

Transforming Collections – and Archives, Too

Question

How do algorithms transform the archive from a static repository of information into a dynamic network?

Transforming Collections

Reimagining Art, Nation and Heritage

It is a 3-year, Towards a National Collection (TaNK) project. Led by susan pui son lok, it brings arts historical and museological researchers from the Decolonizing Arts Institute together with machine learning researchers and engineers from University of the Arts London's Creative Computing Institute to understand how machine learning can support museum practices, and use that understanding to build machine learning tools to address structured inequality and systemized bias within arts historical and museological practice.

Transforming Collections

Reimagining Art, Nation and Heritage

Roles

Ireti : Research Fellow focusing on user interfaces that enable humans, facilitated by machine learning, to interrogate and manage museum-collections-as-data.

Jon : Lead Machine Learning Research Fellow

Transforming Collections – in practice

Interventions that can change how art is presented and perceived:

- Object Descriptions provided in physical or online museums
- Institutional acquisitions or collections policies
- Metadata and tagging methods that aid in object search

Transforming Collections – in practice

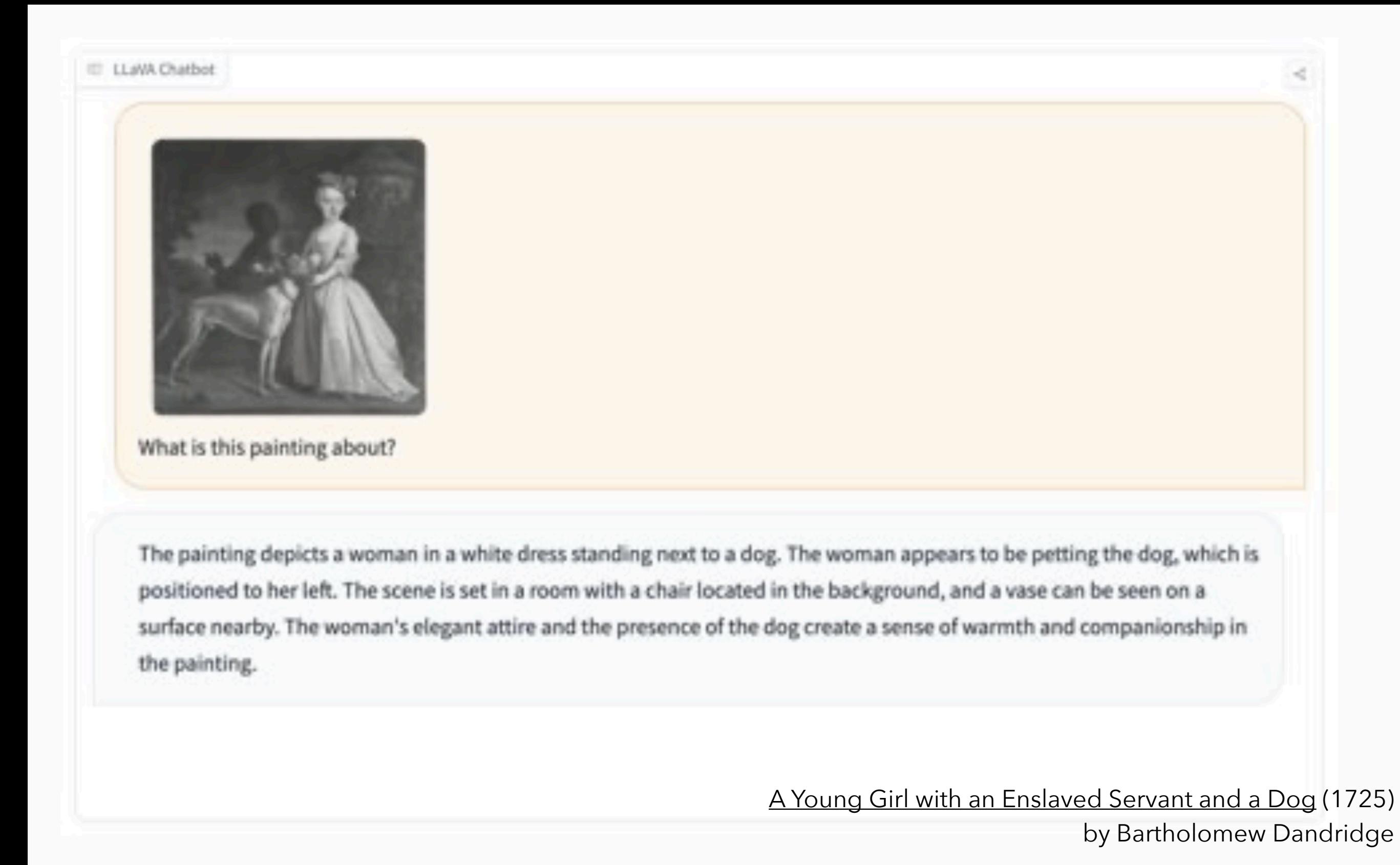
Why use AI / Machine Learning (ML)

- Manage an abundance of information
 - Understand patterns in data
 - Find common threads between different categories and topics
 - Organize and systematize information
- Automation

Transforming Collections – in practice

How AI / ML Fails Us
(2021)

Siddarth, Divya,
Daron Acemoglu,
Danielle Allen,
Kate Crawford,
James Evans,
Michael Jordan, and
E. Glen Weyl.



Transforming Collections – in practice

How AI / ML Fails Us
(2021)

Siddarth, Divya,
Daron Acemoglu,
Danielle Allen,
Kate Crawford,
James Evans,
Michael Jordan, and
E. Glen Weyl.



