

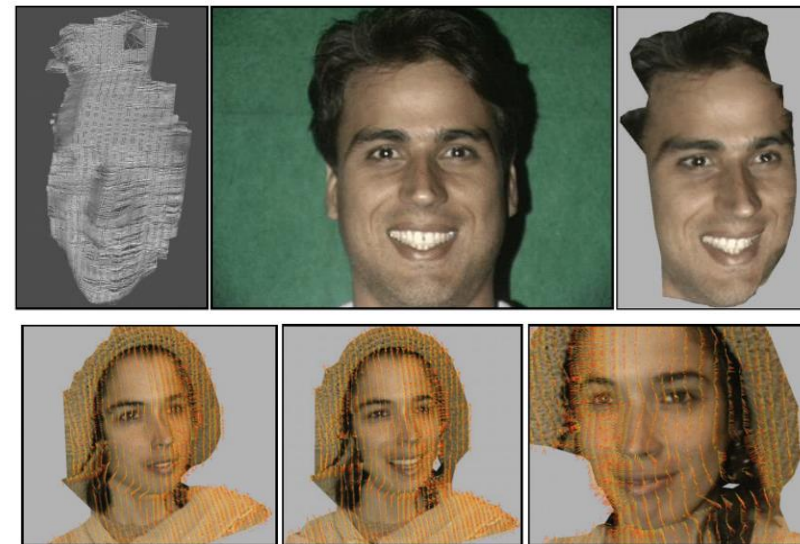
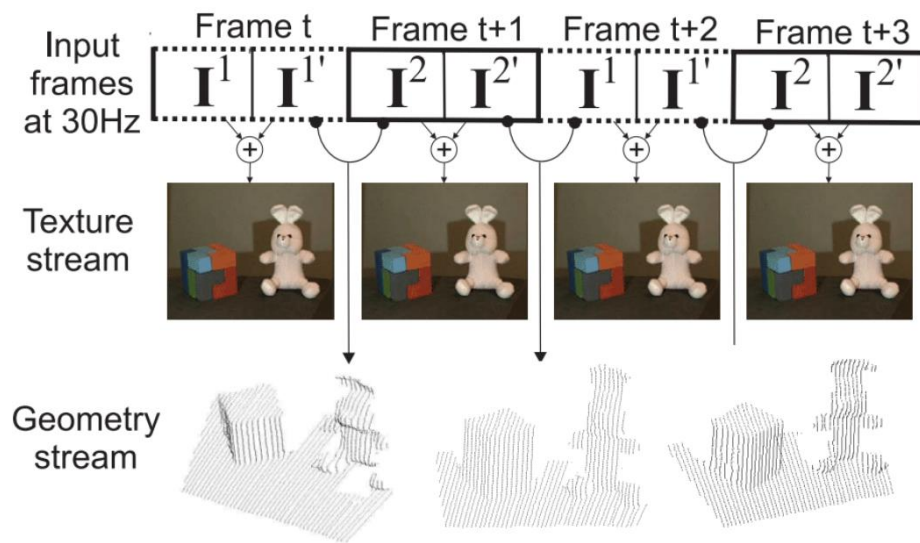
Visualisation of Digital Collections: State of the Art and Challenges

Asla Medeiros e Sá

FGV/EMAp

Let me introduce myself...

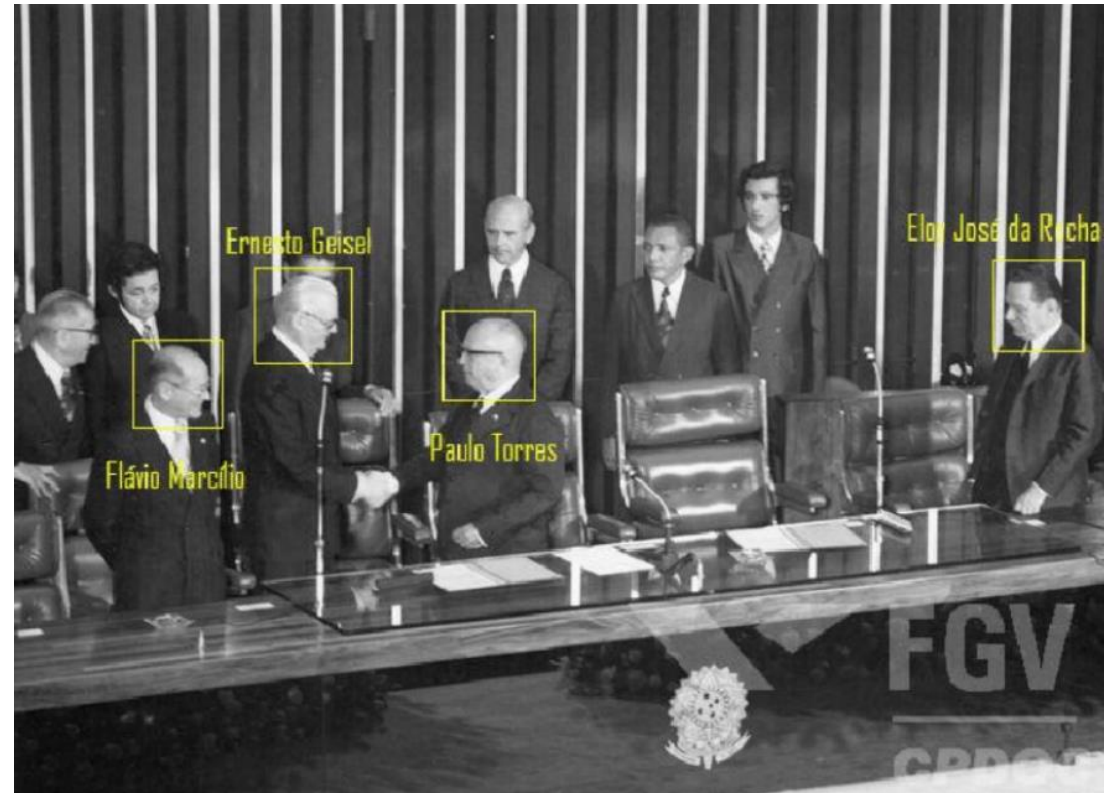
- Mathematician, PhD in Computer Graphics at IMPA - 2006
- PhD thesis: “Controlling illumination to increase image information.”



