An AI platform for the cultural heritage data space

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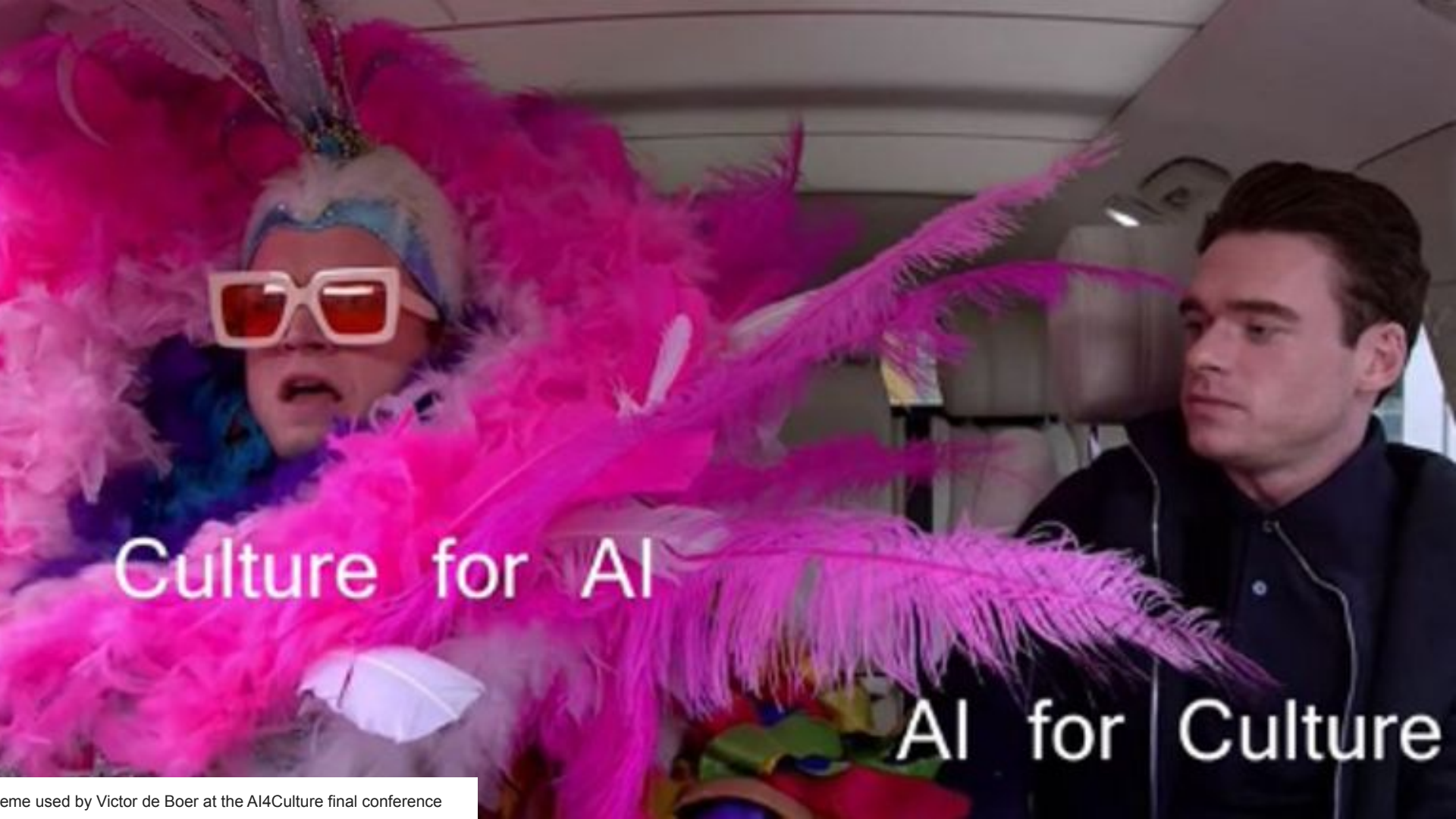
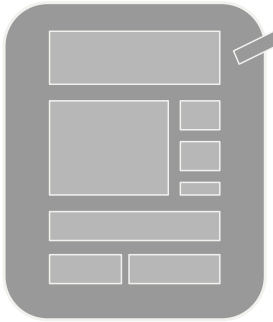


eme used by Victor de Boer at the AI4Culture final conference

Agenda

- The importance of good-quality metadata: how can AI support metadata enrichment?
  - Automatic linking of textual metadata
  - Bias detection
  - Validation mechanisms
- Promoting broader AI applicability across diverse scenarios in the Cultural Heritage sector
  - Making AI technologies more accessible
  - Supporting the practical uptake of AI by CH organisations
  - Capacity building