Transforming Collections – in practice

How AI / ML Fails Us

(2021)

Siddarth, Divya,
Daron Acemoglu,
Danielle Allen,
Kate Crawford,
James Evans,
Michael Jordan, and
E. Glen Weyl.

"The **dominant vision of artificial intelligence** imagines a future of large-scale autonomous systems outperforming human in an increasing range of fields. This 'actually existing AI' vision **misconstrues intelligence as autonomous rather than social and relational.**"

– Siddarth, et al. 2021

Transforming Collections – in training

ML as a Decision Support Tool: An Interactive ML Approach

- Assistive tools are for thinking / working, not automation. Responsibility lies with curators, collection managers, researchers, etc.
- The work lies in zooming in to find patterns of bias on a micro-level. That means coming up with your own patterns to look for and labeling your own data

Transforming Collections – in training

Key Principles

- **Context:** How do we talk and write about artworks and objects in museums and galleries? How can we use AI / ML to assist with the work of cataloging and knowledge production?
- **Transparency:** How do we construct AI / ML algorithms and datasets to train and use machine learning models to interrogate artworks and texts that describe them?

Transforming Collections – in training

Key Principles, con't

- **Absence:** How can we discover what is missing and highlight erasure to make marginalized artists and their work more visible in museum collections?

Transforming Collections – in training

ML as a Decision Support Tool: An Interactive ML Approach

- Train your own Machine Learning models using images
- Train your own Machine Learning models using text
- Train your own Machine Learning models using images and text

Transforming Collections – in prototypes

Questioning A Model

Text classification training
BERT (Bidirectional
Encoder Representations
from Transformers) models
by labeling text-based
classifiers in text.

ID ↑\n↓	Text	Mark Makes a Claim as Present	Mark Makes a Claim as Absent	Predicted
2429	Before the First World War, Roberts made abstract paintings like his fellow Vorticists such as Wyndham Lewis. After the war, he produced a series of scenes of urban popular entertainment, such as this view of the inside of a cinema. Originally called The Silent Screen, it is like an updated version of the views of music hall performances painted by the French Impressionists and British artists like Walter Sickert. There is, perhaps, something significant in the contrast between the rich colouring of the audience and the monochrome, silent action on the screen that seems to hold them enthralled.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Positive
2430	Turner visited St Mawes, east of Falmouth Bay, during a tour of the West Country in 1811. This trip was intended to provide material for a series of engraved views of the south coast, reflecting its scenery, industry and crucial defensive role during the Napoleonic Wars. Although the fishing industry was depressed in wartime, Turner's painting shows the pilchard season at St Mawes at its most bustling and energetic. The sixteenth-century fortress overlooking the bay was built to guard against French invasion. It is an ancestor of the martello towers constructed along the south coast in Turner's day for the same purpose.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	X
2431	Elizabeth, Diana and Mary, daughters of Walter Armstrong of Scotland and London, were in their twenties when Millais painted them. The portrait was started in response to a critic's comment that Millais would have difficulties in painting a group portrait as successful as Joshua Reynolds's picture of the three 'Ladies Waldegrave' of 1780-1. Millais, as a former Royal Academy student, would have instinctively risen to this challenge. In Millais's picture Mary holds most of the trumps and looks towards the viewer. This hints at the sort of gentle sisterly competition in husband-finding which is a theme in another work by Reynolds, 'Three Ladies Adorning a Term of Hymen', displayed in Room 3.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Positive
2432	In this video work, two actors, a young man and an older woman are shown on separate monitors. Each continuously recites a series of one hundred phrases which develop from simple assertions, for example: I was a good boy; you were a good boy; we were good boys, and so on. The two voices appear in competition as they repeat the phrases at different speeds and in different styles but with increasing intensity. Because the two cycles are not synchronised, the actors appear to talk across one another. The pace and tempo of the work reflects Nauman's interest in modern music and dance and the work demonstrates the way language affects the way we perceive images.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Positive

Transforming Collections – in algorithms

Questioning A [Text] Model

Labeling Method	Outcome
Binary	<ul style="list-style-type: none">• Yes - No questions: Is this property present or absent in this statement?• Formulating questions becomes a part of the analysis process.<ul style="list-style-type: none">- What does it mean to say this?- In what context is this idea correct?

Transforming Collections – in algorithms

Questioning A Model

Does the text contain or reference the artist's "voice" (direct or indirect speech)? Is the intent of the artist represented in the text? Is the artist's interpretation and perception of the work mentioned?

Does the text describe artistic practice and process as explained by the artist?

Does the text privilege information that others the artist or sets them apart from the cannon of European/western artists? That is, does it focus on race ethnicity or nationality before information or interpretation of the work of art.

Does the text prioritise discussion of racial (or other) identity of the artist and interpret the work accordingly?

Does the text provide visual, material and content description and analysis of the work? Or is interpretation based mainly on identity and assumptions about identity?

Does the text suggest the work has a place in traditional western art historical categories – ie portraiture, landscape, abstract etc? Does it reference and situate the work accordingly?

Transforming Collections – in algorithms

Questioning A Model

Does the text prioritise discussion of racial (or other) identity of the artist and interpret the work accordingly?

Does the text only position the work and artist in relation to cannon/establishment/widely recognised others – especially men, white artists?

Does the work privilege the curatorial voice/authority of the institution? That is, is the curatorial or “expert” or institutional interpretation made up of assertions and are these assertions evidenced or flagged as opinion?

