

An Introduction to the ChIA Project

Accessing and Analysing Cultural Images with New Technologies

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Project details

Funded by the go!digital Next Generation call of the Austrian Academy of Sciences (GDNG 2018-051)

Project duration: 24 months (06/2019 - 05/2021)

Involved expertise

Digital Humanities, AI & NLP (ACDH-CH OeAW, AT)

Semantic technologies (Dublin City University, IE)

Cultural Image aggregation (Europeana Local - Österreich, AT)

Project team



PI: Amelie Dorn (ÖAW)



PI: Yalemisew Abgaz (IE)



Gerda Koch
(Europeana)

with Ramiro Ortiz



Renato Rocha Souza
(ÖAW)

Advisory board

- Artificial Intelligence: Ulla Kruhse-Lehtonen (Dain Studios) -FI
- Infrastructures and GLAM: Luca Pezzatti (E-RIHS) – IT
- Knowledge Design / DH: Jeffrey Schnapp – US
- Semantic Technologies: Anna Fensel (STI) – AT



Former Project members:
- 04/2020:
José Luis Preza Díaz (ÖAW)

Project team



Expertise



PI: Amelie Dorn (ÖAW)

DH, Cultural analysis



PI: Yalemisew Abgaz (IE)

Semantic technologies



Gerda Koch
(Europeana)

Image aggregation
Cultural Heritage



Renato Rocha Souza
(ÖAW)

AI, NLP, Machine learning

Advisory board

- Artificial Intelligence: Ulla Kruhse-Lehtonen (Dain Studios) -FI
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José Luis Preza Díaz (ÖAW)

Project aims



- engage and **test new technologies** (Semantic/ AI) against a background of a selected dataset of **food images**
- enhance **access** and **analysis** possibilities for **cultural data**

The major research questions

- How can we **explicitly** and **semantically represent** and **interlink** the rich information contained in **historical food images**?
- How can we support efficient search, analysis and exploit historical images by both **humans** and **machines**?
- What **AI tools** are available and how can we build AI tools for the exploitation of historical images?



Image: Banquet Still Life (Adriaen Van Utrecht); CC-BY-PD

Research Aims



- Semantic annotation methods and tools
- Standardised ontologies, vocabularies and thesaurus
 - Supporting automatic and semi-automatic semantic annotation of cultural images
- Automatic image analysis and representation tools
 - Building an AI system to support exploration, search and retrieval
- Automated search and retrieval
 - Building a knowledge design process around cultural food images

