CRTR

A Social Curation Tool for Museums

Final Project Design Document
CMS.633 Digital Humanities
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Team members

Peter DOWNS

Peter Downs is a third year undergraduate studying computer science. His first foray into programming was with Bookshrink – he's been interested in building tools that further our understanding of text ever since. Before coming to MIT he spent time in San Francisco working as a software engineer, and maintains a healthy interest in artistic creation through digital media and photography.

Chaoran WU

Chaoran Wu is a first-year graduate student in architecture in urban design program in Harvard GSD. She received a Bachelor of architecture degree in South China University of Technology, SCUT. Besides, she has spent one and a half year majoring software engineering in SCUT from 2010 to 2012. Now she is also interested in data visualization and user experience design.

Pojiang NIE

Pojiang Nie is a first-year graduate student in Harvard GSD majoring in Architecture in Urban Design. He received his B.Arch. from Huaqiao University in China and worked for a Japanese design firm as an intern. With a great passion for user-centered design, he developed skills related to user research, prototype, design iteration, representation. Here is the portfolio of his undergraduate works.

Xinwen LIU

Xinwen Liu is a first year urban design student in Harvard GSD. She is a UX designer, interaction designer and urban designer. Various background in Architecture, Urban design and Industrial design granted her relentless curiosity and fast design iteration skill. She has conducted several projects ranging from App UX design to data visualization, which you would be able to see on her website.

Concept Overview

Museums have a problem: it's hard to get young people interested and engaged with their archives. Museums require community participation to fulfill their purpose as

educative institutions, as well as on the more practical level of raising funds. But due to physical space constraints, only so many exhibitions can be shown at once, while most of the museum's collection goes unshown and unknown to the public. We propose CRTR, a social curation tool, that allows any member of the public to view, learn from, and curate their own *collections* from all of a museum's digitized archives.

By enabling self-expression (by allowing users to share their collections with the public as online *galleries*) and intellectual exploration (by providing information about the artworks, allowing users to explain the reasoning behind their collections, and recommending similar artworks to those users have viewed or added to their collections), CRTR will encourage greater participation with the artworks in a museum's digital archive.

Doing so increases audience participation with and knowledge of a museum's artworks, fulfilling a modern museum's goals of improving the visibility of their collections, engaging with and educating the community, increasing their audience, and generating funds [Samir Bhowmik]. In addition, CRTR allows museums to better understand their audience's interests, and better target future programming based on this knowledge, further increasing public interest and engagement, and by extension, make it easier to raise funds.

CRTR is a curation tool with a strong focus on just that: curating. Existing tools like Omeka are nearly impossible for the general public to use, and lack the powerful searching, filtering, and tagging tools required for users to learn from, explore, and curate their own collections from a museum's digital archive. CRTR will focus on solving these problems by using modern machine learning techniques to augment existing artwork metadata with additional tags and representations (such as primary colors, or subject matter), and using this data to recommend new artworks to users based on their browsing behavior. Key to this process is a beautiful UI designed from the ground-up to be used by the public, not museum curators, to accomplish these tasks.

While a user browses the digital archive, they can add artworks into their own collections. These collections are shown to other users, allowing for collaboration and peer-education. These collections can then also be presented to the general public in the form of galleries, which can be shared and commented upon both on-site and in other social media. This makes CRTR a powerful tool for self-expression, which is essential to continued community engagement.

In summary, CRTR is a social curation tool with two audiences: museums, and their publics. It allows museums to accomplish their institutional goals better and more

effectively than before, in an augmentative fashion that does not detract or compete with the physical experiences that they currently provide. At the same time, it is a tool that the public can use to learn more about the artworks in the archives of their museums, explore new artwork related to their interests, and self-express this knowledge to their peers. By focusing on these goals and audiences, CRTR meets a need that is currently unfulfilled.

Background Research

The question we set out to answer at the beginning of this project was: *how can we leverage the web to better engage the community with a museum's archives?* Below, we describe three different case studies, and how they have influenced CRTR's design.

Case Study 1: Digitization Strategy -- Crowdsourcing the Museum

Samir Bhowmik, a professor of Digital Strategies, has written extensively about different methods for museums to embrace new digital media, as well as incentives for them to do so. In *Crowdsourcing the Museum! A Digitization Strategy for Small Museums in Finland*, he makes several recommendations that we believe transcend the expressed audience and generalize to all museums interested in using digital collections to further their goals.

In particular, CRTR focuses more on the possibilities that are allowed for by existing digital archives, rather than the process of creating new digital archives. Below are the points from these slides that we feel most influenced our design:

Make Yourself Open

- Build a responsive Online Interface
- Strategize Online Digital Engagement on multiple levels
- Allow Public Access to digital artifacts
- Use Open source Operating Platform & Softwares

Learn and Innovate

- Learn from the Community and be their Forum
- Allow Community to Curate the Museum's digitized collections
- Synchronize Online Presence and Digitized Thematic Collections with the Museum's physical space

As described in the **Concept Overview**, we believe that CRTR is built on and helps a museum to achieve all of these recommendations.