Does the text contain technical or archaic language that obscures meaning? (Technical or archaic language that is explained shouldn’t be counted here).

Does the text identify and discuss only selected figures represented in the work, neglecting to mention others represented?

Does the text uncritically present histories or contexts that are contested, inaccurate, or prejudiced?

Transforming Collections – in algorithms

Questioning A Model

Does the text contain technical or archaic language that obscures meaning? (Technical or archaic language that is explained shouldn't be counted here).

Does the text identify and discuss only selected figures represented in the work, neglecting to mention others represented?

Does the text uncritically present histories or contexts that are contested, inaccurate, or prejudiced?

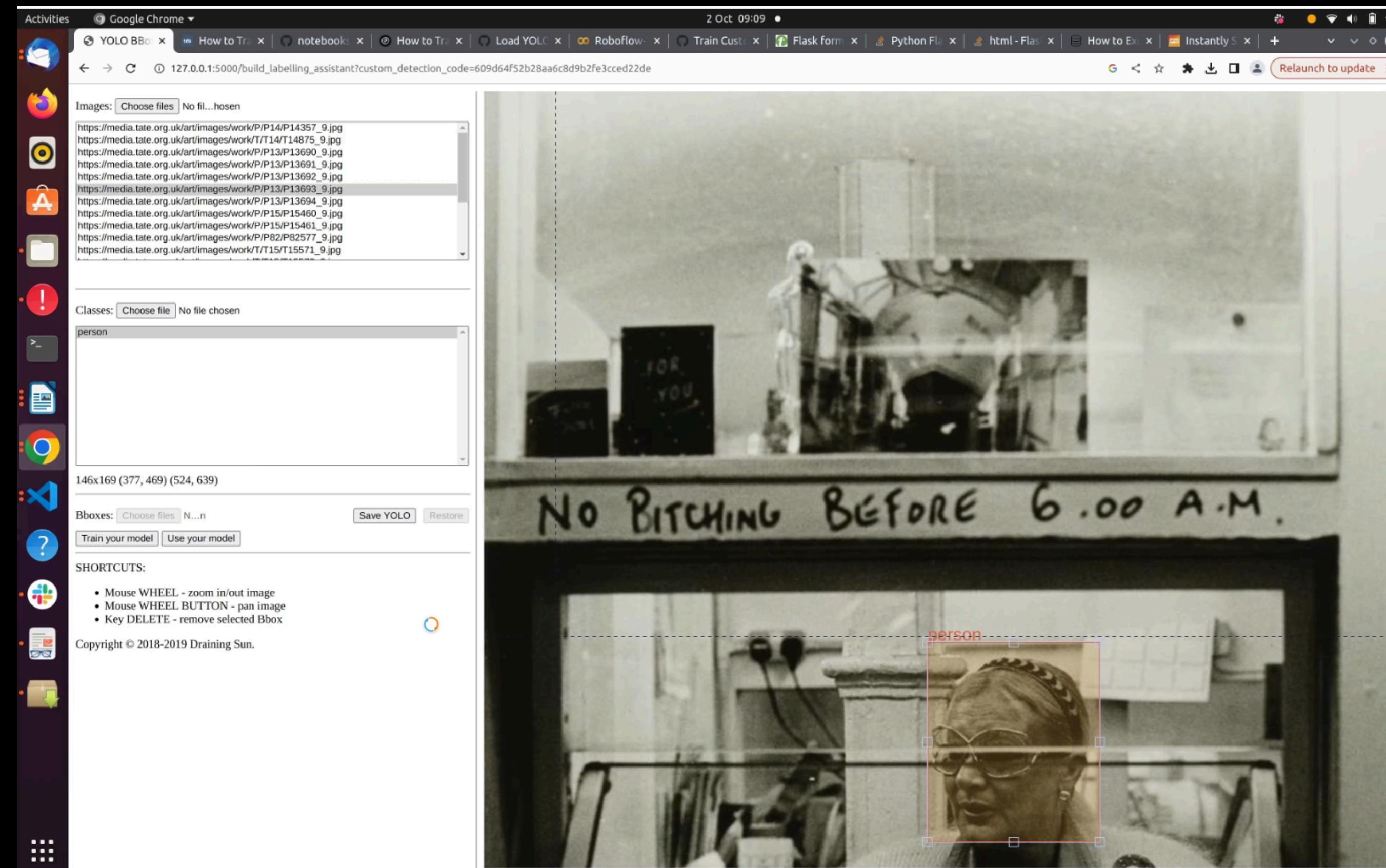
Does the text promote a particular world view as fact?

Does the text present ideas and opinions that are no longer widely held uncritically?

Transforming Collections – in prototypes

Questioning A Model

Image classification
training YOLO (You Only
Look Once, a real-time
object detection
algorithm) models by
labeling image-based
classifiers.



Transforming Collections – in algorithms

Questioning An [Image] Model

Labeling Method	Outcome
Binary	<ul style="list-style-type: none">• Yes - No questions: Is this property present or absent in this image?
Contextual	<ul style="list-style-type: none">• Presence or absence of a property can relate to a subject and/or object, and position which creates additional classifications.

Transforming Collections – in prototypes

Questioning A Model

Text, Image, and Text &
image classification
training Chat GPT-4, a
Large Language Model.