- Professor at FGV/EMAp since 2007

Previous work in Cultural Heritage Applications

- Face Detection in Historic Photographs before Deep Learning

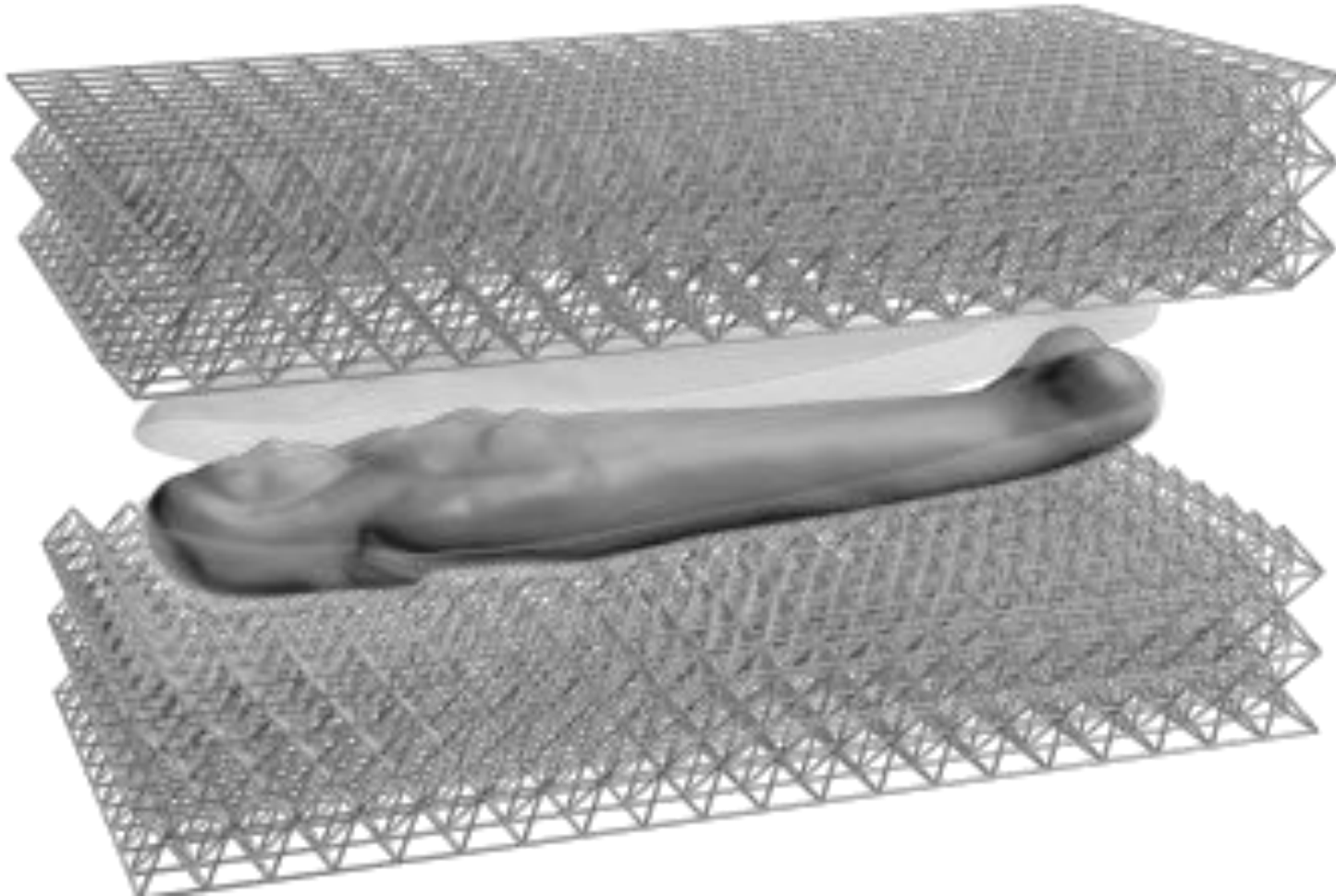


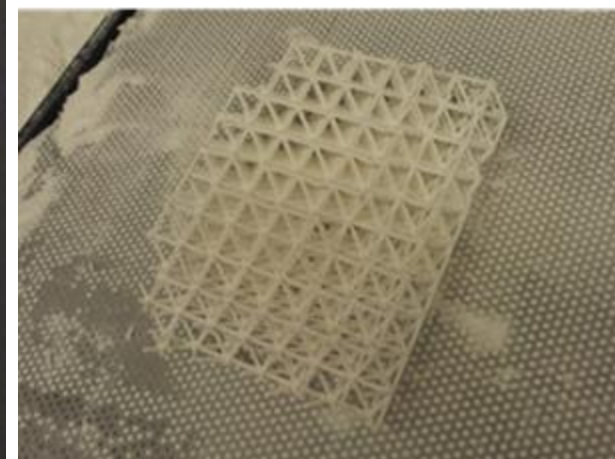
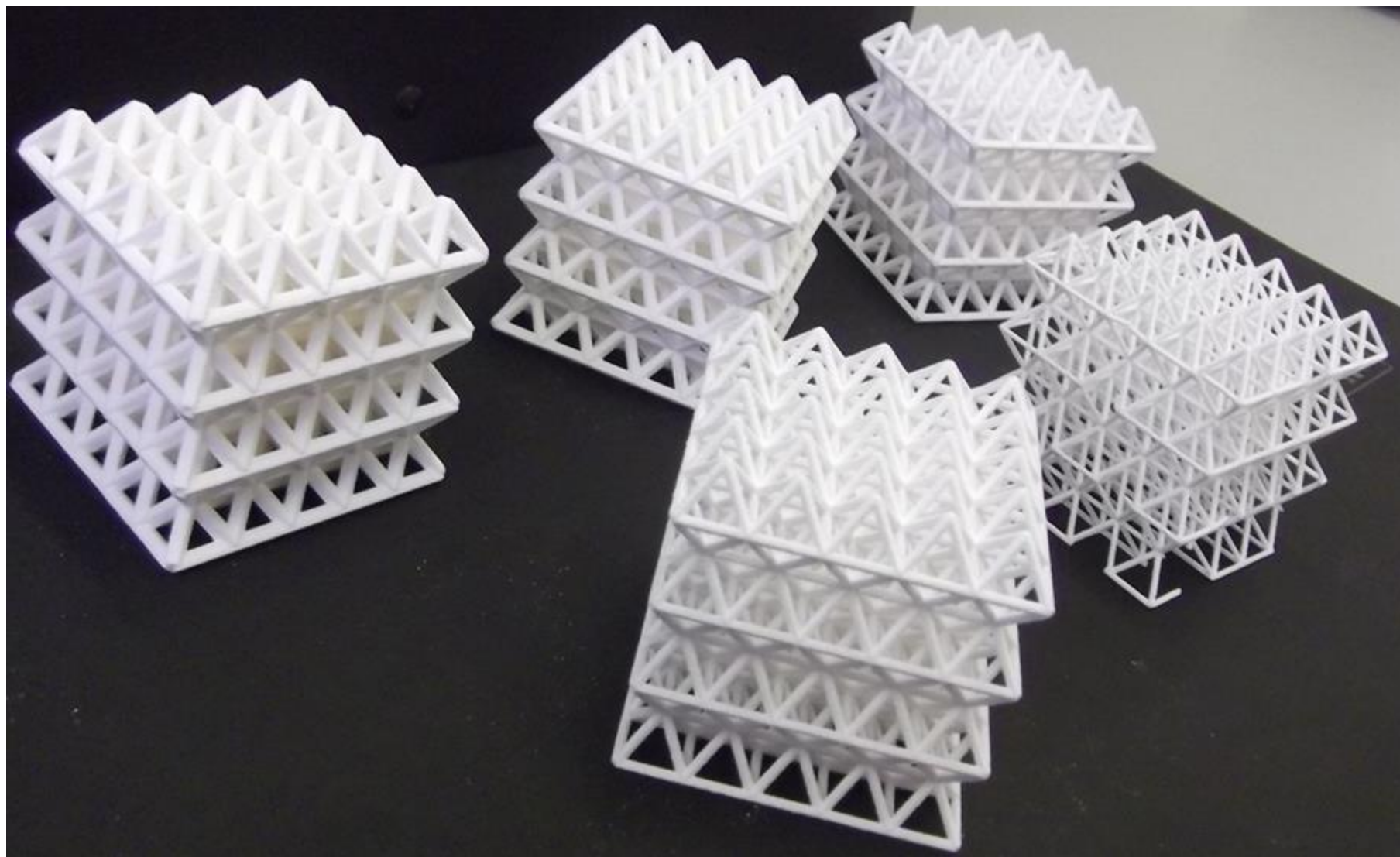
Previous work in Cultural Heritage Applications

- Post-Doc at the University of Brighton, UK, 2012
- [2012] 3D Printing for Packaging Cultural Heritage Artefacts @ University of Brighton, UK.



3D Printing for Packaging Cultural Heritage Artefacts





Previous work in Cultural Heritage Applications

- [2016] Ivory Chinese Junk Disitisation and Virtual Reality exhibit @Museu Historico Nacional (MHN)
- <http://barco.museus.gov.br/>