Europeana data set

Total: 58.6 Mio digital objects

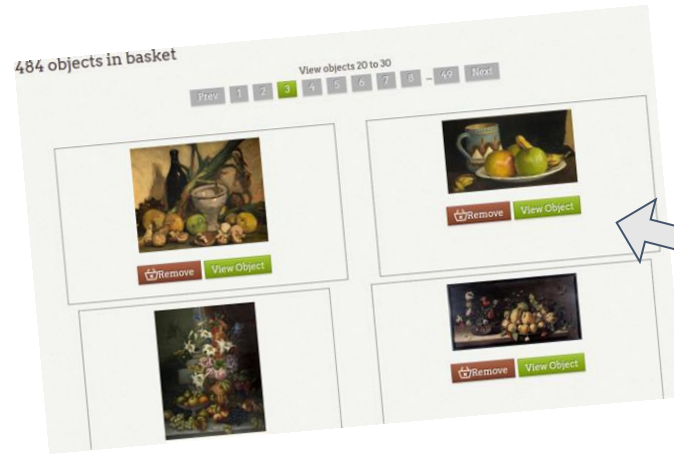
Includes: 34.2 Mio digital images

from: 3.500 institutions in 42 countries

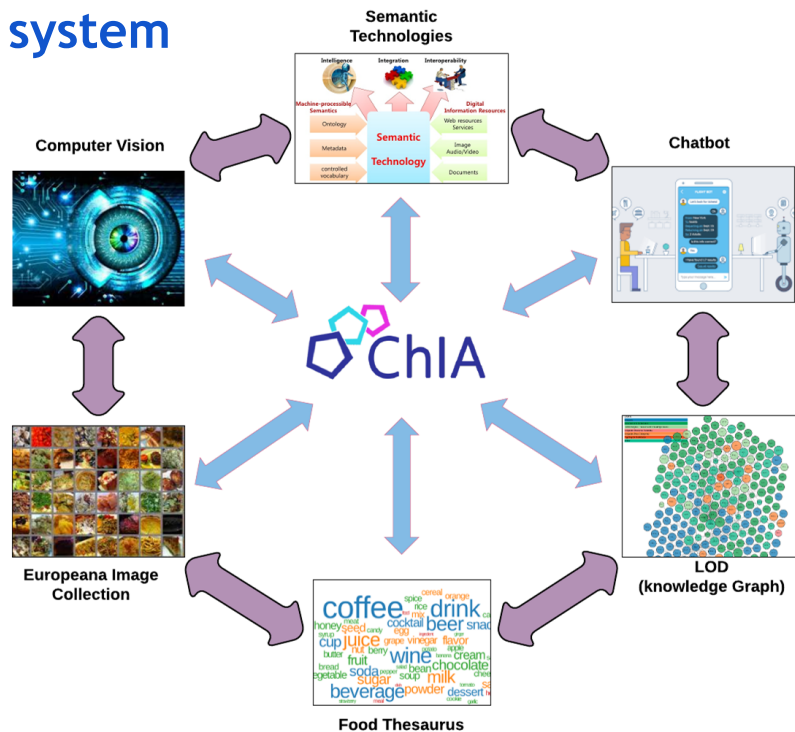


The ChIA dataset

- Selection based on food context of images
- 42.969 images (available with Free Access licenses); ~20.000 images dealing with “food” selected in form of various sets (baskets) for later download & analysis of metadata and images



The ChIA system



- Semantic Technologies
- Chatbot Technology
- Knowledge Maps/Graphs
- Visual Search

The case of building an experimental dataset

- Bridging the gap between the information packed in the images and the explicit annotation of the content of the images using ontologies.
- Interactions between the team members to understand the problem and to work towards the solution

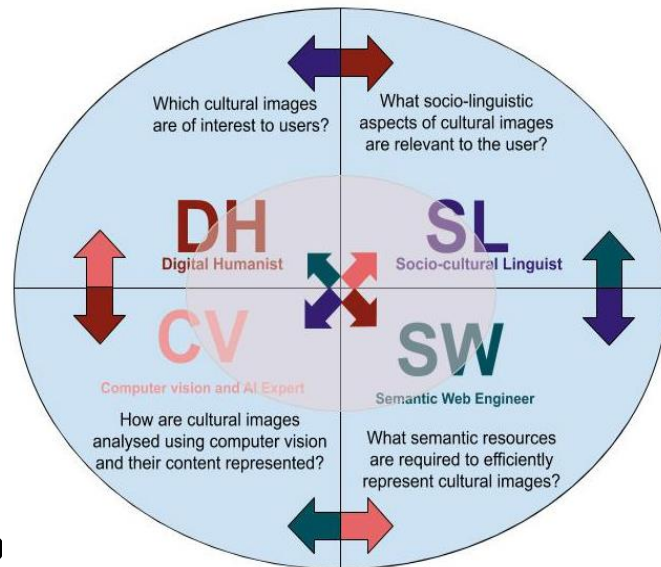


Image: CC-BY-4.0 Yalemisew Abgaz in Abgaz, Dorn, Koch & Preza Diaz. (2020).