Case Study 2: Tate Digital Strategy Research

In 2013, Tate, Britain's national art institution, published a research paper describing their digital strategy for the future. We found that much of what was recommended within agreed with Bhowmik's research, and provided emphasis on the impact of such digital strategies on members of the public. In particular, we again presume the existence of a digital collection, and focus on the principles underlying such a strategy:

> ### Tate's audiences will have digital experiences that:
>
> - increase their enjoyment and understanding of art
> - provoke their thoughts and invite them to participate
> - promote the gallery programme
> - provide them with easy access to information
> - entice them to explore deeper content
>
> ### To achieve this, [Tate] will take an approach that is:
>
> - audience-centred and insight-driven
> - constantly evaluated and enhanced
> - well designed and architected
> - distributed across multiple platforms
> - open and sharable
> - sustainable and scalable
> - centrally governed and devolved across the organisation

The major lessons we were able to add to those we took from Bhowmik's work were that whatever system we built must be "open and sharable", "audience-centred and insight-driven", and "entice [the audience] to explore deeper content." Since 2013, Tate has overhauled their website in according to these goals, and arrived at similar concepts as we have: users can save browse artwork by museum-defined collections, find similar artwork, save artworks to "albums" (our *collections*), and publish them as "showcases" (our *galleries*.) We believe that this strengthens the case for CRTR, as it would enable other museums to create similar experiences for their public audiences.

Case Study 3: The Barnes Foundation

The Barnes Foundation, located in Philadelphia, has since its inception focused on making art more accessible to the public. Andrew Barnes, the founder, focused on creating rooms with works related to each other not by artist, style, or genre, but instead by use of similar light, colors, subjects, or other artistic principles. In accordance with this, the description of their

efforts to bring this vision into the digital world were the source of our goal to incorporate machine learning-based techniques to recommend artworks to users.

A room in the original Barnes Museum, curated by non-traditional methods

In addition to making traditional recommendations by artist, year, and genre, we take advantage of computational photography techniques to recommend artworks by similar visual features such as (but not limited to) color palette, image subject, and brightness. The methods by which we do so are described in the **Enabling Technologies** section.

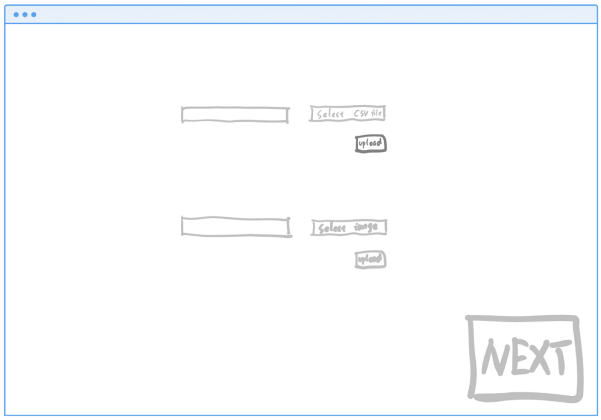
Project Development

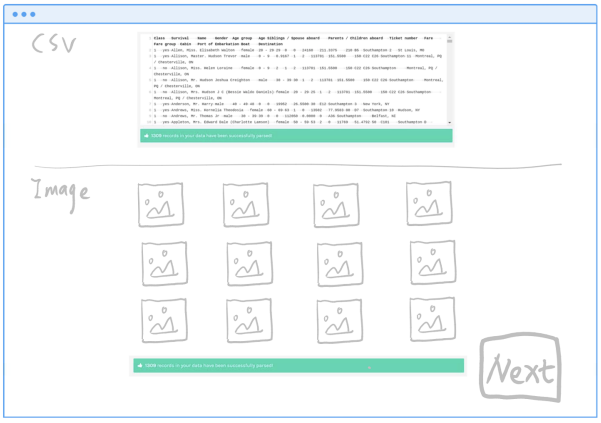
Our team has great strengths both in design and in software engineering, but more designers than engineers. Therefore, much of the design work happened before the implementation. Unfortunately, this prevented us from iterating on the implementation to the extent that we iterated on the design. As we describe in the **Future Directions** section, there is still much that can be done in terms of implementing the designs described in this section.

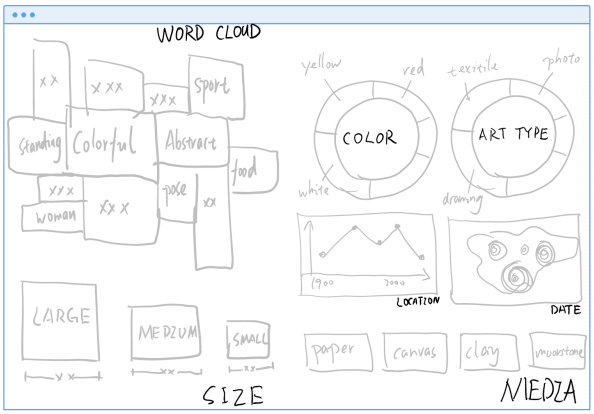
Also due to time constraints, we were unable to perform user studies, a key part of any software development process. Despite this, we believe that CRTR is at least well-positioned to meet our audience's needs, largely based on the case studies described in the **Background Research** section.

