-36 37-48 49-60 61-72 73-84 85-96 97-108 109-120 121-132 133-144 Next »

Sketch based searching

Sketch-Based Pipeline for Mass Customization

Kristian Hildebrand *
TU Berlin

Marc Alexa
TU Berlin



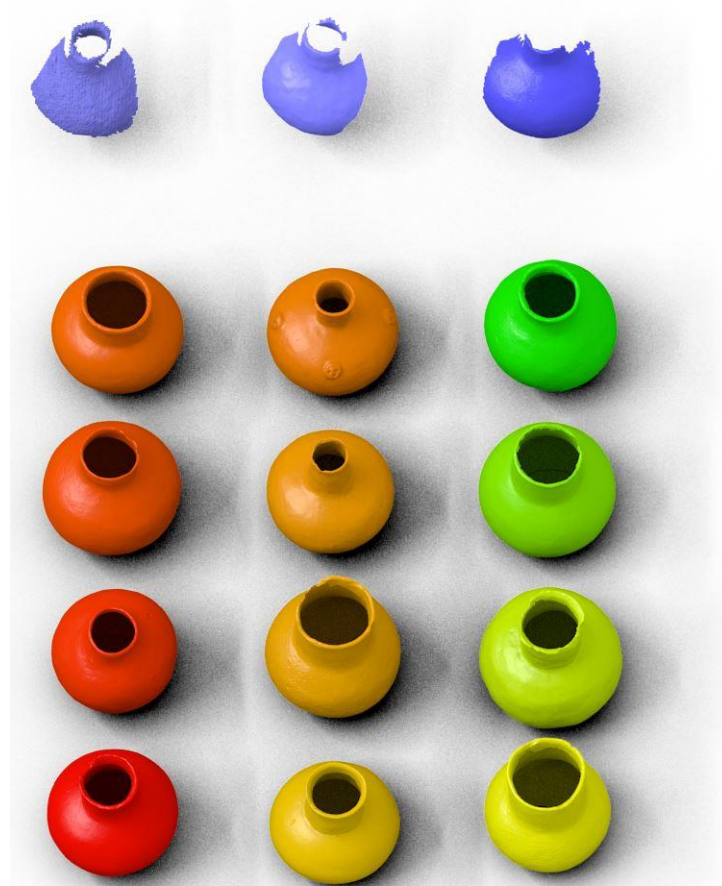
3D shape retrieval methods

Content

Text

Content-based methods

- Rely on shape descriptors of features of interest.
- Automatically generating and matching shape descriptors for high level semantic concepts is not a solved problem.



Descriptor's semantic abstraction

Perceptual Interpretative Reactive

Associated concepts

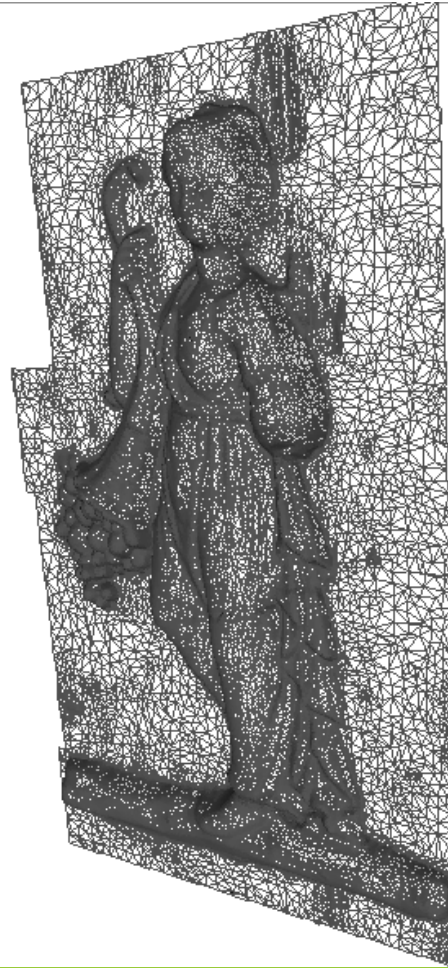
Meaning

Object

Topology

Curvature

of triangles, colour



CG approaches for shape matching

- Use of a combination between global and local shape information.