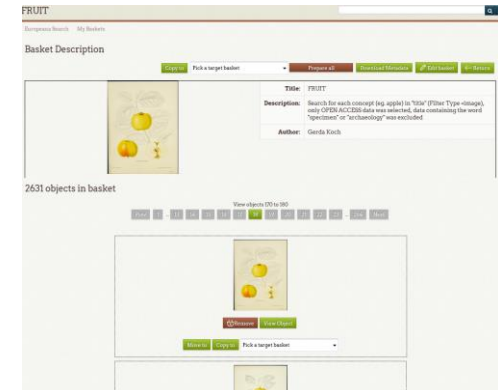
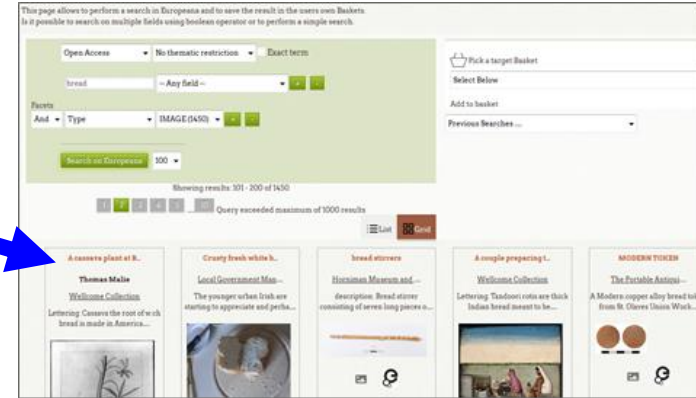
Overall Outcomes

- the ChIA system
- A **search and exploration system** for Europeana datasets
 - experimentation with alternative modes of navigation
 - approach to objects within networks of relations
- **Reports** on advantages/challenges of the application of current and next technologies on the example of Europeana data

Results: the ChIA platform

The ChIA intermediate infrastructure...

- ...was set up as a one-stop shop for **access&download** of European digital content and supports download of digital **images&metadata** in one process including a checking routine on data availability and data access rights
- ...provides for researchers the possibility to easily **generate** out of the wealth of (open access) European digital content **customized test data sets** for further analysis with CV/CNN/AI tools.



Results: Computer Vision systems

Pilot-test on selected images (n=15) of different commercial (Google Vision, Clarifai, IBM Watson, Microsoft Services) and open-source (YOLO) Computer Vision (CV) tools for cultural food image analysis. 3 image categories: photographs, drawings, sketches

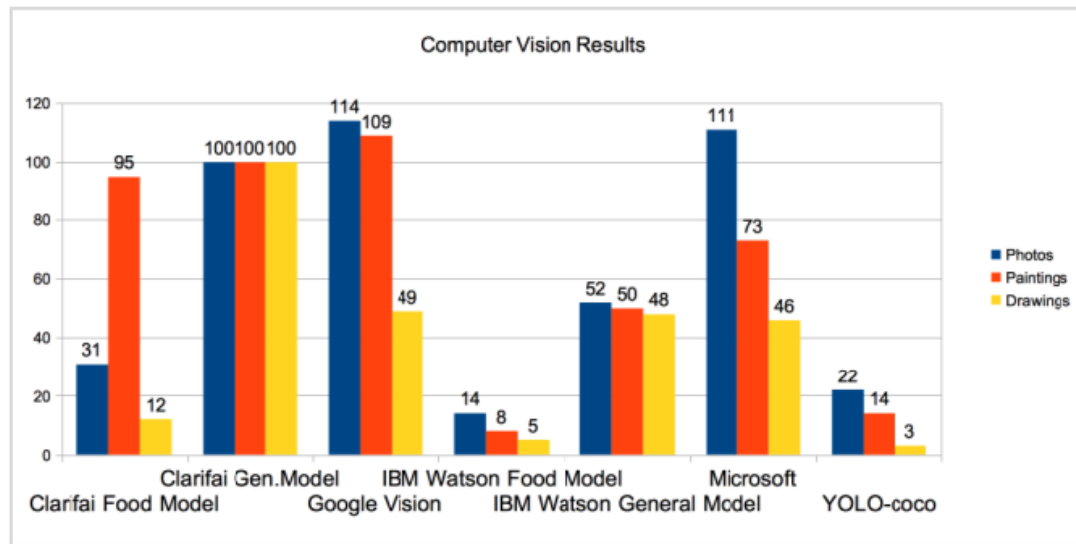


Table: JL Preza Diaz

- Not only quantity, but also quality of generated CV concepts seems important for successfully enriching cultural food images.
- Some types of images (e.g. sketches) particularly challenging to process for CV solutions.