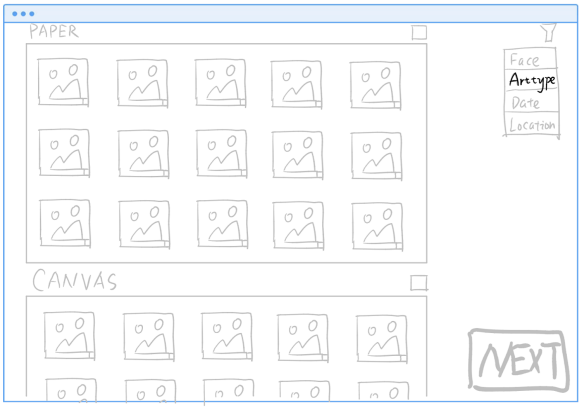
Design Iteration 1

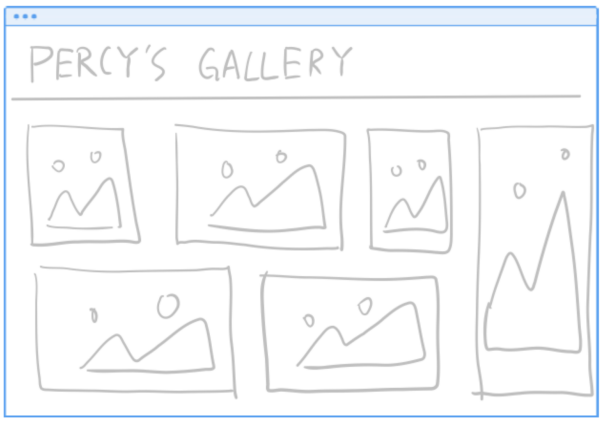
Because we had not yet completed all of our **Background Research**, the first iteration of CRTR focused on improving curation capabilities of museum professionals, rather than members of the public.