Transforming Collections: ML App

Select labelled items for testing:
Please choose at least 3 samples for testing. At least 3 of those need to be labelled so you can review the accuracy.
You have selected 19 items for testing predictions
Viewing 192 items from the dataset "ESEA terminology data"

Chosen training example	Choose test sample	Item Order	Text	Your Label
●	<input type="checkbox"/>	0	His still lifes and landscapes showing what he calls "one foot in reality" are counterbalanced by a rare gift for decorative abstraction , an almost Oriental sense of how charged and eloquent the spaces between objects can be; a restrained sumptuousness of colour is his hallmark	positive
●	<input type="checkbox"/>	1	Oriental influences in her work are obvious but her interest in art goes back as far as her childhood	positive
---	<input checked="" type="checkbox"/>	2	Although it is unclear to what degree Kim Lim's Asian background has influenced her own work, her sculpture has something of the internal balance , tranquility , and harmony that are often found in far eastern art	positive
---	<input checked="" type="checkbox"/>	3	A bower is a private setting for lovers and Rossetti has decorated it with exotic elements suited to a frankly amorous encounter.	positive
---	<input checked="" type="checkbox"/>	4	Beguilingly simple , this painting of Chris calls on a chain of references. Those twig-like eyebrows evoke the Japanese tradition of Ukiyo-e - 'floating world' - pictures. The paint is thin and foreground detail all the more marked for its meagerness . Buttons measure out the body with a ping; dreadlocks are draped around the face, echoing the silky coils of hair and delicately ruched garments of the onlooking angels in Piero della Francesca's Baptism of Christ.	positive
●	<input type="checkbox"/>	5	The black lines that so clean up the cave's crags and gravel can also be related to Caulfield's first trip abroad, to Crete in the summer between leaving Chelsea and starting at the RCA. He was wowed by the liberally restored palace at Knossos, where ' the terracotta red and black contrasts seemed Japanese or at least oriental ; the vivid-ness of colour and sharp contours struck me quite forcibly' (8) Caulfield had a magpie eye for the vivid, and 'crude' Touristico postcards were as	positive

Next: Test Sample

Transforming Collections – in algorithms

Questioning A [Text, Image, or Text and Image] Model

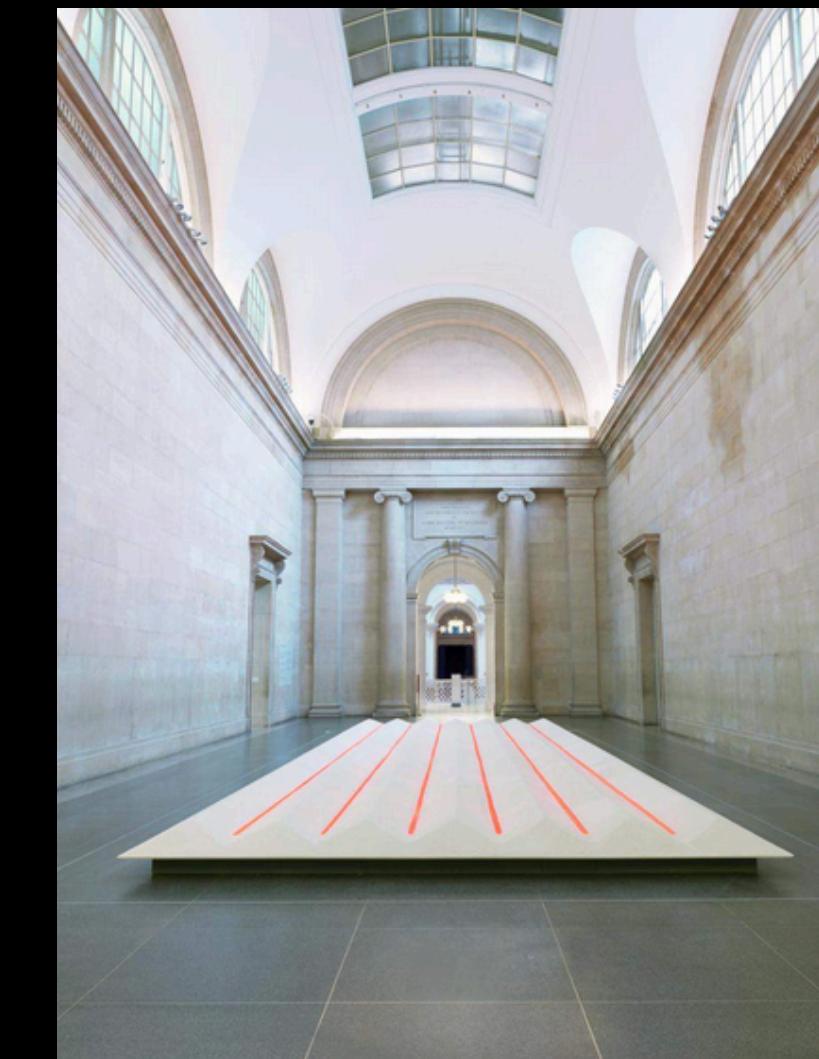
Labeling Method	Outcome
Binary	<ul style="list-style-type: none">• Yes - No questions: Is this property present or absent?
Scale	<ul style="list-style-type: none">• By what degree Is this property present or absent?
Classification	<ul style="list-style-type: none">• What additional properties are absent or present in a secondary questioning?

