Metadata Remediation through Human-AI Collaboration

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Langmuir African American photograph collection

Acquired in 2012, the Robert Langmuir African American photograph collection is an artificial collection collected by dealer Robert Langmuir containing over 12,000 photographs depicting African American life and culture from the late 1880s to the 1970s.

Finding aid:

Why AI?

- **Cost:** It takes about 10 minutes on average to research and describe a still image. For a collection the size of Langmuir, that's about a year of time from one full time person to remediate the collection resulting in a cost of $10 per image on average.

- **Bulk of images were unidentifed:** Because the collection was artificially assembled, most images have no provenance or information other than that contained in the image.

- **Keyword searches were insufficient:** Issues in the collection included incorrect information, missing contextual information, and bias created by a mismatch between the image and the description (not biased language), which keyword searches would have trouble surfacing.

Research questions

1. Can LLMs effectively identify bias in existing metadata while providing appropriate alternatives?

2. How useful is AI-generated metadata to end users?

3. What might a human-AI collaborative metadata workflow look like?

Methodology

1. Experiment with widely-available chat bots to test chain-of-thought prompting and discover whether AI could recognize biased content, particularly with constitutional AI models such as Claude.

2. User testing on sample AI-generated metadata records with both end users and library staff.

3. Develop a proof-of-concept workflow tool that flags bias and facilitates human-AI collaborative metadata creation

Collaborating with Anthropic's Claude
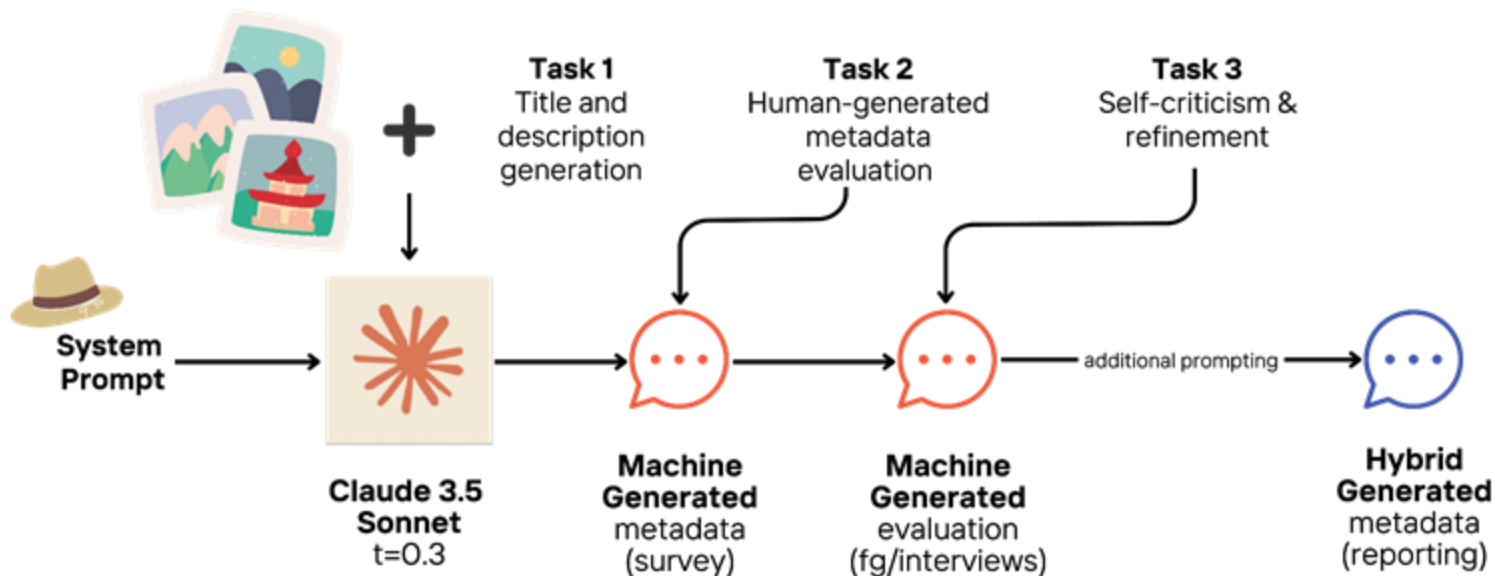
Three descriptive metadata outputs