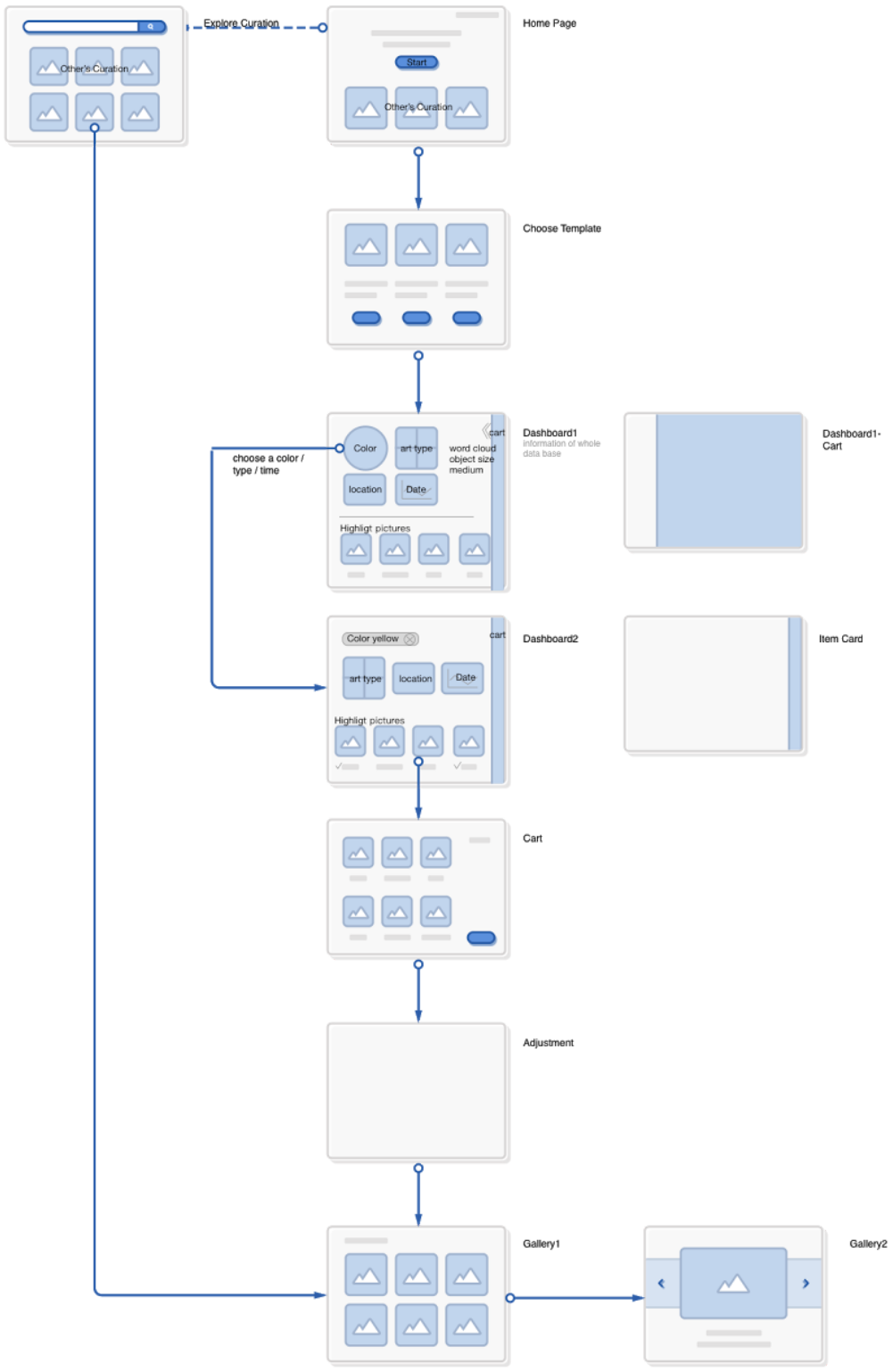






Design Iteration 2

At this point, we had completed our research and settled on the functionality described in our **Concept Overview**: browsing artworks; finding related artworks by visual similarity; creating *collections* of artworks; and publishing collections as *galleries*. The *dashboard* in this design visualizes the metadata of the artwork in a collection to make it easier for users to understand their own interests. Additionally, it was envisioned as a filtering and search interface, allowing users to perturb their interests and find related artwork. As we describe in the **Future Directions** section, this feature has not yet been implemented.


Explore Curation
Other's Curation
Home Page
Start
Other's Curation
Choose Template
Color
art type
word cloud
object size
medium
location
Date
Highligt pictures
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choose a color /
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Dashboard2
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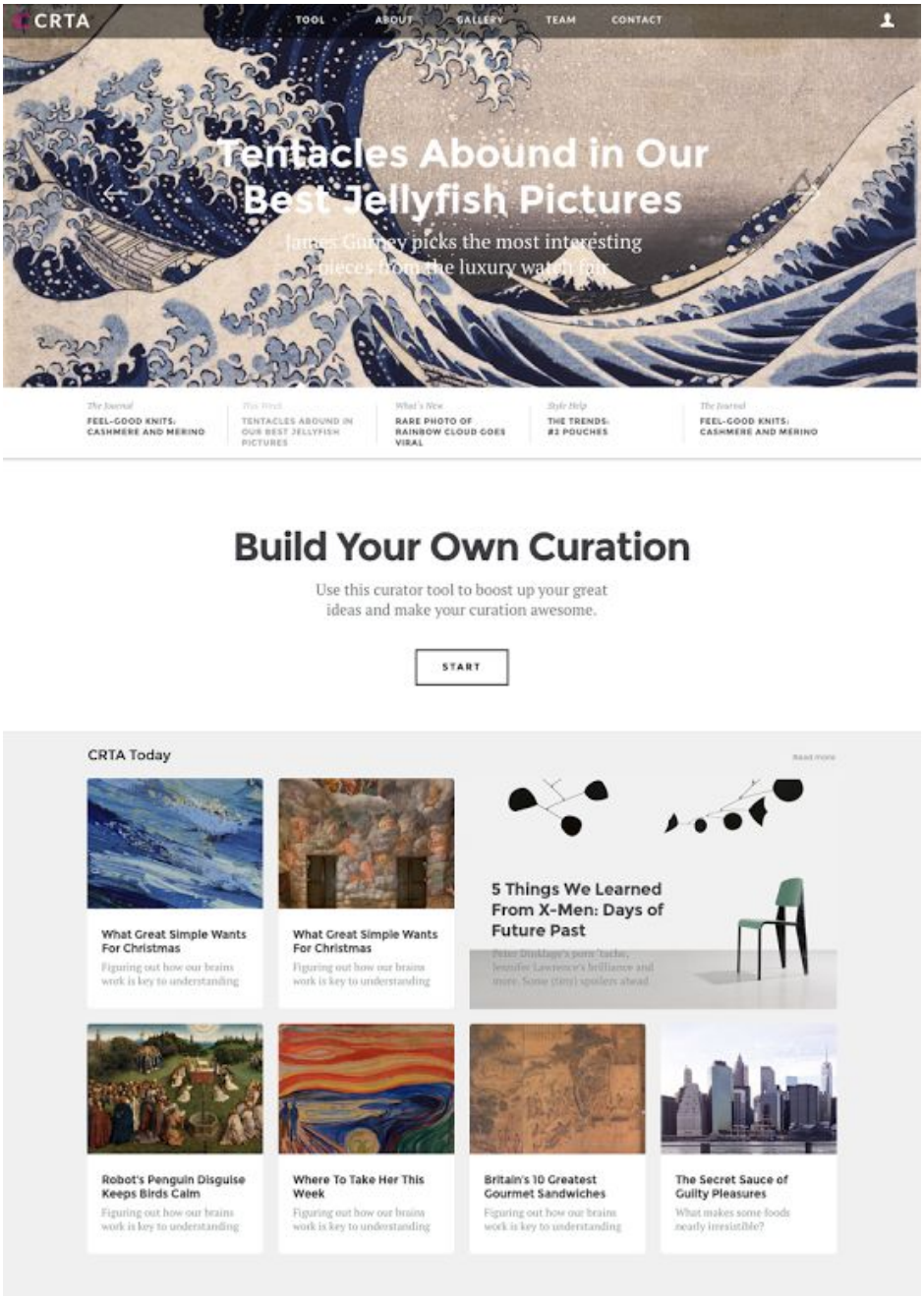
Gallery1
Gallery2