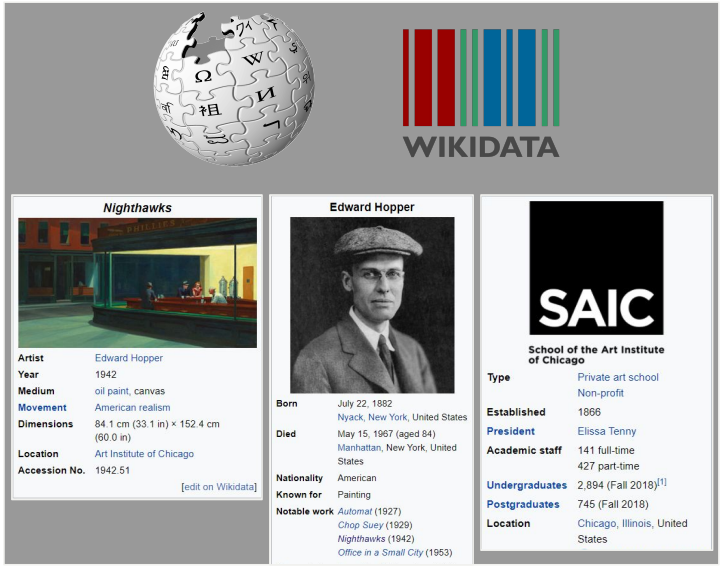
Semantic linking

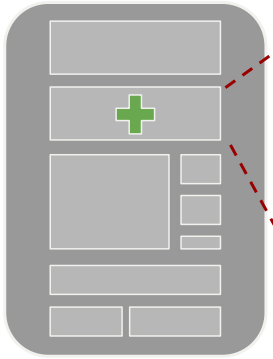


Description: Nighthawks is a 1942 oil on canvas painting by Edward Hopper that portrays people in a downtown diner late at night as viewed through the diner's large glass window. The artwork is displayed at the School of the Art Institute of Chicago.

Semantic linking process

Description: **Nighthawks** is a 1942 oil on canvas painting by **Edward Hopper** that portrays people in a downtown diner late at night as viewed through the diner's large glass window. The artwork is displayed at the **School of the Art Institute of Chicago**.





Nighthawks
Wikidata ID:
Q83872

Edward Hopper
Wikidata ID:
Q203401

School of the Art Institute of Chicago
Wikidata ID:
Q7432601

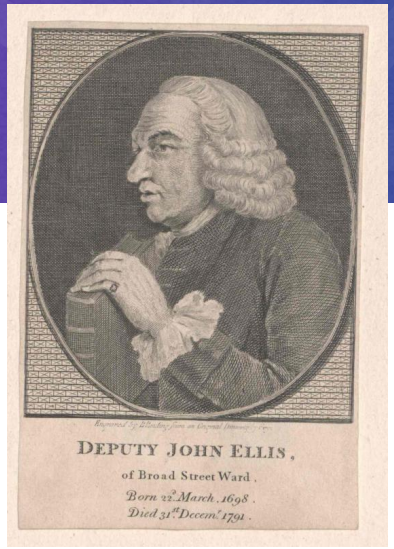
Semantic linking

- Homogenisation

```
<dc:creator>John Ellis</dc:creator>
<dc:creator>Ellis, John</dc:creator>
<dc:creator>Jon Ellis</dc:creator>
```

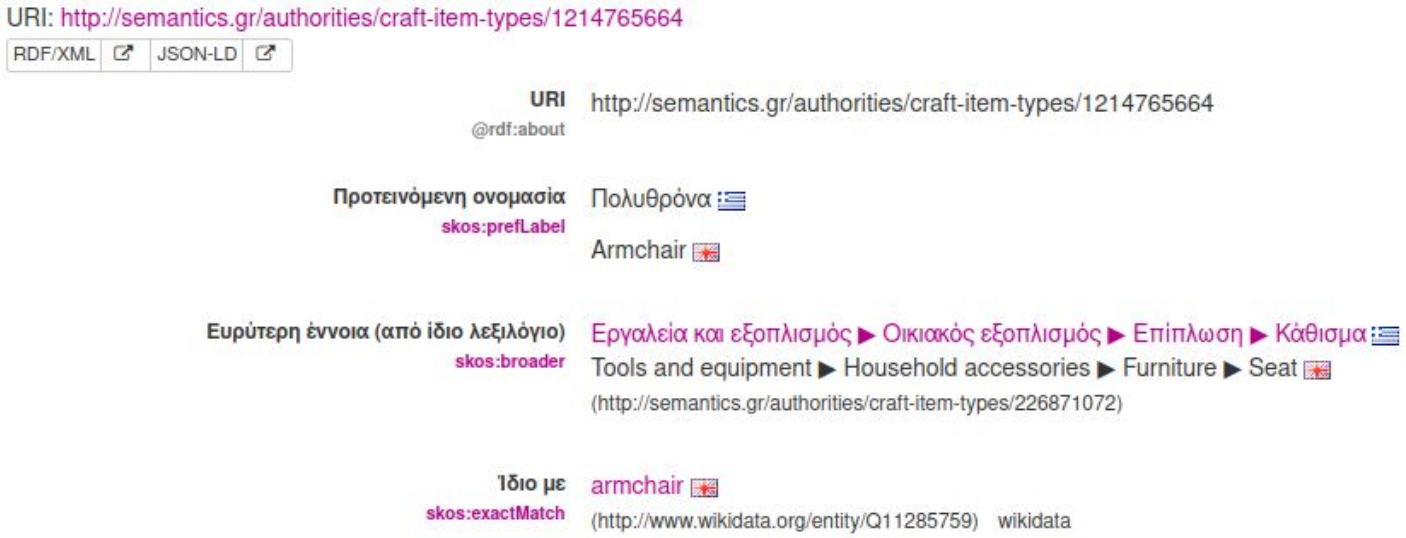
- Unique meaning (disambiguation)

```
<dc:description> [...] In this video, British guitarist
and songwriter John Ellis is performing live  with his
band, the Vibrators. [...].</dc:description>
<dc:description> [...] This portrait depicts English
clergyman and theologian  John Ellis.
[...]</dc:description>
```