Ivory Chinese Junk Digitisation – MHN/RJ



1 - Imagem Original



2 - Crop, Correção Perspectiva e Segmentação



4- Material e Aplicação em 1 Plano



3 - Alpha Binário e Normal Map



6 - Configuração espessura

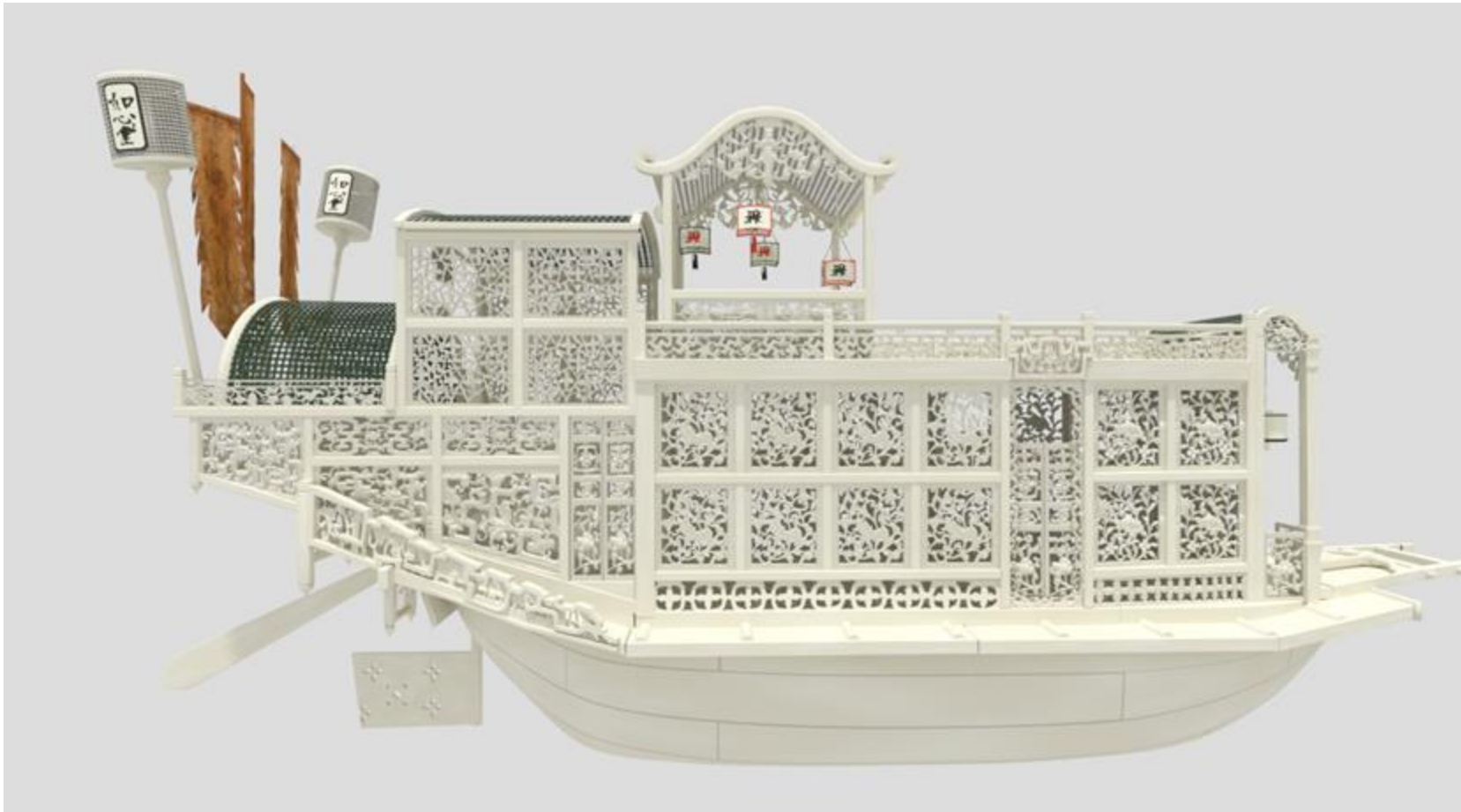


5 - Criação de Array de Planos

7 - Render Final



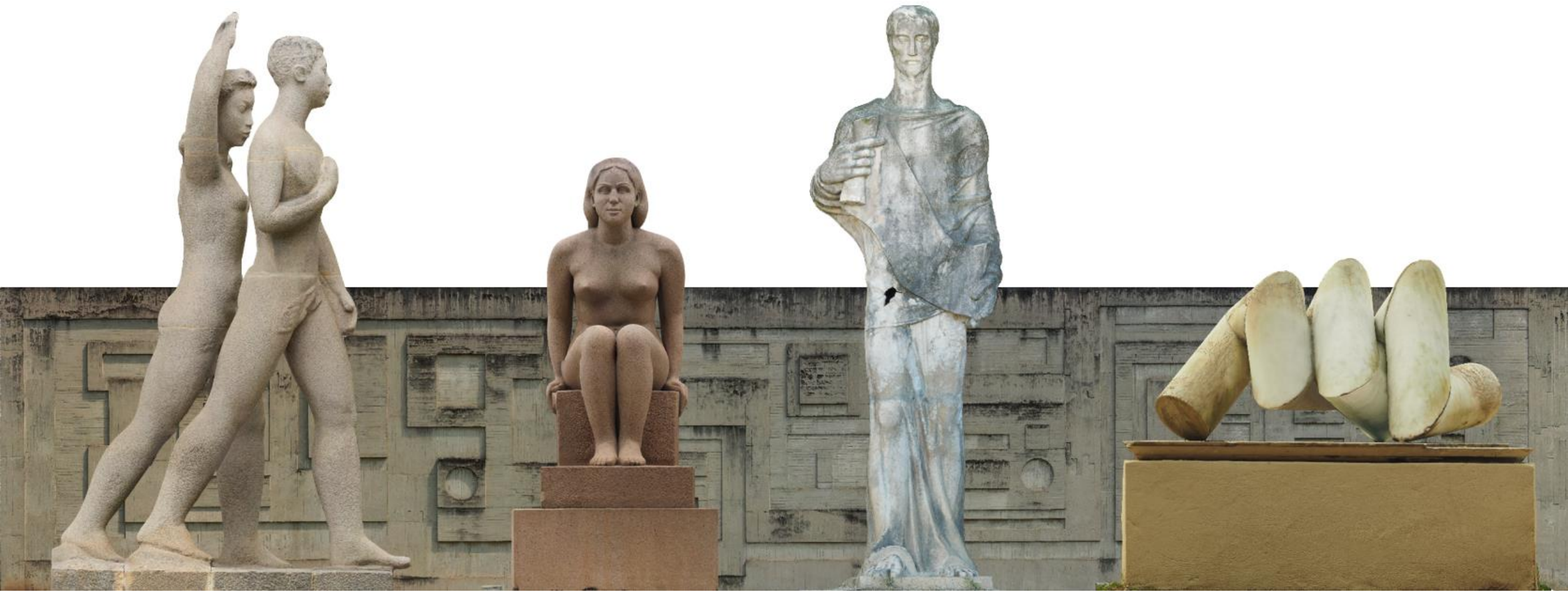
Ivory Chinese Junk – MHN/RJ



<http://barco.museus.gov.br/>

Present work in Cultural Heritage Applications

- [2018] Open Cultural Heritage: The Modern Rio @ FGV/RJ



ADRIANA JANACÓPULOS

MULHER,
1938 - 1943:


PROJECT: Open Cultural Heritage


The Modern Rio


- Documenting **open** and **medium-large scale** cultural heritage assets.
- We focus on **producing digital replicas** of public sculptures from the Modern period situated in public spaces in Rio de Janeiro.








 Inventário dos Monumentos RJ


 HOME


 CATÁLOGO

 QUEM SOU EU


 BIBLIOGRAFIA

 BLOG


 CONTATO



CATÁLOGO



CORETO DE RICARDO DE ALBUQUERQUE
Ricardo de Albuquerque



MODESTINO KANTO
Centro

Filtrar por Categoria

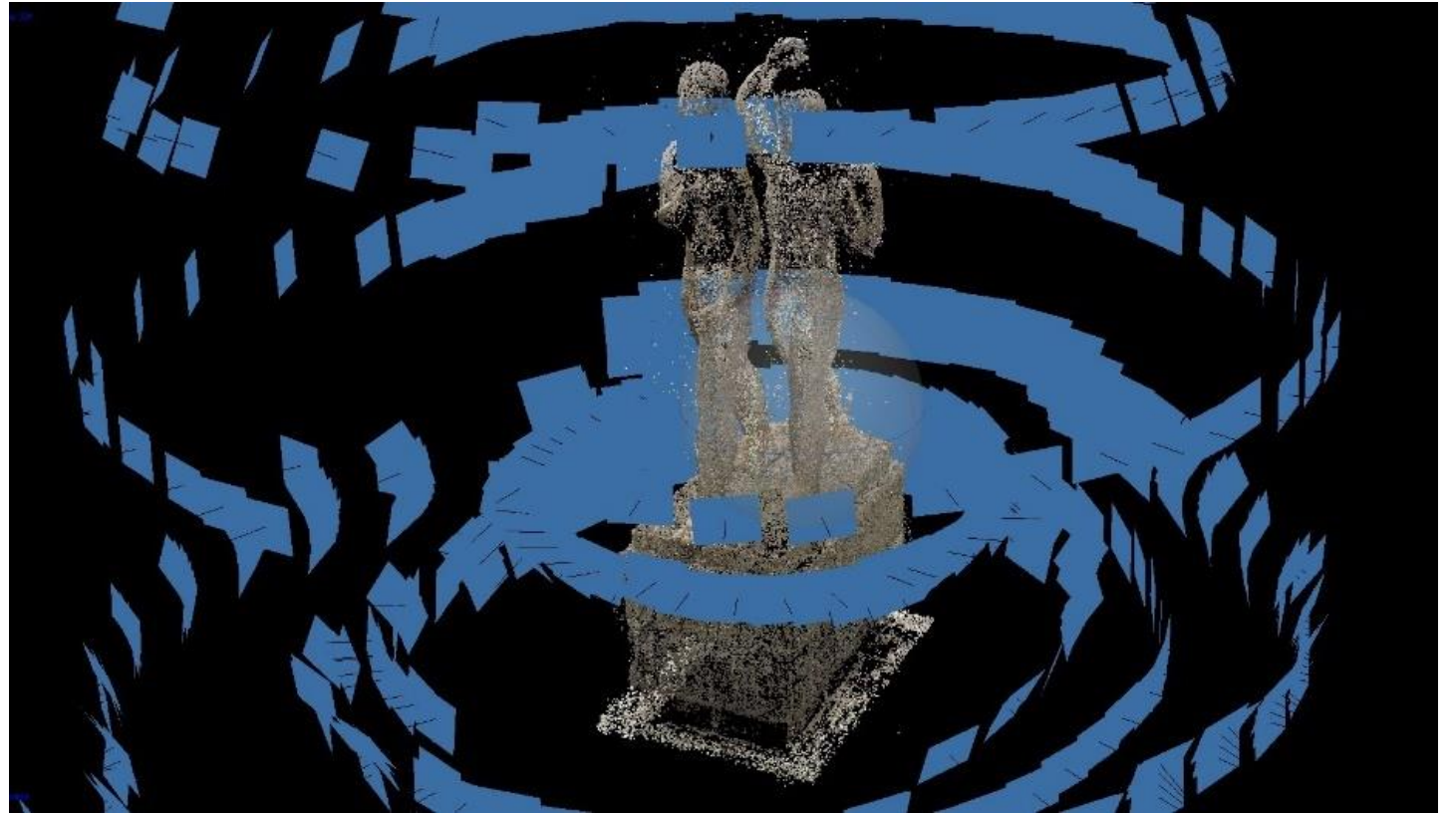
- Esculturas (275)
- Fontes e chafarizes (143)
- Lagos e recantos (19)
- Marcos e Obeliscos (126)
- Obras públicas (391)
- Personalidades - estátuas e bustos (351)
- Representações Religiosas (65)

Filtrar por Bairro

- Alto da Boa Vista (21)
- Bangú (10)
- Barra da Tijuca (20)
- Barra de Guaratiba (5)
- Benfica (8)
- Bento Ribeiro (1)
- Bonsucesso (8)
- Botafogo (38)