Design Iteration 3

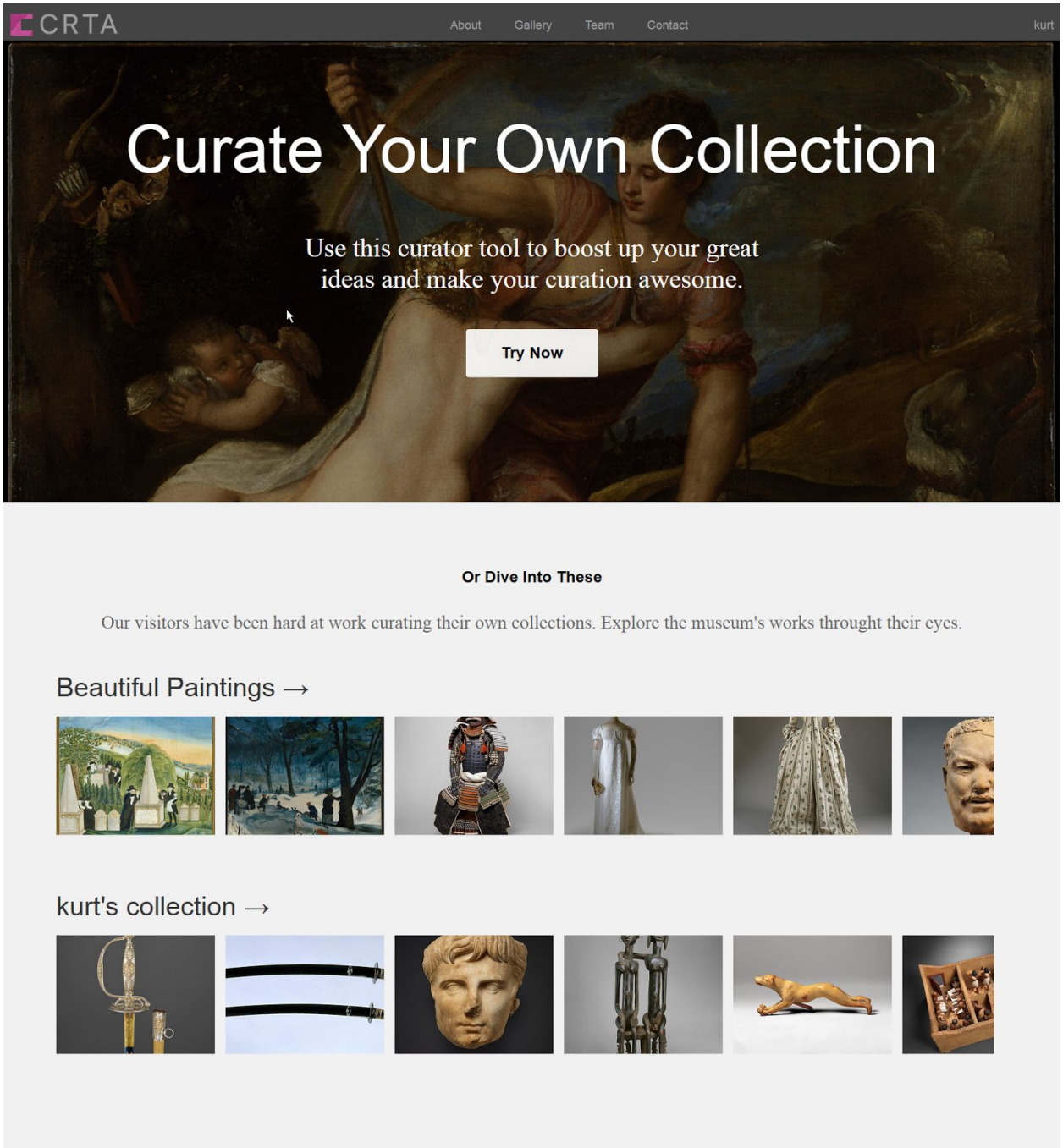
Our third design iteration was focused on the user interface and the visual branding of the project. Here we show the design of the landing page of the website; a supplemental PDF contains the full designs of the site, which are too large to include in this document.



The CRTR landing page

Minimum Viable Implementation

At the time of writing, a demo of CRTR is live on [peterdowns.com:8091](). While developing, we used [the Metropolitan Museum of Art's Open Access Collection]() as our example museum, due to the availability of a large number of permissively-licensed imagery and associated metadata.