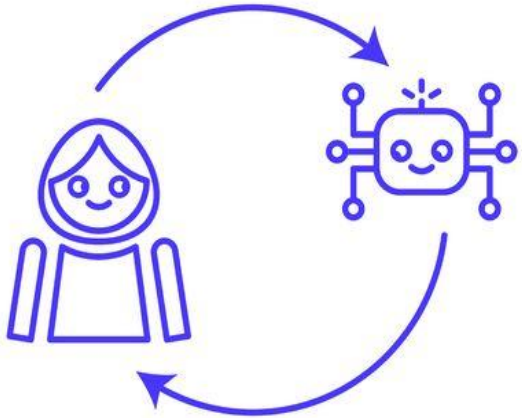
Semantic linking

- Contextualisation and multilinguality



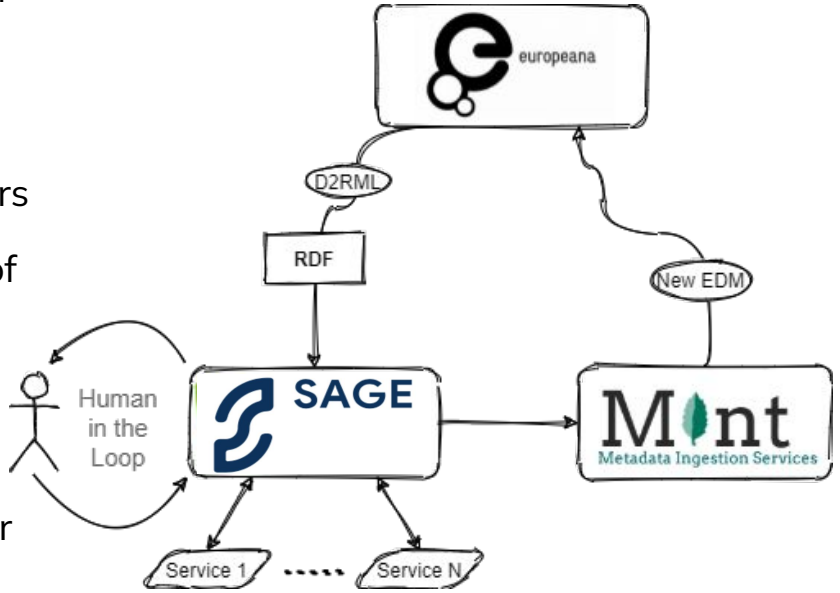
Metadata enrichment methodology

Combine the power of Artificial Intelligence tools with human intelligence for improving the quality of cultural heritage metadata



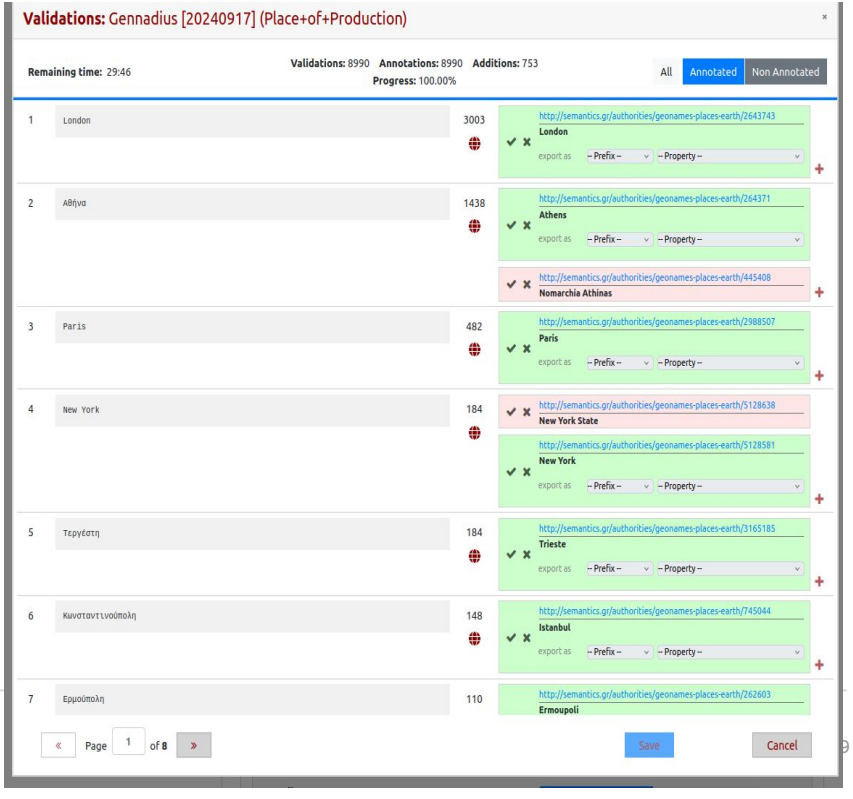
Data management and semantic enrichment platform