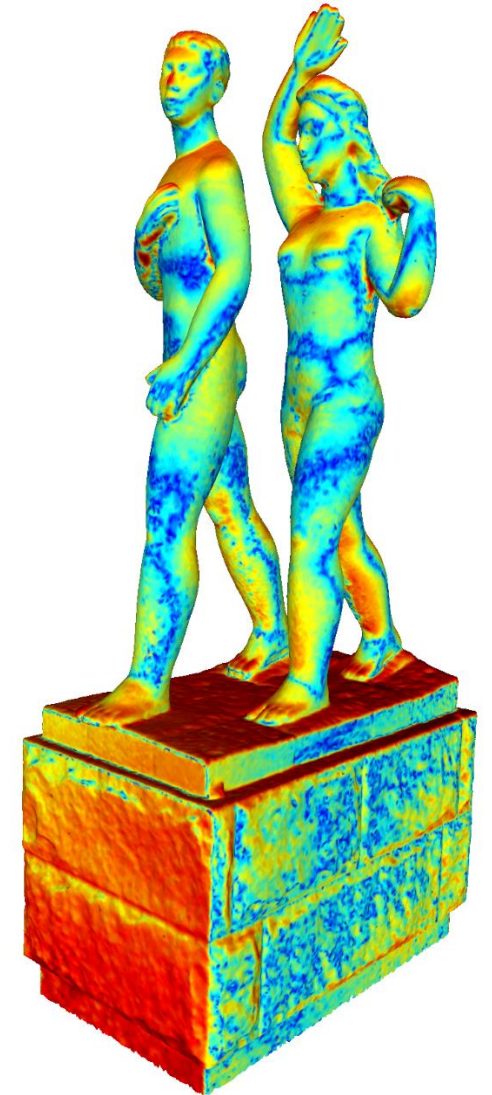
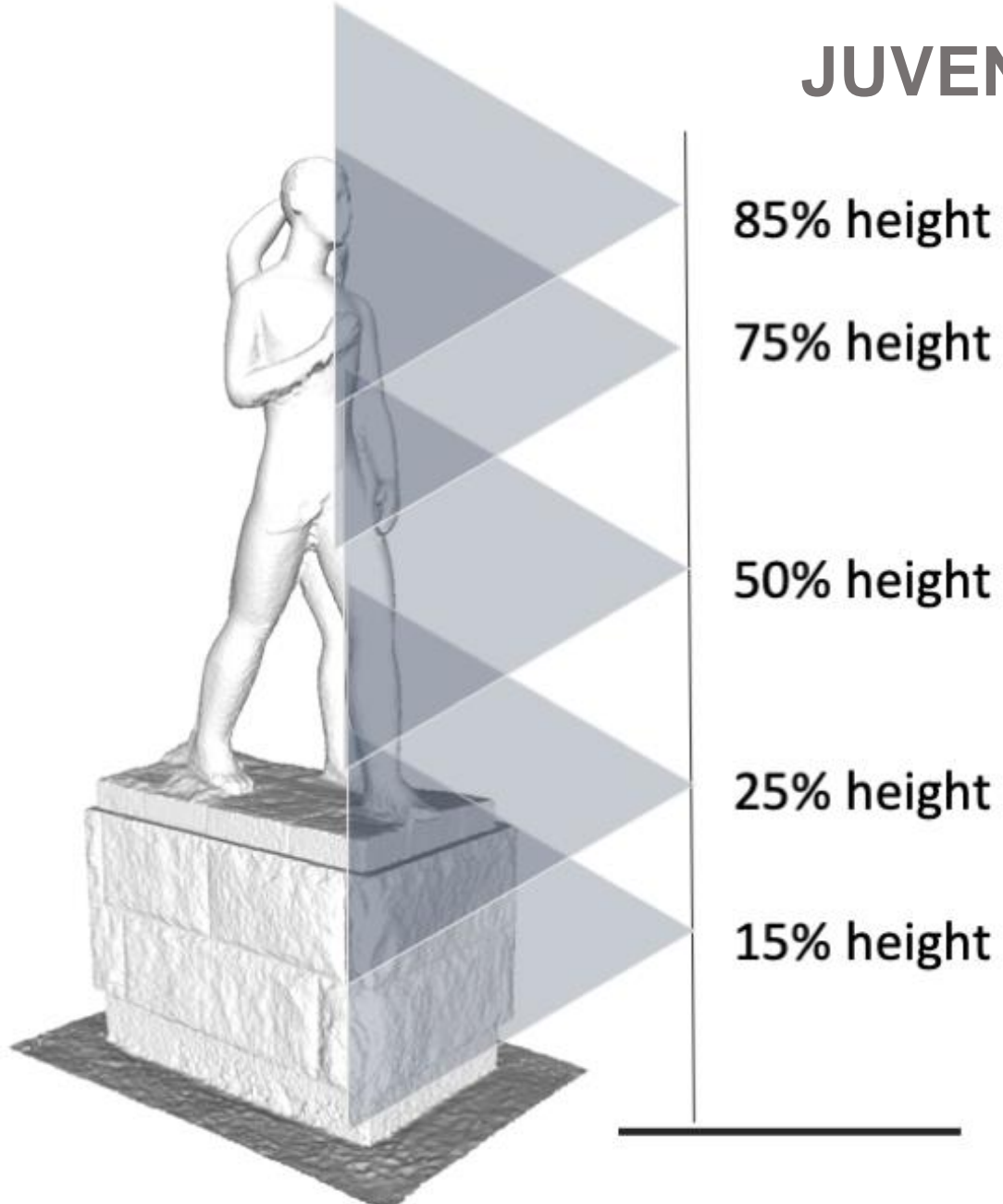
A community produced inventory of public sculptures

Methodology: close-range photogrammetry



BRUNO GIORGI

JUVENTUDE BRASILEIRA, 1943



Delivering and Consuming Heritage 3D Digital Replicas

Web-Based visualisation: 3DHOP



Delivering and Consuming Heritage 3D Digital Replicas



AUGMENTED REALITY

Repositório
OBRAS DE ARTE
NOS ESPAÇOS
PÚBLICOS DO
RIO DE JANEIRO:

UM OLHAR PARA O
MODERNISMO

PROTÓTIPO
REALIDADE AUMENTADA

“EVANGELISTA
MATEUS”