Original (Human-generated):
Title: A Satin-Glo girl, Blanch Thompson, manager of the brown skin models
Description: A Satin-Glo Girl, Woodward Studio Chgo., Blanch Thompson, manager of the brown skin models

AI-generated (Prompt 1 output)
Title: Promotional Portrait of Blach Thompson, Theatrical Performer and Manager.
Description: Sepia-toned photograph of a woman in theatrical costume, posing on a draped surface. She wears an ornate headdress, beaded top, and a fringed skirt. Text at the top reads "A SATIN GLO-GIRL" and at the bottom "BLANCH THOMPSON MANAGER OF THE BROWN SKIN MODELS"

Hybrid (chain-of-thought prompting):
Title: Promotional Portrait of Blanch Thompson, Theatrical Performer and Manager
Description: Sepia-toned studio photograph from the early 20th century featuring Blanch Thompson, a theatrical performer and manager. The subject poses in an ornate costume including a headdress, beaded top, and fringed skirt. The image is captioned "A SATIN-GLO GIRL" and identifies Thompson as the manager of a performance troupe called the "Brown Skin Models."

User Studies

Participants: students and staff (a) recruited at the entrance of the Woodruff Library, including potential users and actual users of the digital collections (b). 81% (96/118) expressed a clear and statistically supported preference for MG and HYG titles and descriptions over the legacy HG content.

## Sample 1 descriptions ranking
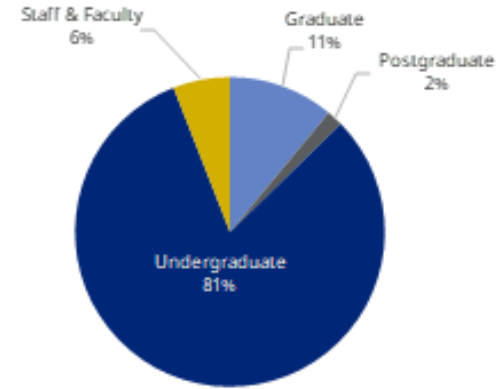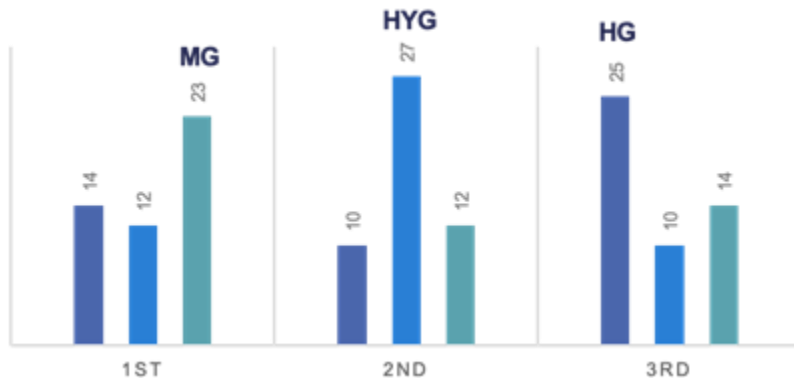
Sample Undergraduate response: "I thought the [HG] one didn't say much about the picture; it seemed like information I could have gathered myself. The [MG] was just better at giving the context.

Sample faculty response: "Both the [HG] and [MG] options fell short in terms of objective information of the image."