- Import heterogeneous data and transform them to a knowledge graph (RDF)
- Publish, organise, and provide access to data
- Automatically enrich published data using annotators
- Create validation campaigns for human inspection of automatic enrichments
- Aligned with the Europeana Annotation Model
- Interlinked with the MINT metadata aggregation platform, component of the European Data space for Cultural heritage



SAGE validation environment

- Human validation by experts in the field
- Grouping of annotations and string values together to speed up validation
- Humans can add their own annotations



Lessons learnt: enrichment

- Precision versus recall
- No one fit-for-all solution: No one fit-for-all solution: Different approach depending on available data, format, objective and required expertise.
- The quality of the original textual description affects the quality of the automatic enrichment
- Generic models (for NERD and LLMs) by themselves perform poorly (lack of sufficient context; training on unrelated corpora - domain-specificity; wrongly disambiguated)
- Fine-tuning: patterns for metadata values (e.g. “surname, name”, “city/region/country” etc); restrict to subset of thesaurus hierarchy; check other properties’ values etc.

Lessons learnt: validation and filtering

- Involve validators who are fit for the task (domain experts, language proficiency, public campaigns)
- Be pragmatic when setting your validation targets
- The sample to be validated does not need to be large but it must be balanced and representative
- Establish thresholds for final inclusion in the metadata: majority vote; based on precision; automatic confidence scores

SAGE in numbers

Annotations
3.900.000+

Enriched Records
1.500.000+

Users
60+

EUROPEAN FASHION HERITAGE ASSOCIATION

Museu

EUSCREEN

Europeana Aggregators
6

DE-BIAS: Detecting and cur(at)ing harmful language in cultural heritage collections

Promoting a more inclusive and respectful approach to describing cultural heritage.

Harmful Language in CH

- Title: “Home for ***Invalids*** Annual Repor
- Description: “List of ***invalids*** residing at the home, with notes on their physical and mental deficiencies.”

Term for **people** with **disability**. It **suggests a person is ‘less than’ their contemporaries** and that they are weak, inferior or useless.

- Title: “***Oriental*** Lady in Tra
- Description: “Photograph of an ***Oriental*** woman wearing exotic attire, likely taken in a bazaar setting.”

“Oriental” **homogenizes diverse Asian identities** and reflects Western **exoticism**.

- Title: “***Savages*** of the Am
- Description: “A missionary s account documenting the customs of local **savage tribes** in Brazil.”

This term has long been used to dehumanize and harm **Native Americans** and **Indigenous people**, labeling them as **uncivilized** or **primitive**.

- Title: “Portrait of a ***Hottentot*** Woman”
- Description: “An ethnographic study of a or educational purposes.”

This term refers to the **Khoikhoi people**, who live in the western part of South Africa. It is a Dutch **colonial term**, first used in the 17th century, and was based on an imitation of the sound of the Khoikhoi language.