Style Compatibility for 3D Furniture Models

Tianqiang Liu¹

Aaron Hertzmann²

Wilmot Li²

Thomas Funkhouser¹

¹Princeton University

²Adobe Research

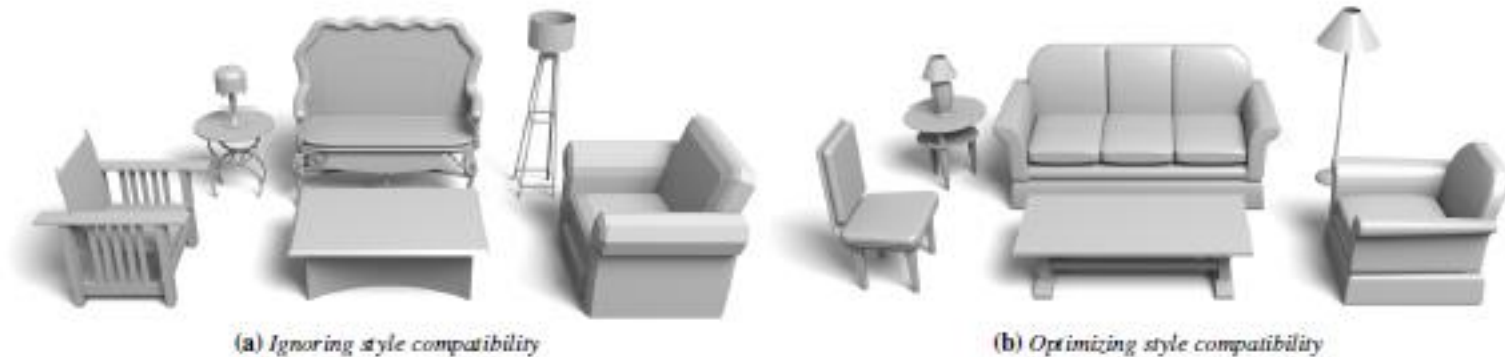
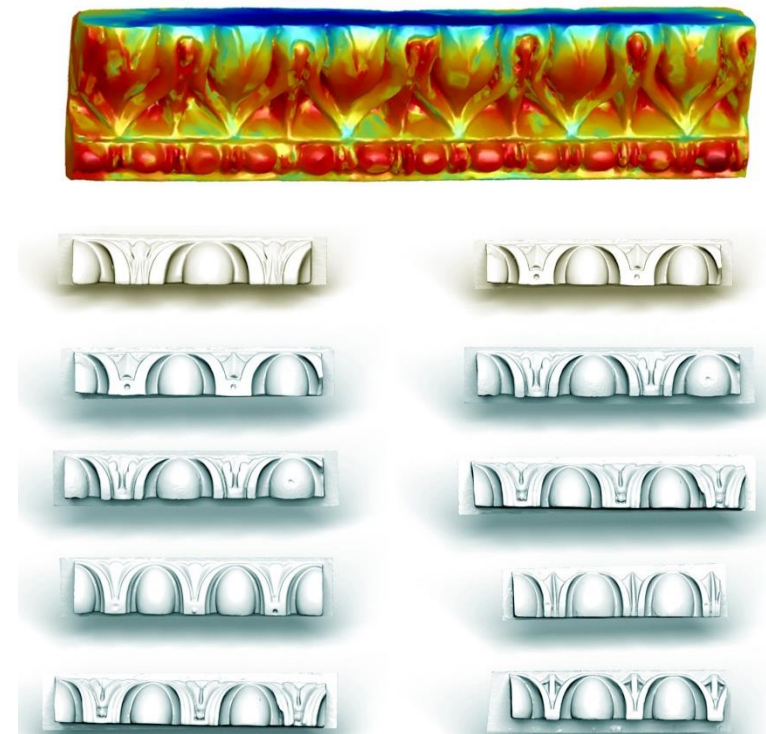


Figure 1: This paper proposes a method to learn a metric for stylistic compatibility between furniture in a scene. (a) The image on the left shows a plausible furniture arrangement, but with a randomly chosen mix of clashing furniture styles. The scene on the right has the same arrangement but with furniture pieces chosen to optimize stylistic compatibility according to our metric.

Text-based methods

- Textual information or concepts linked to the 3D content.
- Manual annotation.
- Automatic enrichment rely on content-based methods.
- Relevant projects for in CH: PRESIOUS, the GRAVITATE project and architectural semantic analysis (Lo Buglio et al 2016).



Rodriguez and Song. 2016. Analysing the Decorative Style of 3D Heritage Collections based on Shape Saliency. JOCCH, 9:4 2016

Future challenges

- Infrastructure to easily connect to 3D content and its metadata.
- Automatic high-level semantic enrichment to support search and browsing.
- Dealing with complex shapes.
- More intelligent multi-modal queries.
- Improved visualisation of results.