Transforming Collections – in algorithms

Questioning A Model

Image Dataset: Tate	
Question	
How colourful is this work of art?	This is a labeling exercise to explore how to use questions to classify datasets.
[0] It's monochromatic.	Here we are using a scale. Exploring the collection in this way can help us assess how a feature like colour can contribute to and impact understanding of an artwork beyond a yes/no binary.
[1] Colour in this work is muted.	
[2] Colour is used as an accent to highlight parts of the work.	
[3] Colour is used as a focal point to guide viewers through the work.	
[4] Colour saturates this work.	
[5] This work is about colour.	Additionally, it provides a chance to question the levels of the scale and develop more nuance.
Level of difficulty	1

What does this do?
<p>This image dataset is likely to fit with</p> <ul style="list-style-type: none">■ this scale because colour is often a significant feature of artworks.
<ul style="list-style-type: none">■ The scale affords a closer reading of how colour contributes to artworks.
What can you do?
<ul style="list-style-type: none">■ Label some more items in the dataset.■ Change the scale in the labeling guide.■ Add more test examples.■ Change the training examples.

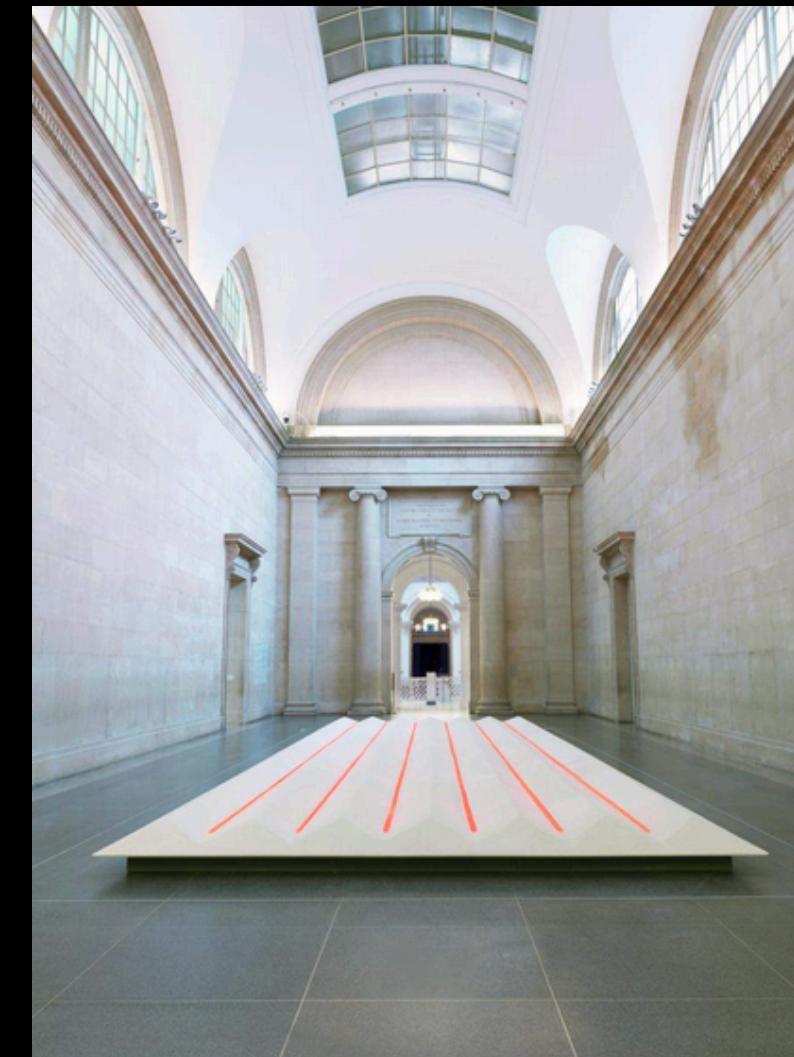


Museum X Machine X Me
Tate 2024

Transforming Collections – in algorithms

Questioning A Model

Text Dataset: Art UK	
Question Can you identify inaccessible or archaic language that would be difficult for an average visitor to understand?	<p>This is a labeling exercise to explore the language used to describe artworks in datasets. This may be more complex than the colour scale analysis.</p> <p>Interrogating the collections information in this way can help identify how language can impact the accessibility of and how audiences understand descriptions used to explain aspects of art.</p>
<input type="button" value="Present"/> <input type="button" value="Absent"/>	What does this do? <ul style="list-style-type: none">■ This exercise surfaces how understanding, or not, of certain words can be a factor of specific knowledge and cultural awareness.■ Surfacing inaccessible language can lead to clear, accessible language. What can you do? <ul style="list-style-type: none">■ Label some more items in the dataset.■ Highlight relevant text.■ Explain any rational for labeling to help train the model.■ Add more test examples.■ Add more training examples.
Level of difficulty	2