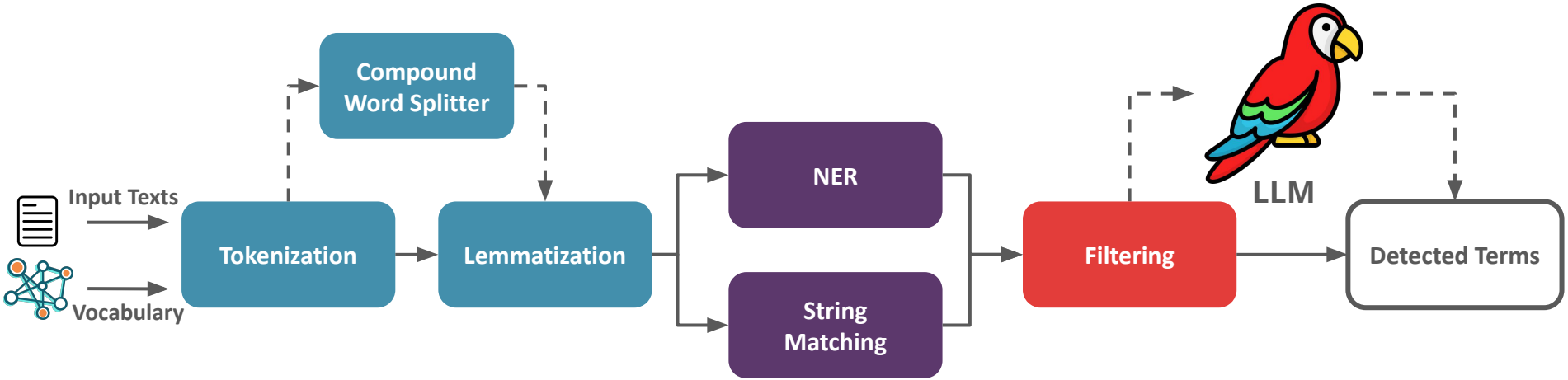
The DE-BIAS Approach

- **Curated a multilingual vocabulary of harmful terms**
  We built a structured vocabulary by working with CH professionals, researchers, and affected communities. Each entry includes a curated explanation of why the term may be considered harmful today, ensuring cultural and historical specificity and supporting accurate, respectful detection. **5 languages, 700 terms**

- **Developed a harmful language detection tool**
  Using the vocabulary, we created a tool that flags harmful terms in metadata using both traditional NLP techniques and large language models (LLMs).

- **Applied the tool at scale and integrated it into real-world platforms**
  We deployed our tool both as a standalone web app and via integration with Europeana.

The Tool

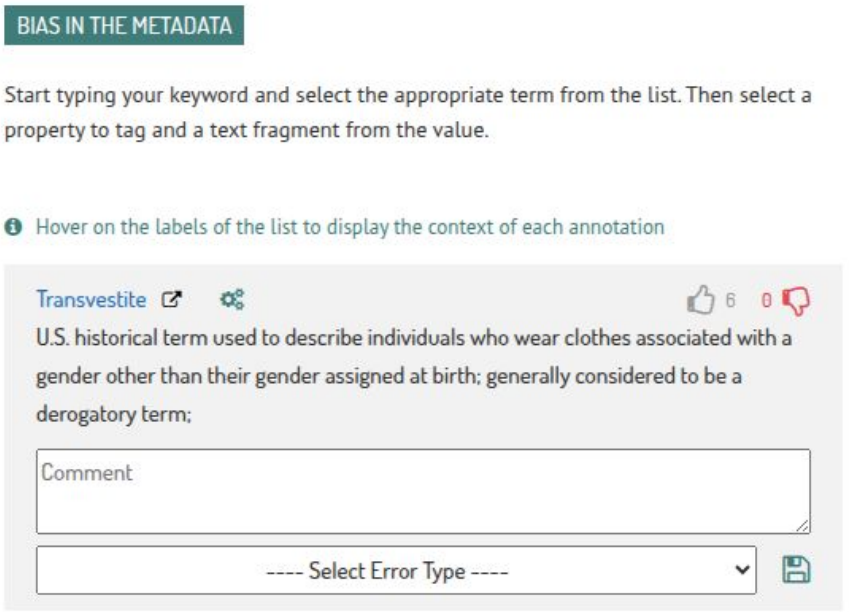


TL;DR vocabulary-based fuzzy string matching and LLM for disambiguation

Human validation

CrowdHeritage

- **3,700 annotated texts** covering all 687 terms of the vocabulary
- **145 participants** contributed in CrowdSourcing campaigns