Alfredo Ceschiatti

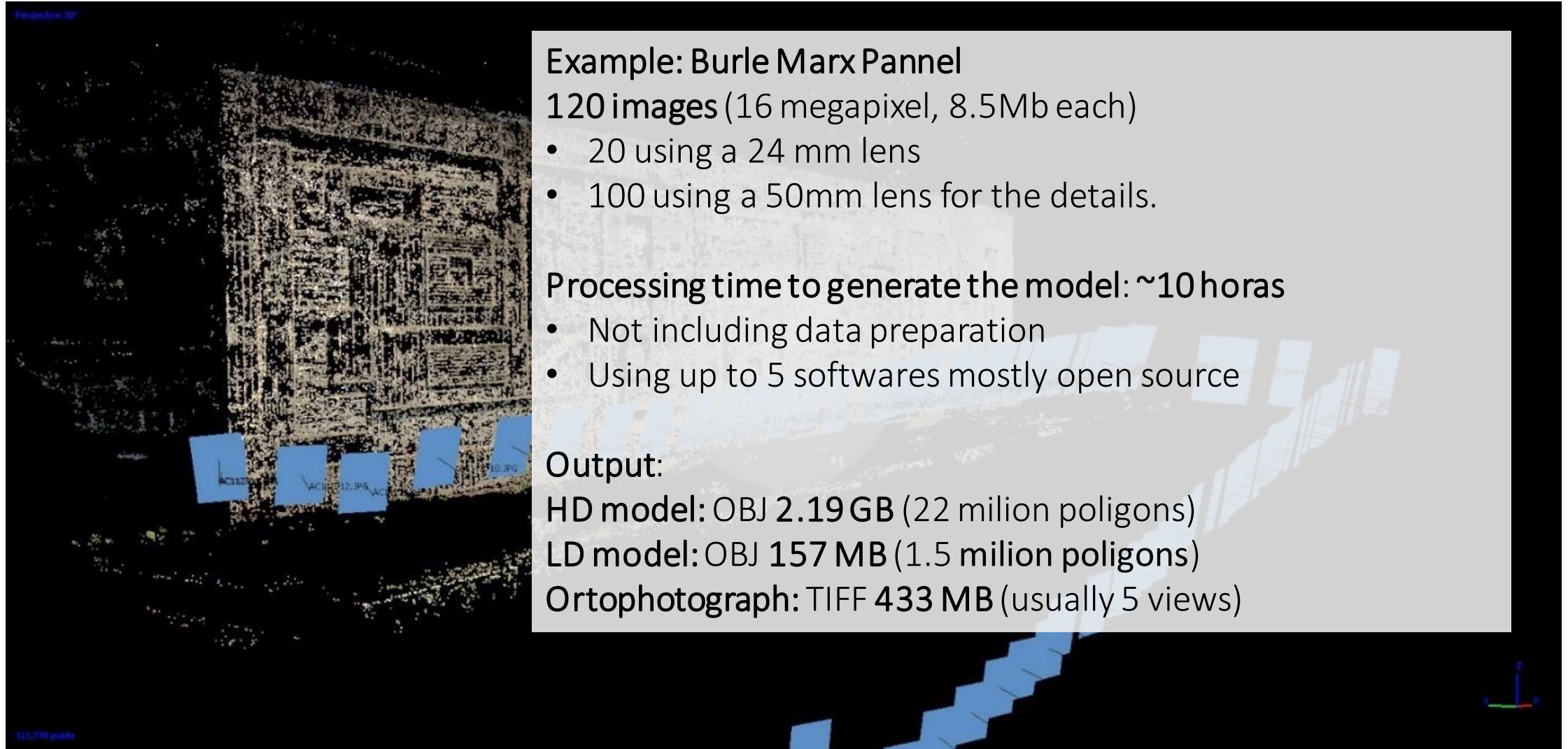


CPDOC
ESCOLA DE
CIÊNCIAS
SOCIAIS

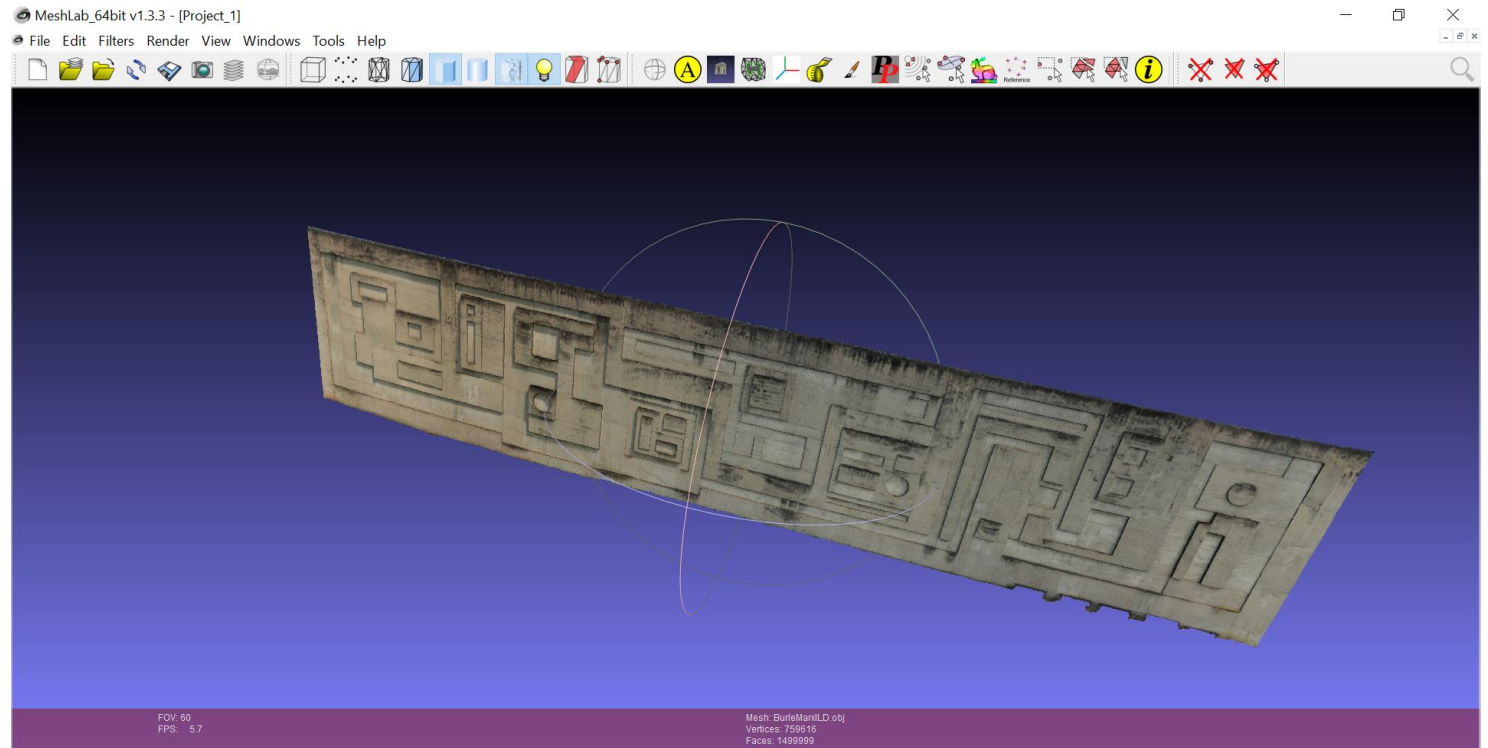
EMAp
ESCOLA DE
MATEMÁTICA
APLICADA



Example of the produced data:



Production and Quality Evaluation of 3D Digital Replicas



Sculpture	Height (m)	Number of Photos	Surface Area (m ²)	Resulting Density (points/m ²)
<i>Juventude Brasileira</i>	6.7	600	44.66	27,362
<i>Mulher</i>	2	430	7.52	189,862
<i>Panel</i>	10	120	192.38	88,904
<i>Evangelista Matheus</i>	3	492	9.89	314,090
<i>Estrutura</i>	0.75	457	5.65	365,610

Table 1: List of digitised heritage assets with approximate heights and number of images taken in acquisition phase.

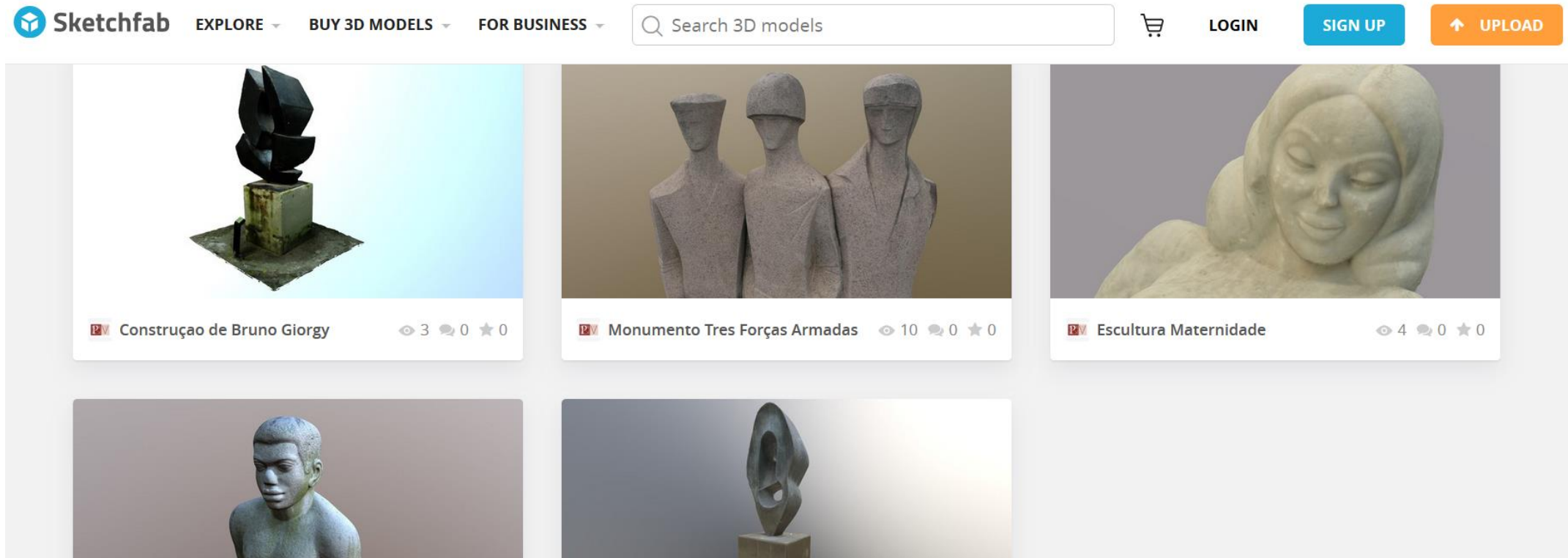
MORE SCULPTURES BEING DIGITISED...



ALFREDO CESCHIATTI
TRES FORÇAS ARMADAS
1979

Present work in Cultural Heritage Applications

- 3D Digital repositories: Single Object -> Multi-Object
- <https://sketchfab.com/arboreologia/collections/modernismo-fgv>



Present work in Cultural Heritage Applications

[Home](#) > Acervo Digital da “Colección Textil Precolombiana”



Acervo do Museu Nacional

Present work in Cultural Heritage Applications

- Pre-Colombian textiles Collection
- Originals were lost in the 2018 fire.
- <https://acervo.mn.ufrj.br/acervo-digital-da-coleccao-textil-precolombiana/>
- Exhibit: Marinhas – De Martino @ NHM
- <http://mhn.acervos.museus.gov.br/exibicoes/demartin>

Fragmento de tejido tipo *patchwork*

De Influencia Huari / Horizonte Medio (650-850 d.C.)

Procedencia: Sierra – Costa Sur

Medidas: 34 x 45 cm.

Hilos:

Urdimbre: FC/ crema (Z-2S)

Trama: FC/ crema (Z-2S)

Técnica: Elaborado en telar andino, teñido por reserva

Estructuras: Tela llana 1/1 de urdimbres discontinuas (20 x 7)

Descripción: El ejemplar se halla conformado por tejidos escalonados, teñidos al negativo. Los motivos (rombos y listas horizontales) difieren de tamaño y distribución de un tejido a otro. En algunos casos la unión de los tejidos formó a través de los rombos una configuración concéntrica.

Uno de los escalonados lleva flecos estructurales, es decir, aquellos formados por las urdimbres no tejidas.

La unión de los tejidos se hizo a través de un ensamblado de urdimbres y puntadas surjete para la unión de los orillos de trama.

Comentarios: Según Pedro Velasco proviene de Acari.

Referencias: Stone-Miller 1994 (Lam. 21^a, b; fig. 147, 272), Frame 1999 (pag. 334-335 lam. 21, 22), Strelow 1996 (pag. 71-72), Rowe 1977 (Fig. 24), D'Harcourt 1962 (lam. 49c), Oakland y Fernández 2000 (fig. 30)

Pieza N°: 36.213

Foto: 36.213 (1)



Arabel Fernández López

CENTRO DE INVESTIGACIÓN TEXTIL CHUGUAY



Single Object -> Multi-Object -> Collections

- After decades of massive digitization initiatives, large collections of items have emerged inside Galleries, Libraries, Archives and Museums (GLAM) institutions, as well as on the web.
- The volume of information promises new modes of analysis and increased levels of access to the information.
- <https://www.europeana.eu/portal/en>
- <http://brasilianafotografica.bn.br/>



Single Object -> Multi-Object -> Collection

Challenge: to go beyond standard representations search-centric and grid-based interfaces.