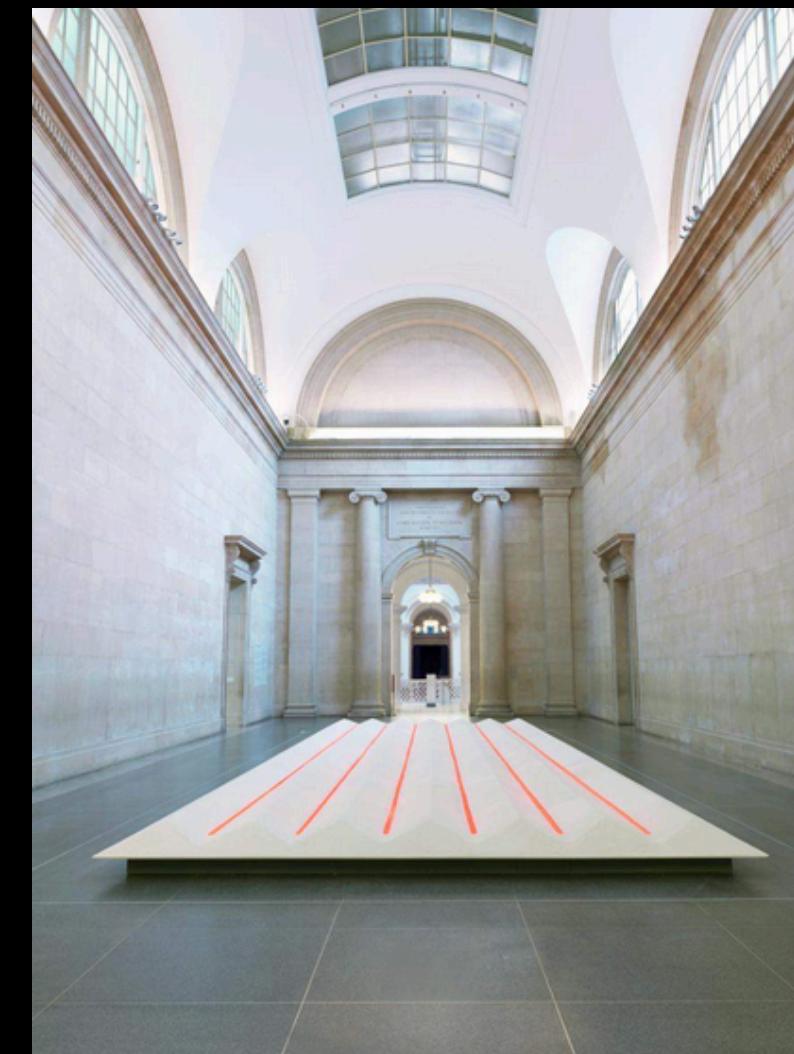


Museum X Machine X Me
Tate 2024

Transforming Collections – in algorithms

Questioning A Model

Text Dataset:	Liverpool Museums, National Museums Scotland, Manchester Art Gallery, British Council, Government Art Collection, Tate	
Question Analyse descriptions of artworks to identify problematic terminology or assumptions about the art or cultures of East and Southeast Asia (ESEA)?	This is a labeling exercise to explore the language used to describe culture and people of a culture in datasets. Interrogating the collection in this way helps assess how structural, systemic, and cultural biases can affect how people perceive and objectify other cultures, peoples, and by association, their artworks.	What does this do? <ul style="list-style-type: none">■ This exercise surfaces and challenges one's own structural and cultural biases.■ It also exhibits how language used to describe people and cultures changes over time, while assumptions may not. What can you do? <ul style="list-style-type: none">■ Label some more items in the dataset.■ Highlight relevant text.■ Explain any rational for labeling to help train the model.■ Add more test examples.■ Add more training examples.
Level of difficulty	Present	Absent



Museum X Machine X Me
Tate 2024

Transforming Collections – in [new] practice

Key Principles of this Approach

- Build relevant datasets to interrogate museum collections.
- Maintain human-in-the-loop interaction to instill empathy, ethics, and responsibility.
- Shape technology to meet the needs of [Arts Historical and Museological] practices.

Transforming Collections – in archives

From Static to Dynamic

Typically, archives present static representations of museum collections that record information about objects that compose them.

Our approach makes derivatives of archives, the datasets, archives as well. Rather than a direct representation of museum collections and objects, here, archives represent documentations of critical thought processes that explore properties of objects and ideas. This process creates dynamic time- and context-oriented archival records whose point of view is managed by an individual or collaborative group.

Transforming Collections – in archives

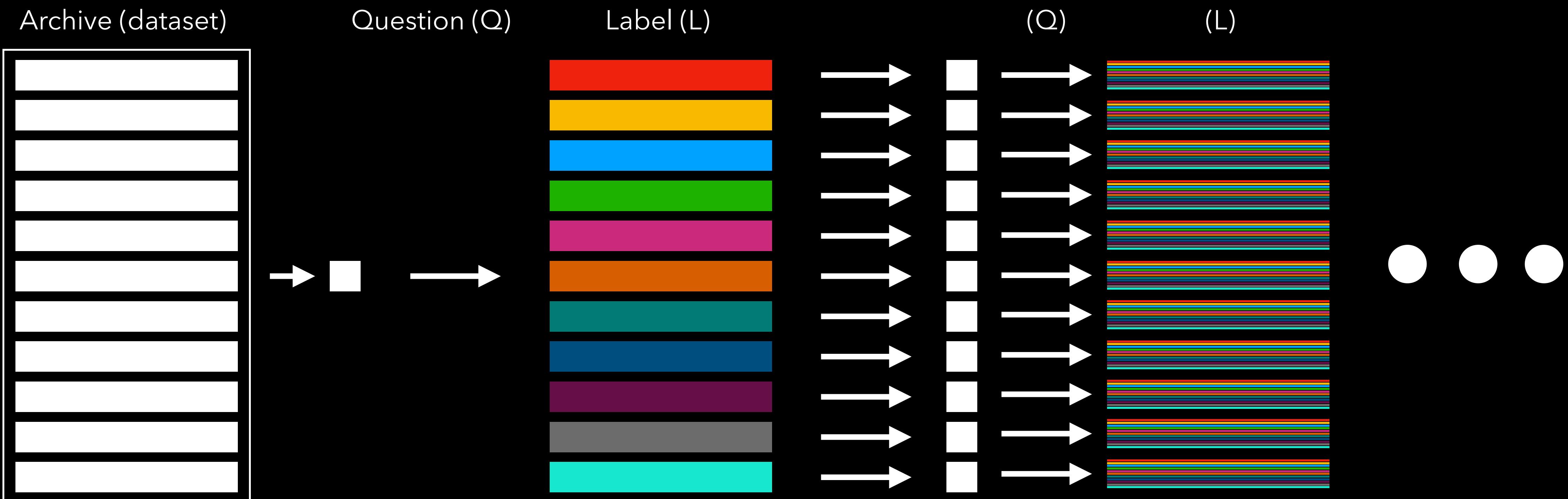
From Static to Dynamic

Starting with a purpose, question, or task, the archive, a dataset, is initially composed from textual and/or pictorial material extracted from other resources, for example, information about museum acquisitions, an artist's works from a particular period of time, or object descriptions from a catalog.