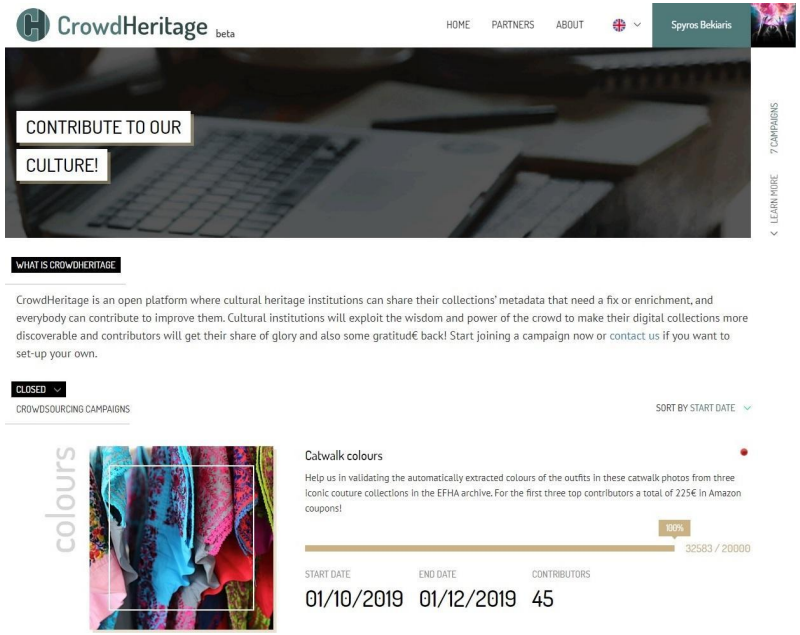


Crowd- and niche-sourcing

- Distribute an online task to a group of people
- Broadly used in the CH domain: e.g. tagging, transcribathons, subtitl-a-thons
- Benefits:
  - For CHIs: improve the quality of their collections and engage with target audiences
  - For participants: interact with cultural heritage items

Using crowd- and niche-sourcing

- A campaign leads to the enrichment of CH metadata
- Users asked to inspect an item (image, video, text, metadata) and fulfill a task
  (a) Add annotations from scratch
  (b) Validate/evaluate annotations produced by automatic algorithms
- Target audiences
  - Citizen Science (wide audiences)
  - Education (pupils, students)
  - Expert campaigns (closed groups)

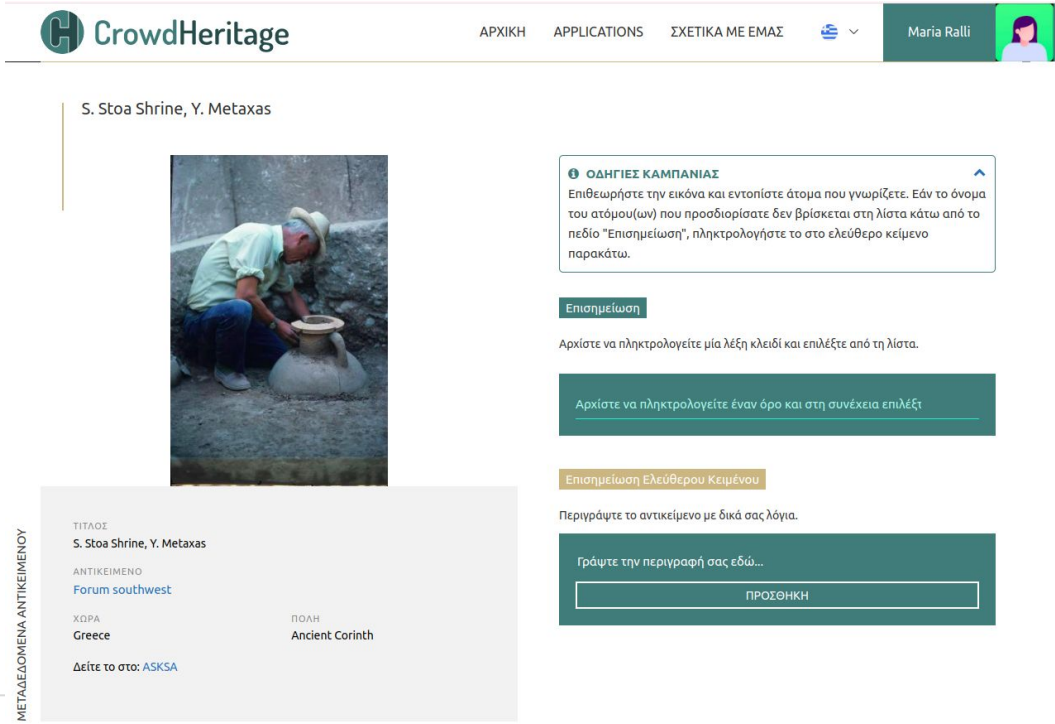


Using crowd- and niche-sourcing

- Semantic enrichment: add terms representing various entities and concepts (from instruments and emotion tagging to color- and geo-tagging)
- Evaluate and post-edit automatic translations
- Validate the results of color and object detection algorithms
- Validate the results of bias detection algorithms and mark biased terms
- Rank automatically produced super-resolution images

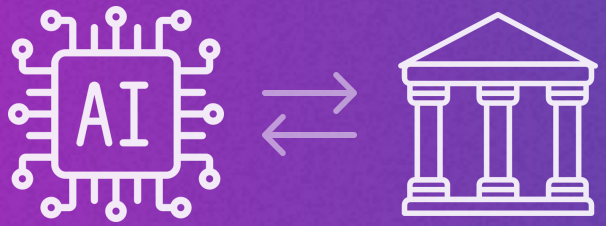
What AI can’t do

- Photos of excavation places and findings in Ancient Corinth
- Connect archaeological items with people from the local community connected to their finding
- Participants: Inhabitants of the Ancient Corinth region with good knowledge of local people



Moving from Task-Specific to Cross-Domain: AI4Culture

Online capacity building hub for making AI technologies more accessible and usable by the CH sector