The CRTR landing page

Features

- **Fast and accurate searching of the archive** based on the descriptions and metadata of the artworks.
- **User account system** that allows multiple users, with industry-standard security.
- **Collections** of artworks created by users.
- **Viewing** of individual artworks and their descriptions and metadata, as well as collections created by yourself and other users on the website.
- **Galleries** linked to each collection, with a beautiful design for public presentation.
- **Recommendations** of artworks based on collections or individual works of art, using state-of-the-art machine learning techniques.

Enabling Technologies

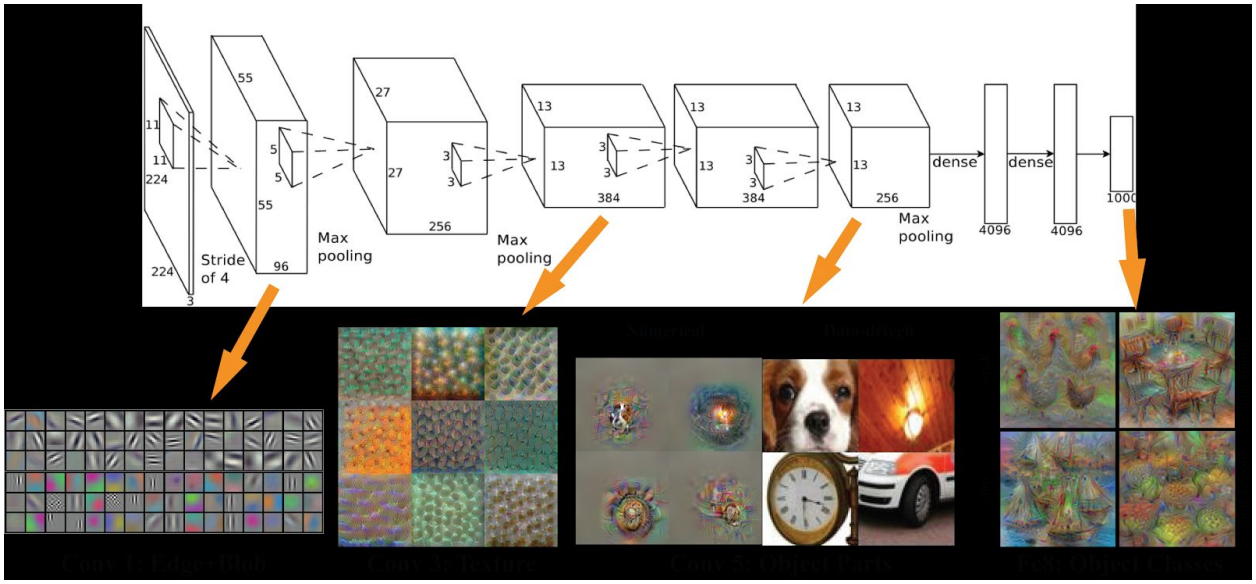
We built CRTR with modern, maintainable, and open-source technologies, in order to best serve the needs of museums as recommended by Bhowmik. You can view the full source code on our Github page.

Backend

- Django as our web server.
- Sqlite as the primary relational database.
- FALCONN for recommending similar images.

Machine Learning

In order to better recommend similar paintings to users as descripted in the **Concept Overview**, **Case Study**, and **Project Development** sections, we used a neural net developed and released by the Visual Geometry Group at the University of Oxford to give images an additional vector representation conducive to similarity-comparisons.