→ Information Visualization is out there!

→ I will present a State of the Art recent paper on information visualization that reviews and discusses design choices to present digital collections through information visualization techniques.

Visualisation of Digital Collections: State of the Art and Challenges

Florian Windhager, Paolo Federico, Günter Schreder, Katrin Glinka,
Marian Dörk, Silvia Miksch and Eva Mayr

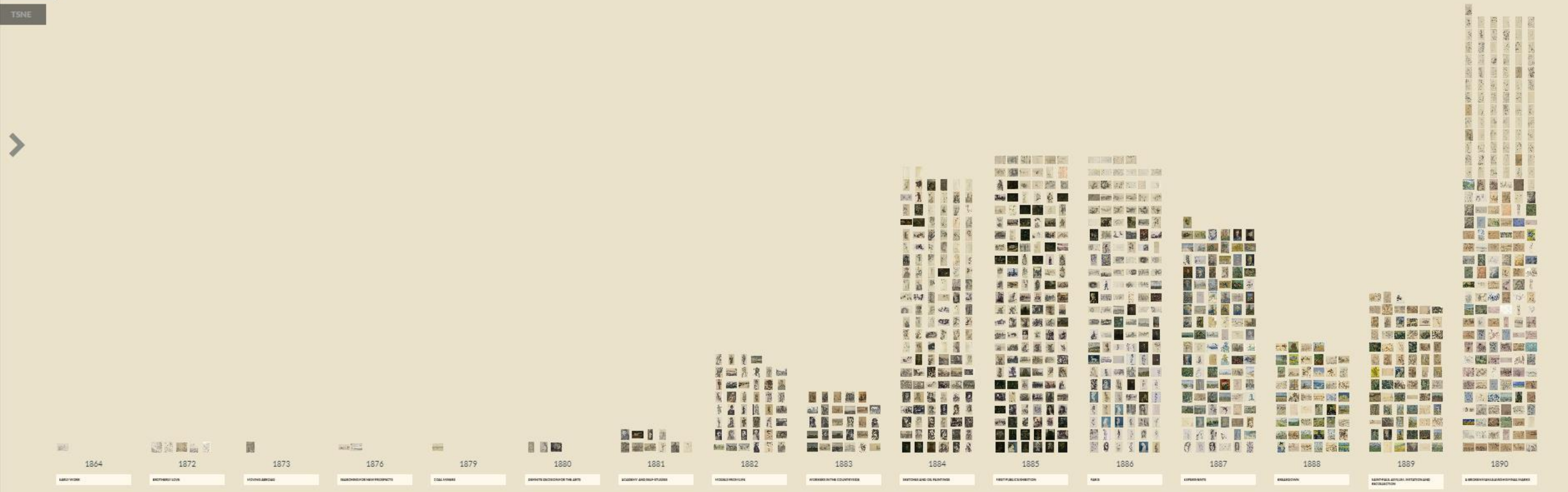
Transactions on Visualization and Computer Graphics, 2018

Enabling Visual access to CH Collections

- A multitude of approaches has recently started to enable visual access to digital collections, and to explore them as complex and comprehensive information spaces by the means of interactive visualizations.
- This class of information visualizations gives rise to a notable diversity of interaction and representation techniques in connection with visualization design.

Enabling Visual access to CH Collections

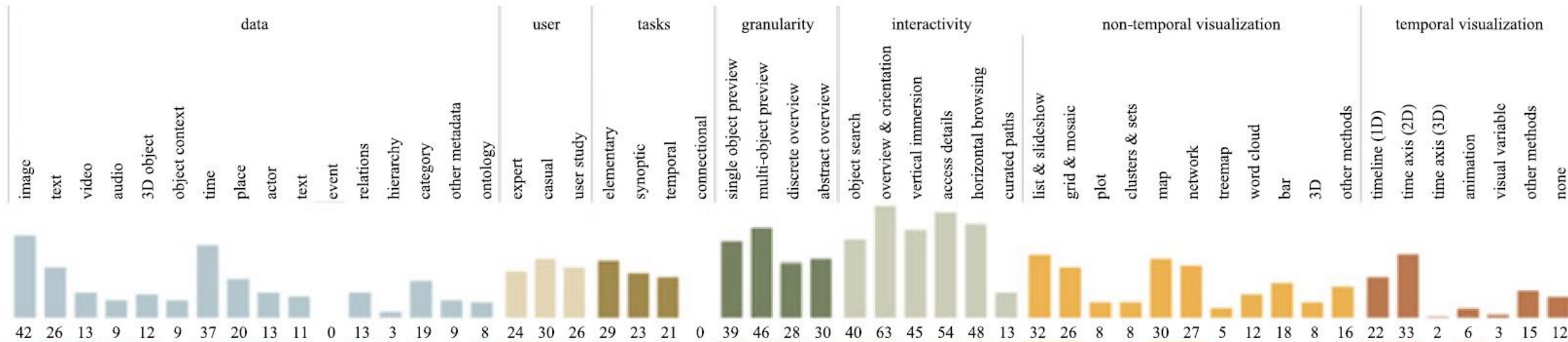
TIME
TSINE



<https://vikusviewer.fh-potsdam.de/vangogh/>

General concepts - Survey

- One of the contributions of the Survey is to propose a categorization of the solutions.
- The authors analysed 70 different proposals in order to converge to a categorisation into 5 broad categories



Data

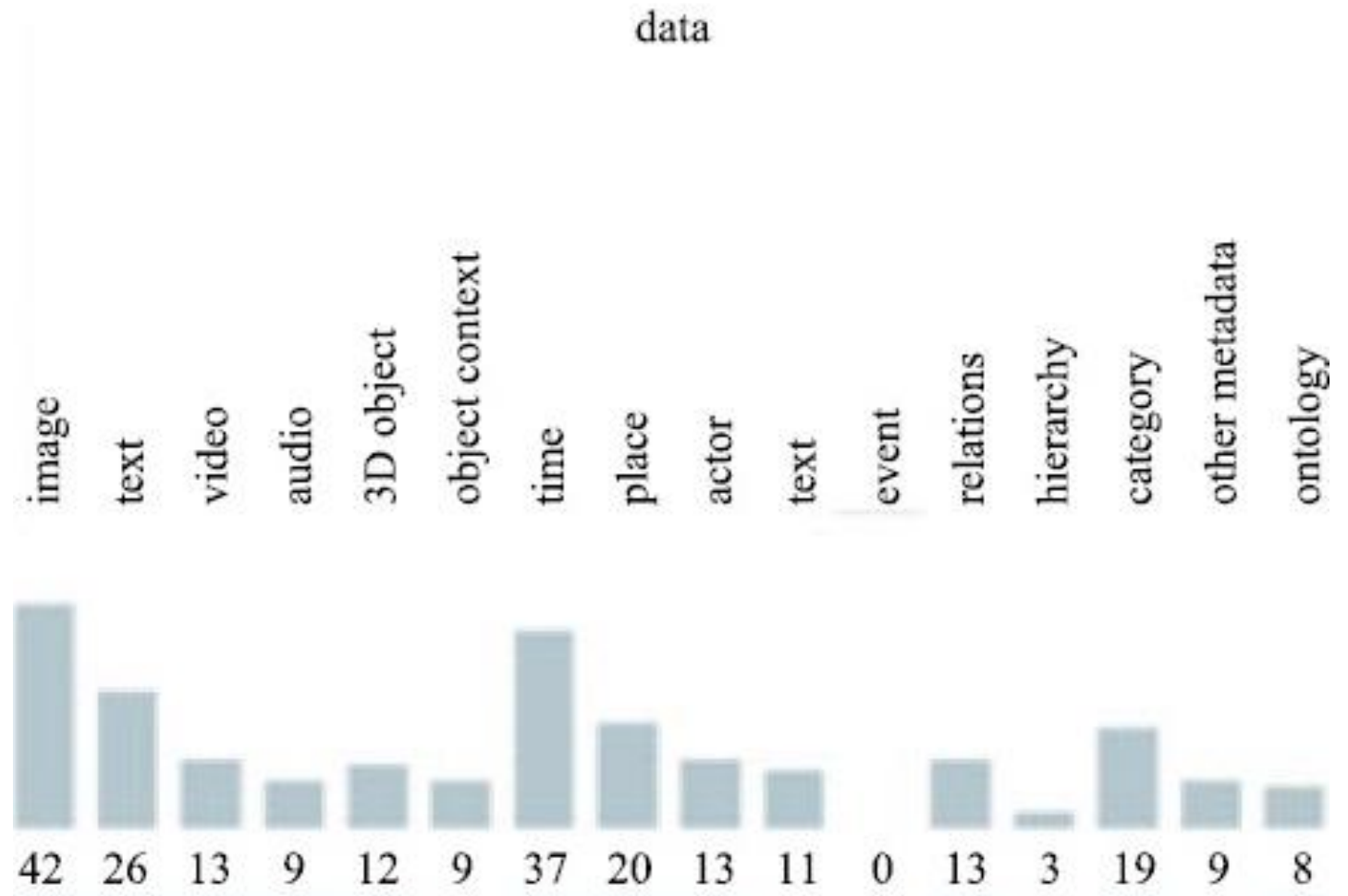
- Media

- Image
- Text
- Video
- Audio
- 3D object

- Metadata

- Time, Place, Event
- Object context, Category,
- Other Metadata, Ontology

- Relations, Hierarchy



Expert vs. Casual users

- Domain expertise facilitates directed search in databasis.
- Knowledge of the content and structure of the collection enables experts to use relevant keywords for searching and filtering that yield more precise results.
- Casual users require an orientation phase before they start engaging with the information.