Results: Image classification

Assessing the (human) inter-annotator agreement

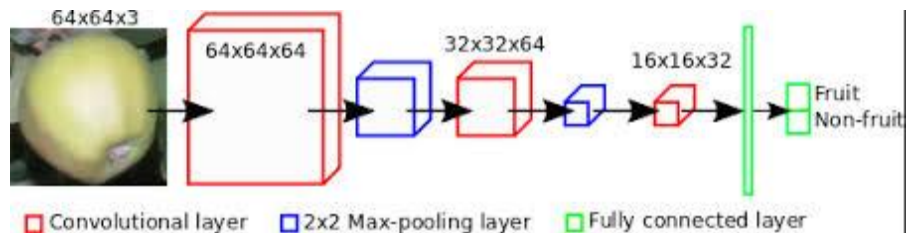
Task_1	Amelie	Gerda	Marcos	Renato	Yalemisew
Amelie	1.000/(392)	0.928/(392)	0.892/(392)	0.907/(392)	0.886/(391)
Gerda	0.928/(392)	1.000/(392)	0.892/(392)	0.938/(392)	0.896/(391)
Marcos	0.892/(392)	0.892/(392)	1.000/(392)	0.923/(392)	0.923/(391)
Renato	0.907/(392)	0.938/(392)	0.923/(392)	1.000/(392)	0.918/(391)
Yalemisew	0.886/(391)	0.896/(391)	0.923/(391)	0.918/(391)	1.000/(391)

Task_2	Amelie	Gerda	Marcos	Renato	Yalemisew
Amelie	1.000/(392)	0.330/(392)	0.252/(392)	0.316/(392)	-0.091/(392)
Gerda	0.330/(392)	1.000/(392)	0.210/(392)	0.306/(392)	0.153/(392)
Marcos	0.252/(392)	0.210/(392)	1.000/(392)	0.051/(392)	-0.031/(392)
Renato	0.316/(392)	0.306/(392)	0.051/(392)	1.000/(392)	-0.028/(392)
Yalemisew	-0.091/(392)	0.153/(392)	-0.031/(392)	-0.028/(392)	1.000/(392)

Task_3	Amelie	Gerda	Marcos	Renato	Yalemisew
Amelie	1.000/(392)	0.659/(392)	0.296/(392)	0.534/(392)	0.317/(392)
Gerda	0.659/(392)	1.000/(392)	0.325/(392)	0.453/(392)	0.268/(392)
Marcos	0.296/(392)	0.325/(392)	1.000/(392)	0.424/(392)	0.370/(392)
Renato	0.534/(392)	0.453/(392)	0.424/(392)	1.000/(392)	0.454/(392)
Yalemisew	0.317/(392)	0.268/(392)	0.370/(392)	0.454/(392)	1.000/(392)

Table and analysis: Renato Rocha Souza

Study of available CNN architecture candidates for transfer learning



Scientific outcomes & activities

Project website: <https://chia.acdh.oeaw.ac.at/publications/>

Open Access repository on Zenodo: <https://zenodo.org/communities/chia4dh>

Researchgate: <https://www.researchgate.net/project/ChIA-project>

Github: <https://github.com/acdh-oeaw/Chia>

Social Media: Twitter #chia4dh

ChIA cultural food image game

ChIA Cultural Food Image Memory Game – find the historical and corresponding current food images that match!



Thank you for listening



#chia4dh

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@yalemisew

@rrsouza

@Europeanaeu

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