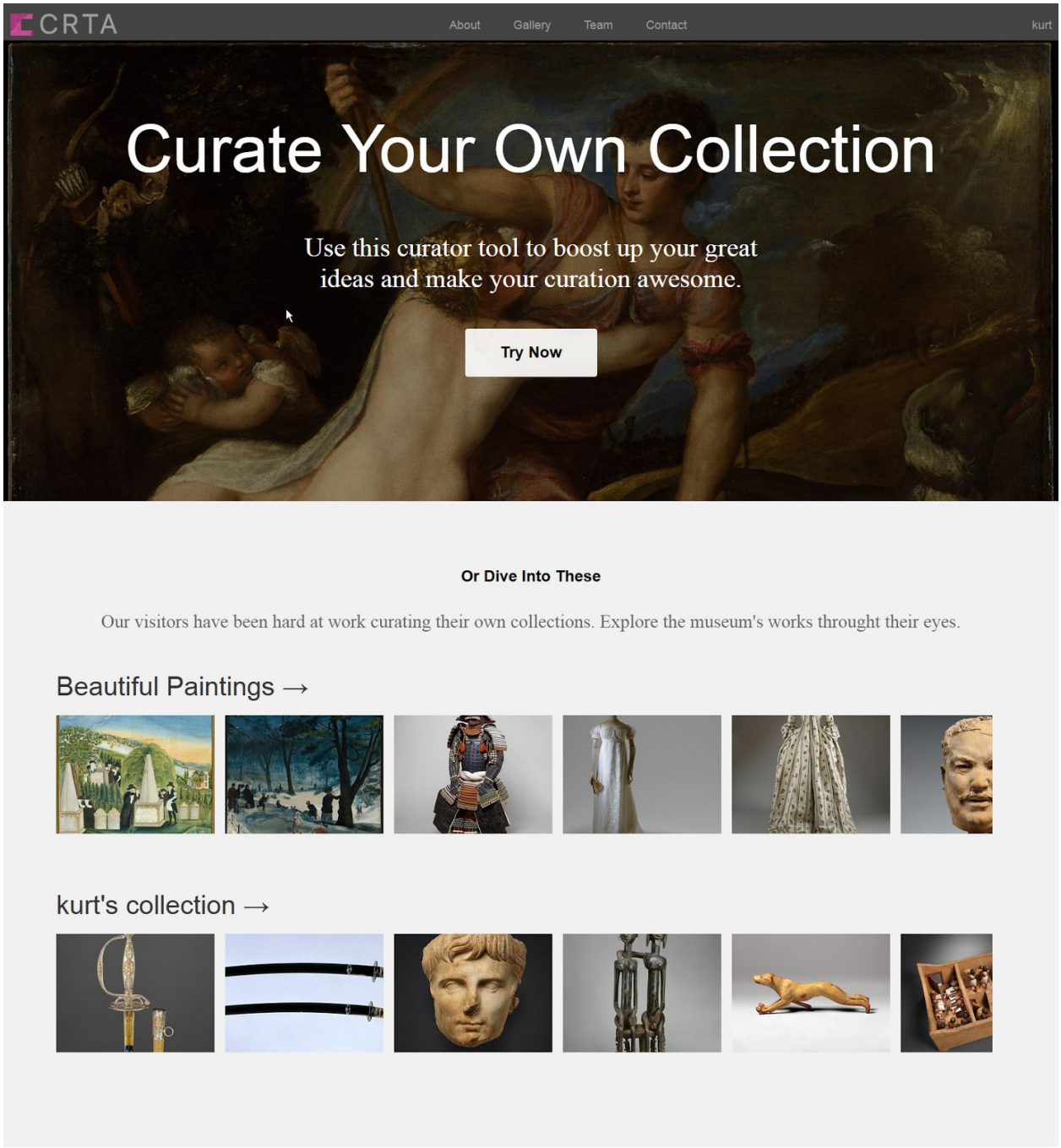
The structure of the VGG neural net, thanks to [Georgia Tech]

Frontend

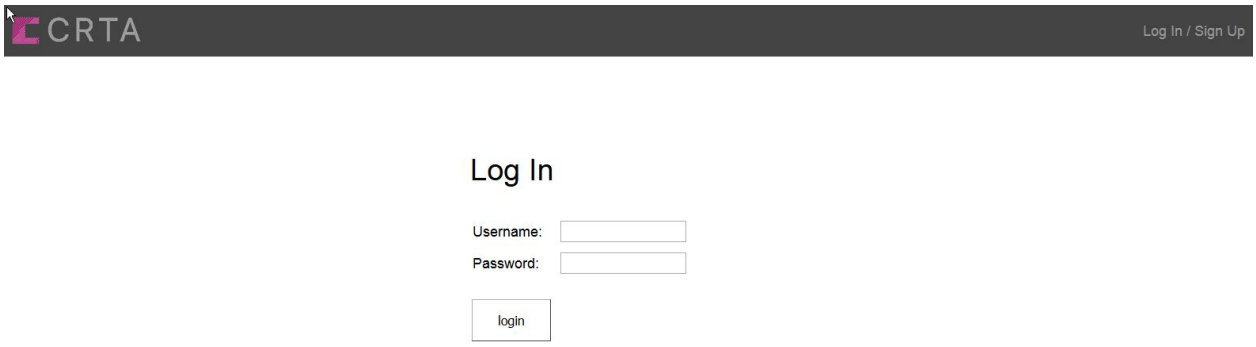
- [React] as a modular, component-based Javascript framework.
- **Custom CSS** for all of the user interface styles.