Proof-of-Concept: AI-Generated Metadata

	Metadata Item	Output from AI Model
0	description	Color photograph showing a young Haitian woman wearing a red polka-dotted headscarf and white clothing, holding an infant while smoking a pipe. The image was taken in a rural setting with a red building visible in the background. The photograph captures aspects of daily life and motherhood in mid-20th century Haiti.
1	transcription	{'printed_text': ['Haitian mother with offspring (Furcy) - Haiti.', 'Color photo from Ansco Color transparency', 'Distributed by W. E. Lemke, Port-au-Prince, Haiti.', 'POST CARD', 'PLACE STAMP HERE', '72582', 'Genuine Natural Color Made by Dexter Press, Inc., West Nyack, N.Y.'], 'handwriting': []}
2	date	circa 1950s-1960s
3	location	Furcy, Haiti
4	publication_info	[Distributed by W. E. Lemke, Port-au-Prince, Haiti, Produced by Dexter Press, Inc., West Nyack, N.Y., Ansco Color transparency]
5	contextual_info	[Commercial postcard depicting daily life in Haiti, Part of mid-20th century documentation of Haitian culture, Uses Ansco Color technology, which was prominent in 1950s-60s]
6	format	LibraryFormat.still_image
7	genre	[Color photographs, Postcards, Documentary photographs, Commercial photographs]
8	objects	[headscarf, pipe, white clothing, red building]
9	actions	[smoking, holding child]
10	people	[Woman, Infant, Haitian, Mother]
11	topics	[motherhood, family, traditional dress, rural life, Haitian culture]
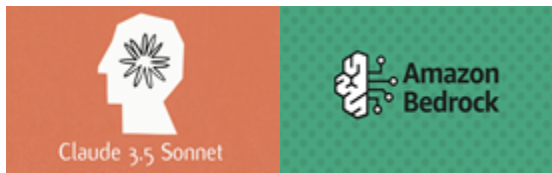
Criterion	DLF Metadata Quality standard	Meets criteria
Completeness	Are the required metadata elements, properties, and/or attributes present? To what extent does the metadata represent the people within the communities the item is of/from? Who is represented, who is missing, what are the areas of gaps?	81%
Accuracy	Are metadata values semantically correct? Is the correct terminology, spelling, diacritical markers, and punctuation used for names and labels?	68%
Conformance to expectations	Do the metadata values adhere to the expectations of your defined user community (internal and external)? Are the terms preferred by the communities represented used in the descriptive metadata?	79%
Consistency	Are semantic and structural values and elements represented in a consistent manner across records?	94%
Timeliness	Language changes over time and terms that were once preferred or commonly used can become harmful. Are the terms up to date? Are the most current subject headings used?	92%
Accessibility	Is metadata description written in plain language? Is metadata provided in the appropriate language(s)? Are metadata elements that provide information about accessibility features or hazards present?	98%

Metadata were evaluated based on a rubric from the DLF Metadata Assessment Working Group: https://osf.io/yf96h

Project findings

The overall cost to produce AI-generated metadata for historical images was surprisingly low.
- Cost to generate metadata for a 2-sided image in AWS Bedrock was $0.05

Validation metrics from the proof of concept reinforce a continued need for human oversight and refinement of AI outputs.
- Strengths include assignment of dates, identification of appropriate topical and contextual subject terms, exhibiting bias consciousness, and use of up-to-date, accessible language
- Accuracy issues: 68% accuracy rate, primarily transcription errors
- Overinterpretation risk: AI tended to infer personal relationships not clearly visible
- Completeness gaps: 81% completeness, sometimes missed handwritten text and cultural nuances
- Identification of existing bias was uneven: accurate for highly biased images with decreased accuracy as the risk level decreased (Claude tends to over-emphasize the presence of bias)

AI-generated metadata often supplied richer detail than human-generated metadata.
- AI-generated metadata contained deeper contextual information valued by users, especially undergraduates
- Hallucinations were rarely encountered

A Human-AI collaborative interface

Current capabilities:
- AI-generated descriptive metadata for historical images
- Transcription of text (recto + verso)
- Batch processing, including grouping of multipart objects
- Recognition of legacy metadata and archivist-provided contextual information
- Rationale supplied by AI for each element for human validation
- Assessment of bias and risk level
- Editing capabilities to correct metadata
- CSV extract

Additional information

Project whitepaper:
https://emorylib.atlassian.net/wiki/spaces/EULMTDS/overview (see blog)

Project code repository (+UI):
https://github.com/emory-libraries/ai-description [released under an open source (Apache 2.0) license]

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