The next step is to formulate a question to query the dataset and ascertain the binary or scale of presence or absence of a particular property.

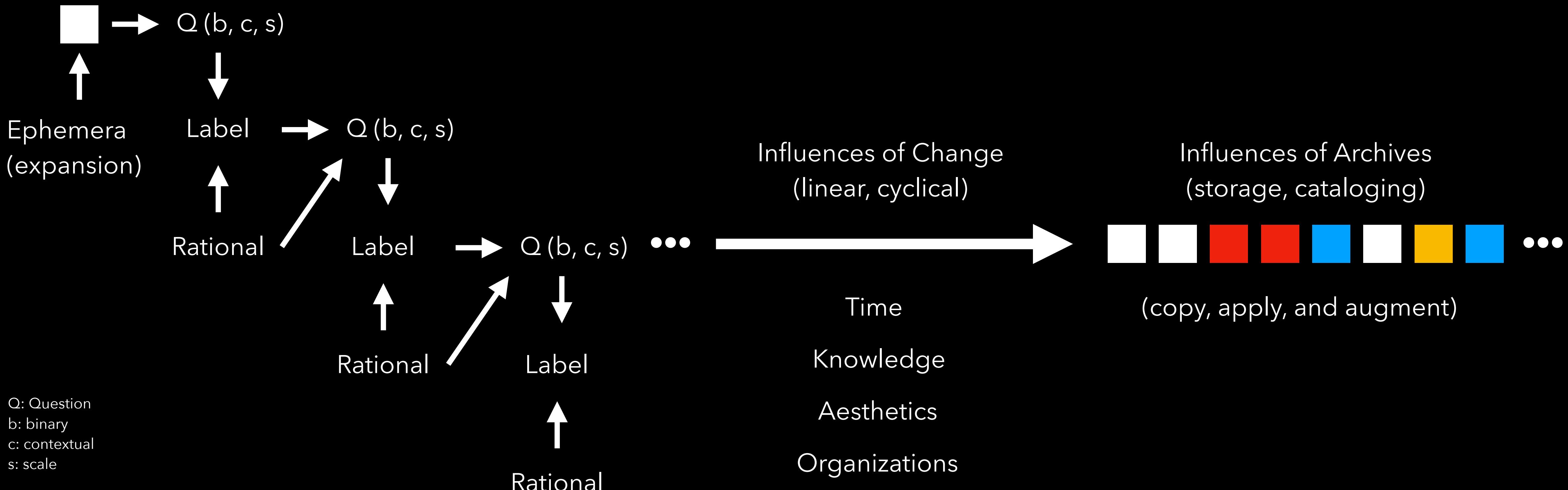
Transforming Collections – in theory

From Static to Dynamic



Transforming Collections – in theory

From Static to Dynamic



Transforming Collections – in theory

From Static to Dynamic

In this way, the archive is transformed into a working network of information. The information creates a system generated from internal links that represents patterns signifying its similarities and incongruences. External links that expand the archive, and represent relationships contributed by human effort and thought can be:

- ephemera that links to supporting and inspirational stimuli
- notes and recorded rational for decision-making within the process of analysis

Transforming Collections – in theory

From Static to Dynamic

These networks of dynamic archival data require new support infrastructures:

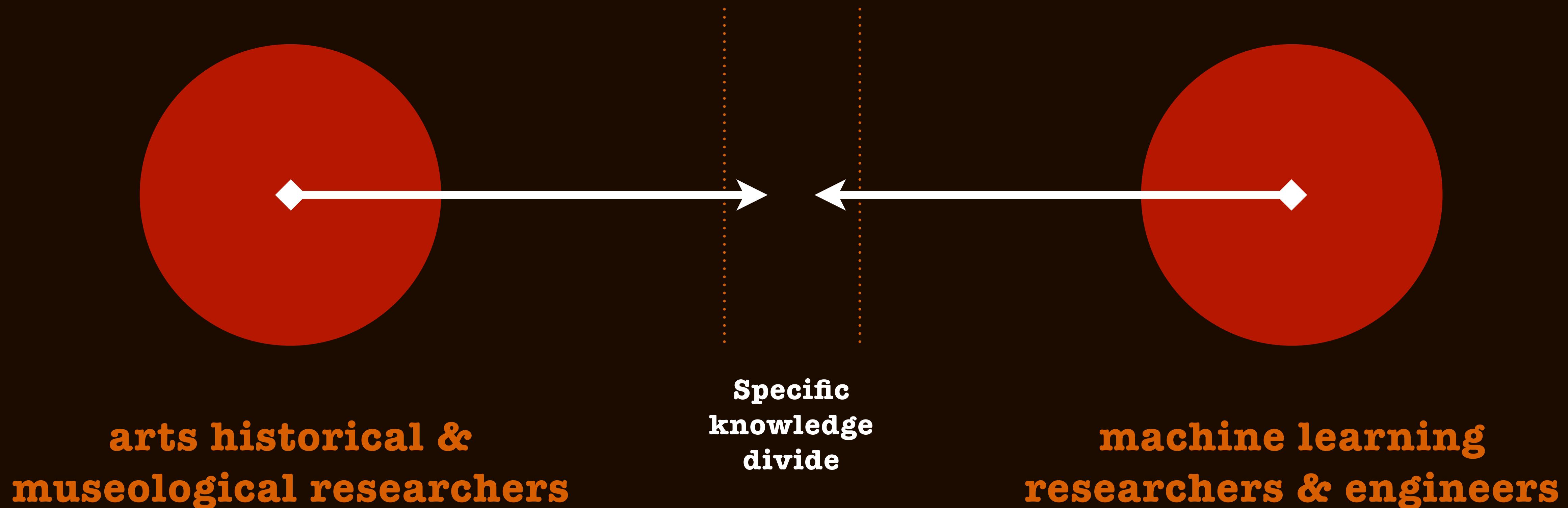
- What parameters are necessary for assigning metadata that defines different types of information by concept, context, object, and subject?
- What type of search capabilities are required to sift and explore the systems of information we construct?
- What types of organization can we use to make sense of the systems of information we construct?