Tasks

- Elementary tasks:
 - lookup,
 - comparison,
 - relation-seeking.
- Synoptic tasks:
 - involve finding and comparing patterns,
 - seeking relations between patterns;
 - play an important role in exploratory data analysis.

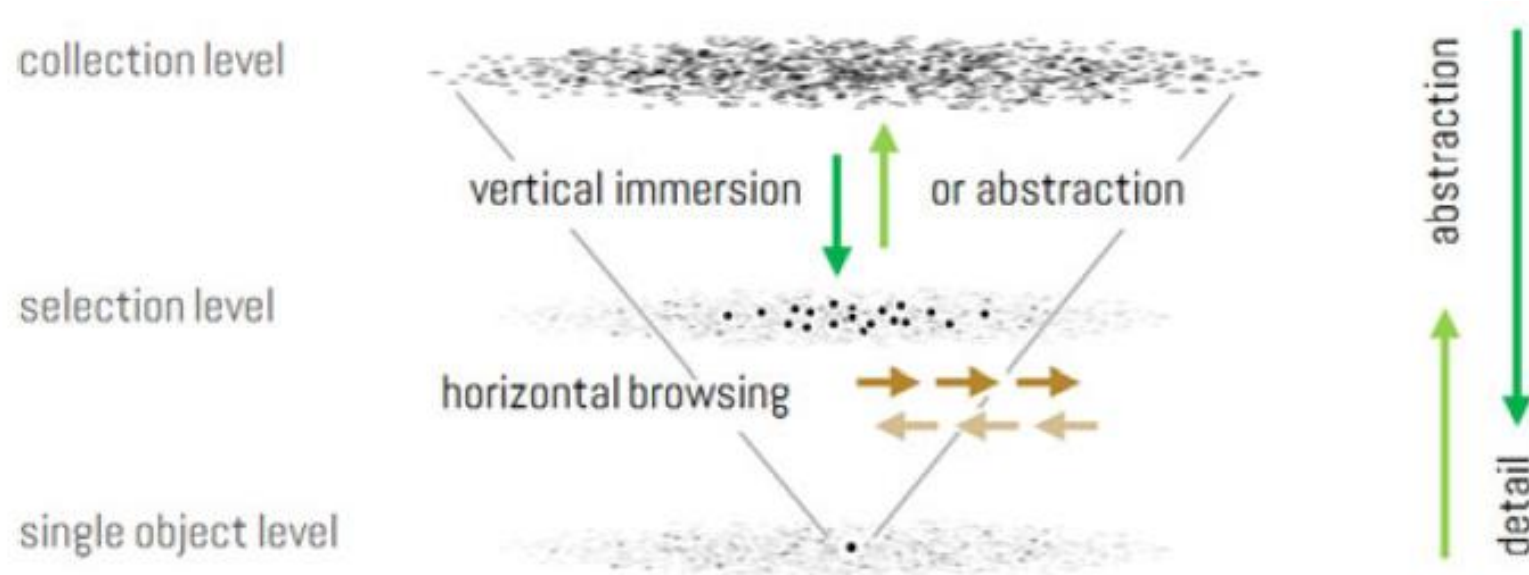
Previews vs. Overviews

- **Object Search:** Geared towards finding one or more relevant objects in an information space. At the end of a search, there tends to be the single find that ideally satisfies the information need.
 - **Single Object Previews:**
 - Accessing Object Detail to allow for a close-up contemplation, many systems provide detailed representations of objects previews—often including access to object metadata and textual descriptions.
 - **Multi-Object Previews:**
 - Aggregated previews of CH objects into multi-object arrangements, such as lists, grids, or mosaics, where thumbnails serve as object previews.

Previews vs. Overviews

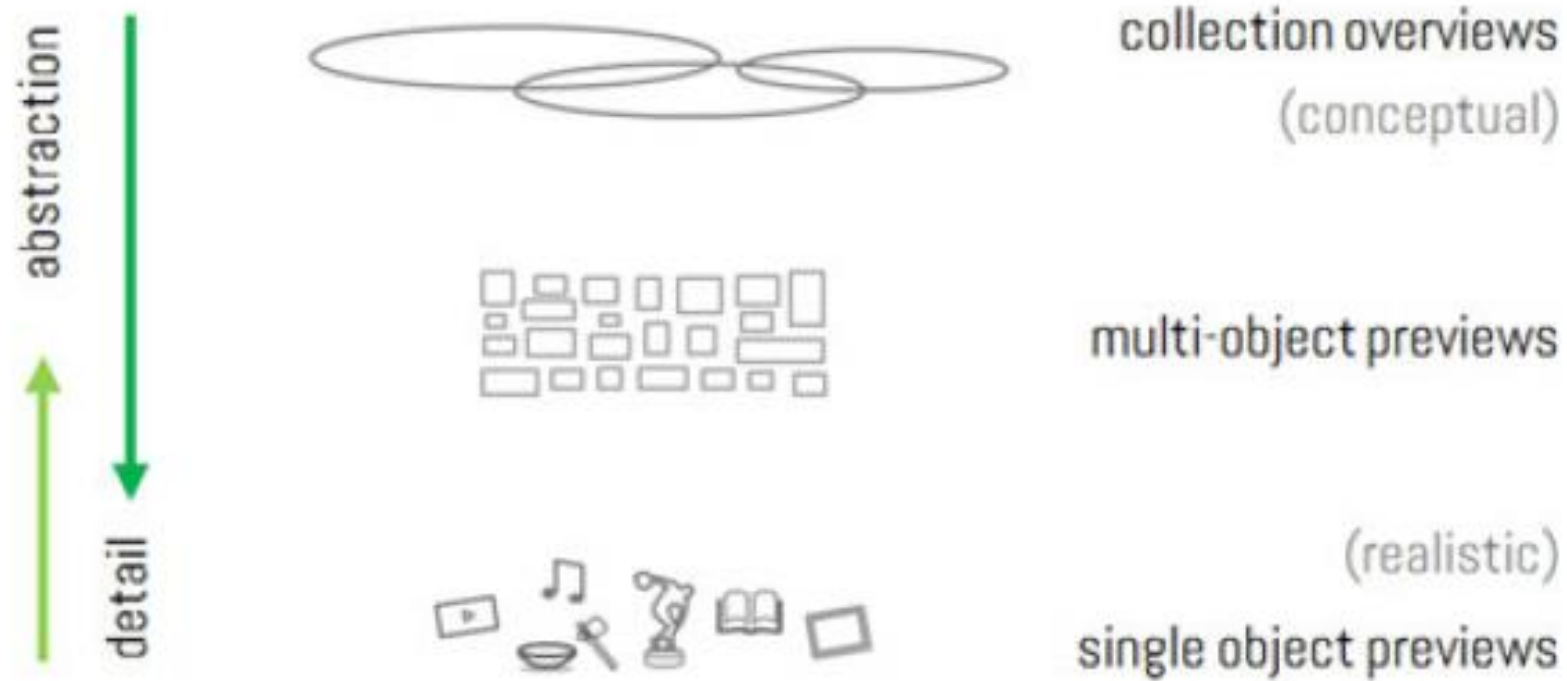
- **Overview and Orientation.** Collection overviews visualize collections on a macro level. It enable users to orient themselves according to various metadata dimensions and to visually analyze distributions, relations, patterns, or trends of entire collections on a high level of aggregation.
 - **Collection Overviews Utilizing Discrete Surrogates:**
 - visualization systems can provide collection overviews by using discrete abstractions for single objects.
 - **Collection Overviews Utilizing Abstractions:**
 - utilize all possible types of diagrammatic representations.

Granularity and Interactivity



- **Vertical Immersion or Abstraction:** Vertical immersion travel across to the access of single objects, the exploration of (faceted) subsets of a collection and overviews. Interfaces can support vertical movements of immersion (zoom in) or abstraction (zoom out) along the overview-detail-axis.
- **Horizontal Exploration:** horizontal browsing or exploring includes all sorts of open-ended, lateral movements, either on the object level, or along a selected level of aggregation or abstraction. This includes browsing or “strolling” along various metadata dimensions or facets, like (same) style, artist, subject, or time.