Barriers to the uptake of AI in the Cultural Heritage sector

Lack and fragmentation of knowledge about how AI can be applied in the CH sector

Limitations of existing tools

Complexities of interconnecting AI tools with other digital components and with the Europeana platform

Lack of labelled datasets for domain adaptation

Difficulty to convincingly demonstrate ethical applications of AI with clear benefits

AI Tools

Open source or free SaaS

- Data space-compliant
- Curation of CH-relevant AI tools
- Contributed by end users

Open Datasets

Open labelled datasets for training and testing AI models

Upskilling Material

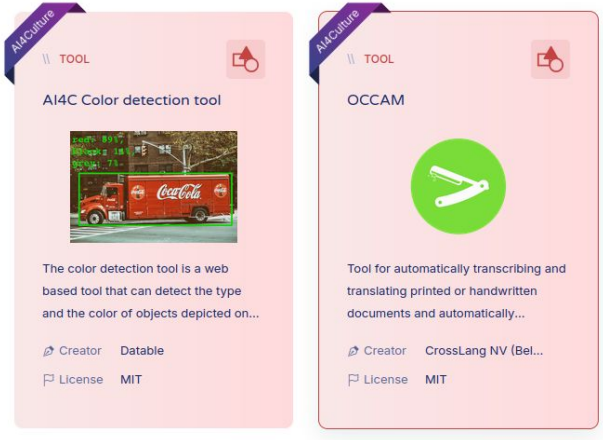
Technical material (e.g. API documentation) and resources for professionals with lower IT skills (e.g. interviews, user tutorials)

Recipes

Step-by-step instructions about how to perform a complex task by combining different AI tools

AI tools and datasets

- **Open source tools** (or offered as free services) relevant to CH domain
  - Documented with respect to various parameters (e.g., AI category, CH task type, required skills, intended users, etc) to facilitate discoverability and understandability
- **80 tools** in total
  - Tools developed by AI4Culture partners for scenarios with high interest for CHIs: offered as Docker containers and as online services; interoperable with Europeana
  - Existing tools curated by the consortium
  - Tools contributed by end users
- **15 datasets** that can be used for AI training and validation



Recipes

- Step-by-step instructions about how to use and combine different tools to solve complex tasks

Resource Details | Recipe Steps

1 Install the AI4C FBK Subtitler tool

Description

You need the AI4C FBK Subtitler tool which can be used to generate the subtitles (in SRT format) of a given audio.

Clone the AI4C FBK Subtitler repo and follow the steps described in the README.md file to install e run the subtitler tool.

Once installed, the AI4C FBK Subtitler works as described in this 10 minute video . Note that the FBK Subtitler is a web service without a GUI: to observe the functionalities shown in the video, it need the platform descibed in the step 2.

Resources Used

TOOL
AI4C FBK-subtitler

2 Install the AI4C TLT Subtitle Manager tool

Description

Clone the AI4C TLT Subtitle Manager repo

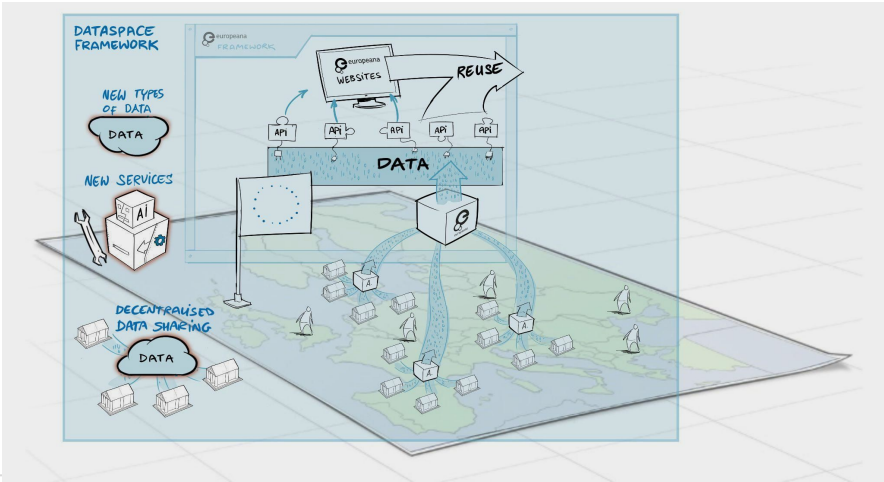
The AI4C TLT Subtitle Manager tool is based on three components (Frontend, Sub-Player and Backend), each implemented as a docker image.

The README.md file contains the instructions to download the three docker images (ai4europeana-frontend.tar ai4europeana-subplayer.tar and ai4europeana-backend.tar) and run them.