Transforming Collections – and Archives, Too

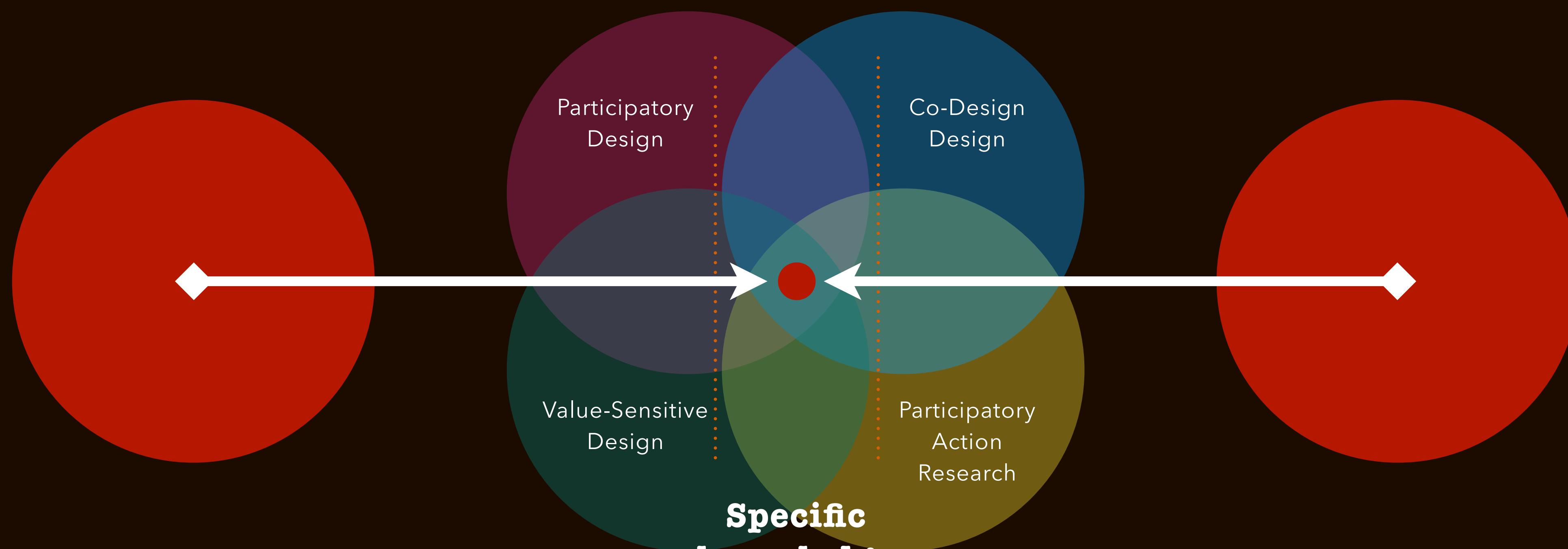
Panel Question 1

Could you share more details about this interdisciplinary collaboration, for example what challenges have you faced when communicating with researchers from art historical and museological backgrounds?

Knowledge Sharing :



Knowledge Sharing :



arts historical &
museological researchers

machine learning
researchers & engineers

Transforming Collections – and Archives, Too

Panel Question 2

Is there any potential risk that AI reinforces the systemic biases in the museum collection, especially considering the project engages Tate's collection which has been critiqued as a centralised and hierarchical institution?

Bias - Understanding embedded biases in material, and explicit and implicit biases within oneself, better equips interrogators to challenge it. During the project's residency, one artist explained how the process of interrogation helped surface their own bias in the material, which helped them see it in a nuanced way.

Transforming Collections – and Archives, Too

Panel Question 2

Time - Analyzing information, using AI in the way we have implemented it, takes time. The feedback we've received proves that performing AI-mediated analysis in this way is helpful and valuable for research, while in industry it has been considered too time consuming.

However, without investing in time, challenging systemic and structural bias is impossible. We hope these tools can help institutions see value in the time it takes to overcome these issues in their collections.

Transforming Collections – and Archives, Too

Thank You.

Mick Grierson : m.grierson@arts.ac.uk

prototype: <https://collectionstransforming.com/>

Transforming Collections – and Archives, Too

Thank You.



Arts and
Humanities
Research Council