Granularity and Interactivity



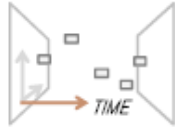
Visual encoding



time-axis (1D)



time-axis (2D)



time-axis (3D)



animation



visual variable



other (e.g. treecut)



lists & slideshows



grids & mosaics



plots



clusters & sets



maps



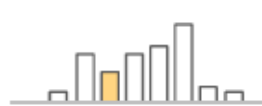
networks



hierarchical diagrams



word clouds



bar charts



3D



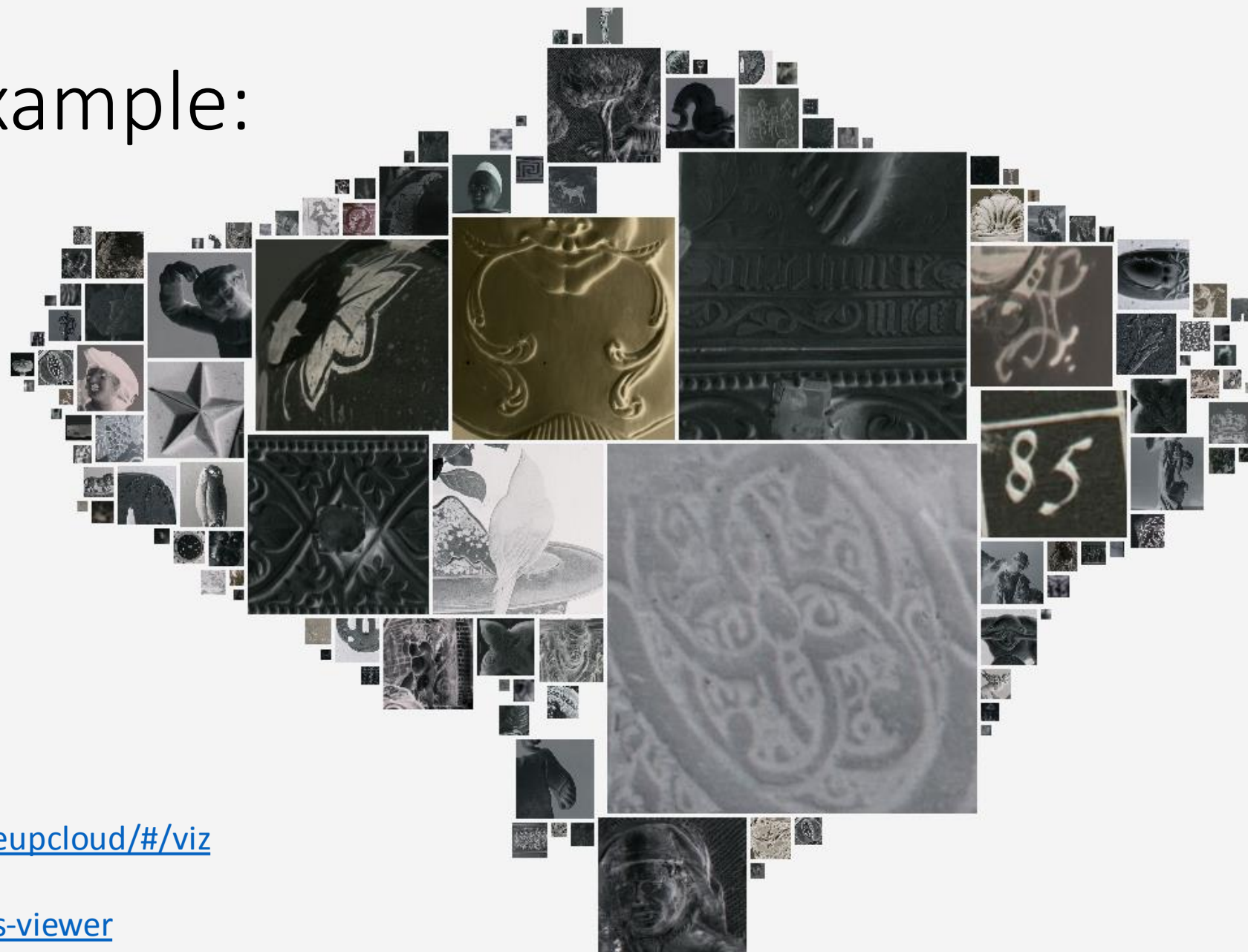
other (e.g., voronoi)

Fig. 9. Surveyed visualization methods to encode temporal data aspects (top row) and methods to visually encode non-temporal aspects of CH data collections (bottom).

Wilhelm Weimars Glasnegative

5315 CLOSE-UPS IN 144 OBJEKTEN

Yet another example:



<https://uclab.fh-potsdam.de/closeupcloud/#/viz>

<https://github.com/cpietsch/vikus-viewer>

Discussion

- Developments in the CH representation have motivated a multitude of visualization approaches
- It begin to form an interconnected field of study with its own questions and challenges that are being answered by a discussion about newly required design principles and strategies, such as:
 - Serendipity (find knowledge that you were not looking for)
 - Generosity
 - Criticality (support interpretative accounts and critical analyses)
 - User Guidance and Narration
 - Remote Access vs. Being There
 - Facets of Uncertainty
 - Contextualization

Generosity

- 1) show first, don't ask;
- 2) provide rich overviews;
- 3) provide samples;
- 4) provide context;
- 5) share high quality primary content.

User Guidance and Narration

- recommendation;
- narrative;
- curated paths
 - <https://www.europeana.eu/portal/en/exhibitions/foyer>

Visualization of Cultural Heritage Collection Data: State of the Art

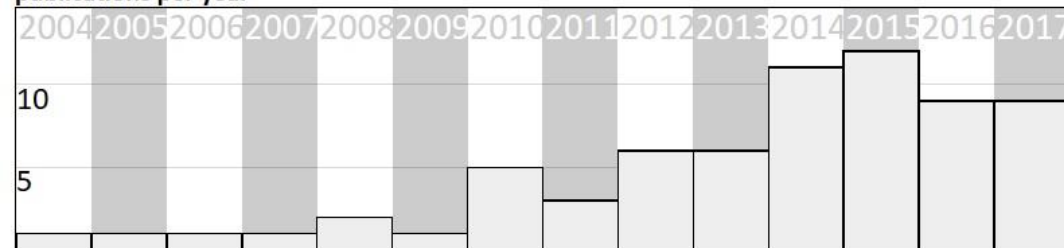
Link to the Survey ([TVCG 2018](#))



Selectors      

▼ Timeline

publications per year



▼ Keywords

filter ...

min - 1 +

OBJECT_TYPE: image₄₁ text₂₄ ?₂₀ video₁₂ 3d_object₁₁ audio₉

DATA: time₃₆ ?₂₁ place₂₀ category₁₉ actor₁₃ relation₁₃

text₁₁ other₉ ontology₈ object₇ hierarchy₃

USER: casual₂₈ ?₂₆ professional₂₅

EVALUATION: ?₄₃ yes₂₆

TASK: elementary₃₂ synoptic₂₈ temporal₂₂ ?₂₀

69 publications

sorted by selector agreement and publication key

evaluation:yes task:elementary granularity:abstract_overview

granularity:multi-object_preview interactivity:analysis_and_orientation interactivity:detail

interactivity:search non-temporal_encoding:list_and_slideshow non-temporal_encoding:maps

non-temporal_encoding:other temporal_encoding:time_axis(2d) source:paper

select similar

Citation BibTeX



19. DLL15 INTETAIN (2015)

| URL | Google Scholar | Google

Visual metaphors for semantic cultural heritage

Damiano, Rossana Lombardo, Vincenzo Lieto, Antonio

Abstract: During the last decade, cultural heritage has moved toward the encoding of information in semantic format. Ontologies make the description of artworks clearer, unambiguous and often self-explanatory, with advantages in terms of interoperability. In cultural heritage, the current shift toward sema... ▶

object_type:3d_object object_type:audio object_type:image object_type:text

object_type:video data:ontology data:other user:casual evaluation:yes

task:elementary granularity:abstract_overview granularity:multi-object_preview

interactivity:detail interactivity:horizontal_browsing interactivity:search

non-temporal_encoding:3d temporal_encoding:other source:paper

select similar

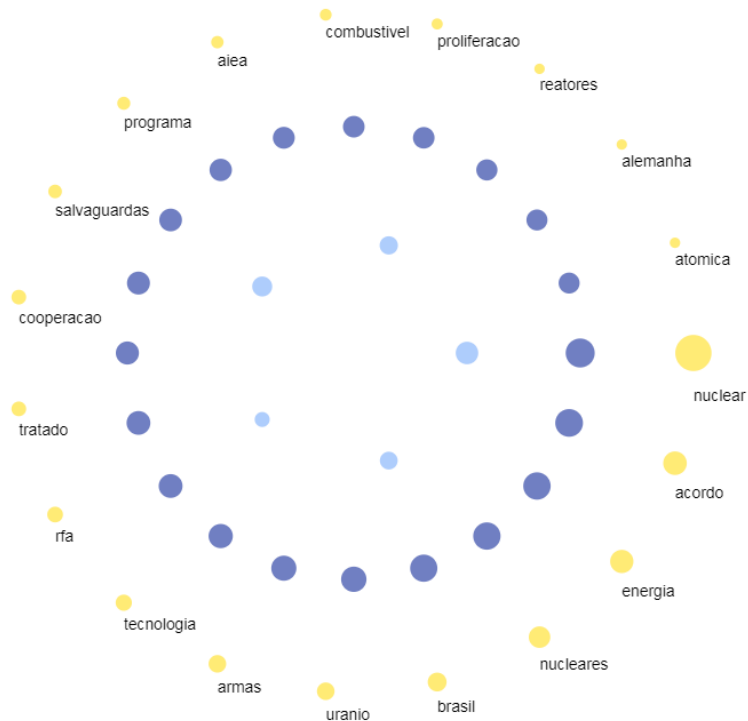
Citation BibTeX

<http://collectionvis.org/>

Coming Soon....

Cultural Heritage Collections Applications

- Master Dissertation: Marcelo Ribeiro
- <https://observablehq.com/@marcelobbbr/thesis-visualization>



Beyond Cultural Heritage Collections

- CH Collections vs. Urban Data
- CH Collections and Sparsity

Thank you for your attention