Potential to support synergies and interoperability at the catalogue level

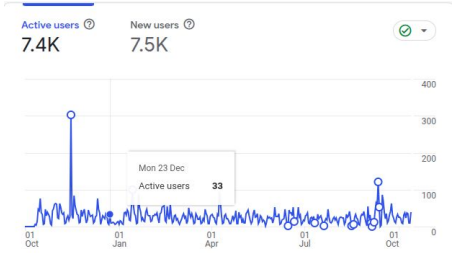
- The AI4Culture platform can act as an online reference point where stakeholders can register their resources (tools, datasets, recipes, success and failure stories etc)
  - Existing synergies with De-bias, Flemish AI Academy (VAIA), AI4LAM, and EuropeanaTech

- Interoperability
  - **Catalogue level**: use of standards for tools' and datasets' descriptions based on DCAT-AP with extensions to serve the sector needs
  - Data level: Mapping between different data models is use case specific and a big challenge
  - Technical: Loose interoperability based on APIs but also consider tighter integration, depending on use case



Ongoing momentum

- >7.5K unique platform visitors
  - 3.9K after the project's completion (Apr 2025)
- > 120 registered resources
- > 1.2k followers on social media
- Upskilling activities attracted high interest (>470 attendees)
- 12 blog posts on Europeana Pro with >12K views
-



Views by Page title and scree...

PAGE TITLE AND S...	VIEWS
AI4Culture	39K
/	8.8K
/resources	6.5K
/project/mission	1.4K
/project/contribute	861
/dashboard/tools	529
/auth/login	484

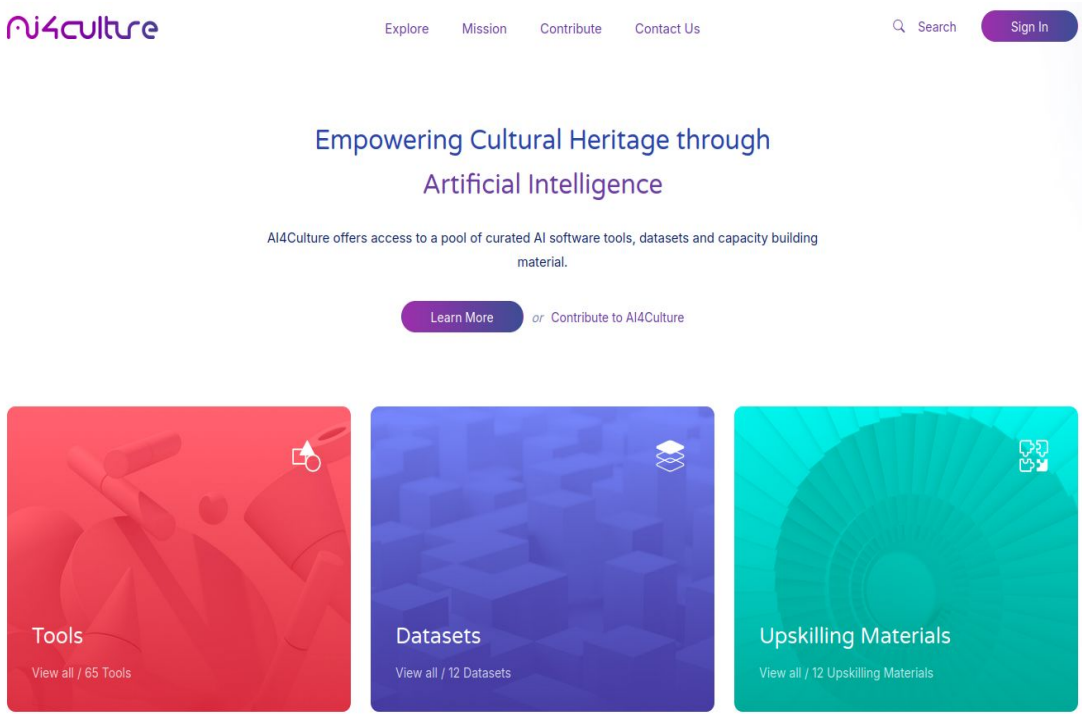
COUNTRY	ACTIVE USERS
Netherlands	1K
Ireland	649
Belgium	590
United States	555
United Kingdom	459
Italy	455
Germany	336

Capacity building

- Lessons learnt
  - High interest in gaining hands-on experience
  - CHIs often lack the necessary expertise and resources for adopting AI tools
  - AI tools cannot be applied as ready-to-use black boxes but need to be *adapted* to the needs of the sector and *integrated* with existing digital tools used by CHIs
  - Scepticism and legitimate concerns (e.g. about CH datasets being exploited by big tech with no real gain for the sectors) often hinders willingness to adopt AI technologies

Let’s explore the platform!

https://ai4culture.eu/



- Do you have an IT tool that is useful for the CH sector?
- Do you have an AI success (or failure) story to recount?
- Do you have a dataset that can be useful for in-domain training?
- Do you wish to experiment with AI to solve a problem?
- Do you wish to share your ideas and concerns about the application of AI in the CH sector?

Register on ai4culture.eu to co-shape the AI4Culture platform!