Journey Map

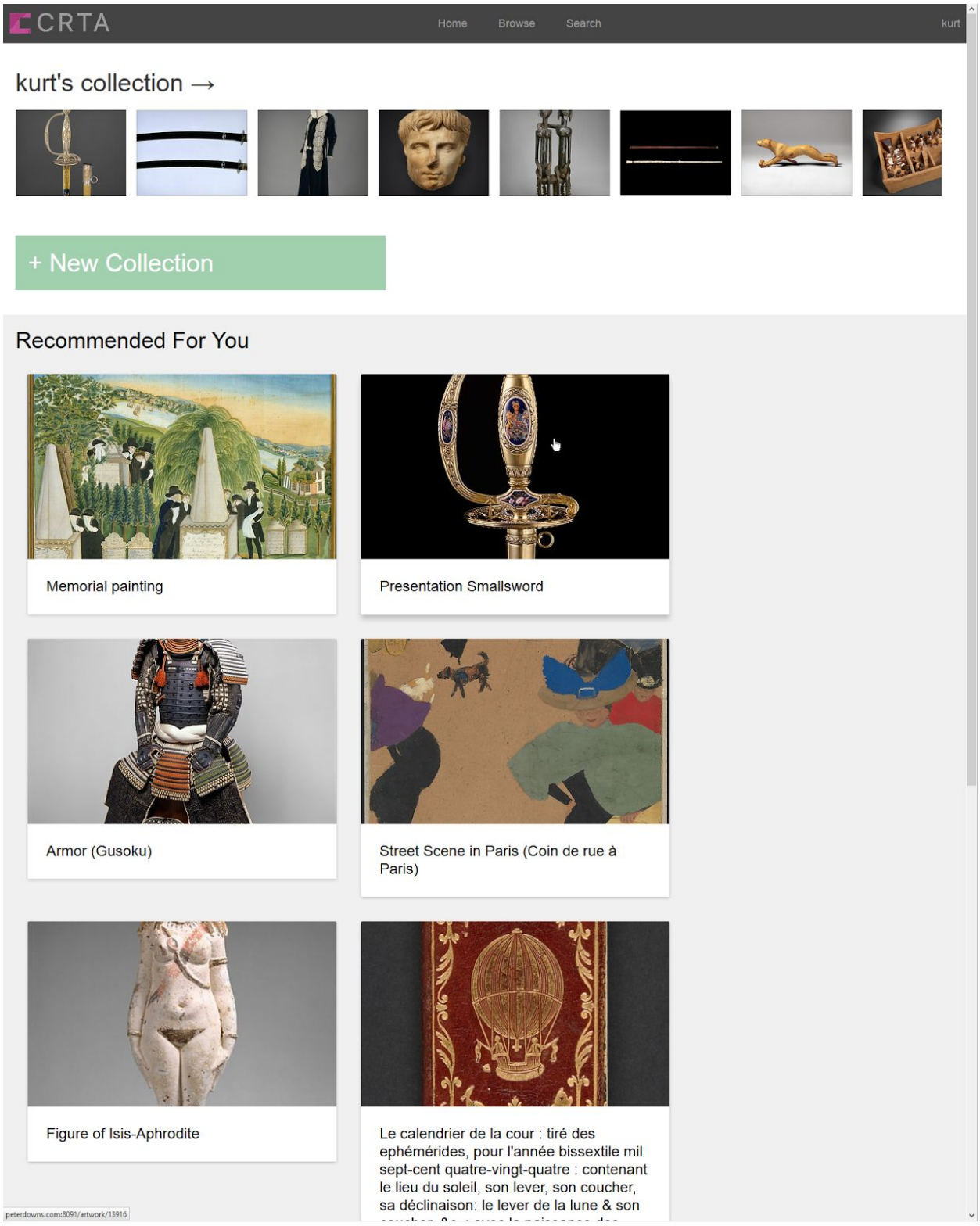
Home Page


CRTA
About
Gallery
Team
Contact
kurt
Curate Your Own Collection
Use this curator tool to boost up your great ideas and make your curation awesome.
Try Now
Or Dive Into These
Our visitors have been hard at work curating their own collections. Explore the museum's works throught their eyes.
Beautiful Paintings →
kurt's collection →

Login Page



Dashboard


CRTA
Home
Browse
Search
kurt
kurt's collection →
+ New Collection
Recommended For You
Memorial painting
Presentation Smallsword
Armor (Gusoku)
Street Scene in Paris (Coin de rue à Paris)
Figure of Isis-Aphrodite
Le calendrier de la cour : tiré des ephémérides, pour l'année bissextile mil sept-cent quatre-vingt-quatre : contenant le lieu du soleil, son lever, son coucher, sa déclinaison: le lever de la lune & son
peterdowns.com:8091/artwork/13916

Artwork Page

CRTA Home Browse Search kurt

+ My Collection

The Litchfield Female Academy (1792–1833), where this picture was made, was one of the few schools that provided both academic and ornamental educations for young American women. Parents sent their girls to Litchfield expecting them to return home knowing English grammar, arithmetic, history, geography, and religion. But any ladies' academy, no matter how progressive, was still expected to provide instruction in needlework, music, and painting. This painted silk mourning picture is one of eight known from the Litchfield Female Academy. All are almost identical in size, composition, images, and coloring. The painted faces in all eight appear to be by one artist, possibly Flora Catlin, an art teacher at the school from 1815 to 1831.

Title	Memorial painting
Classification	Textiles
Department	American Decorative Arts
Culture	American
Medium	Watercolor and ink on silk
Date	January 1st 1811

Related Art

Add to collection

+ My Collection

: Litchfield Female Academy (1792–1833), where this picture
de, was one of the few schools that provided both academic
amental educations for young American women. Parents sent

Recommendations

Related Art

明 吳彬 十六羅漢圖 卷|The Sixteen Luohans

Pair of silver scyphi (cups) with relief decoration

Jaharis Byzantine Lectionary

Courtiers in a Rose Garden: A Lady and Two Gentlemen

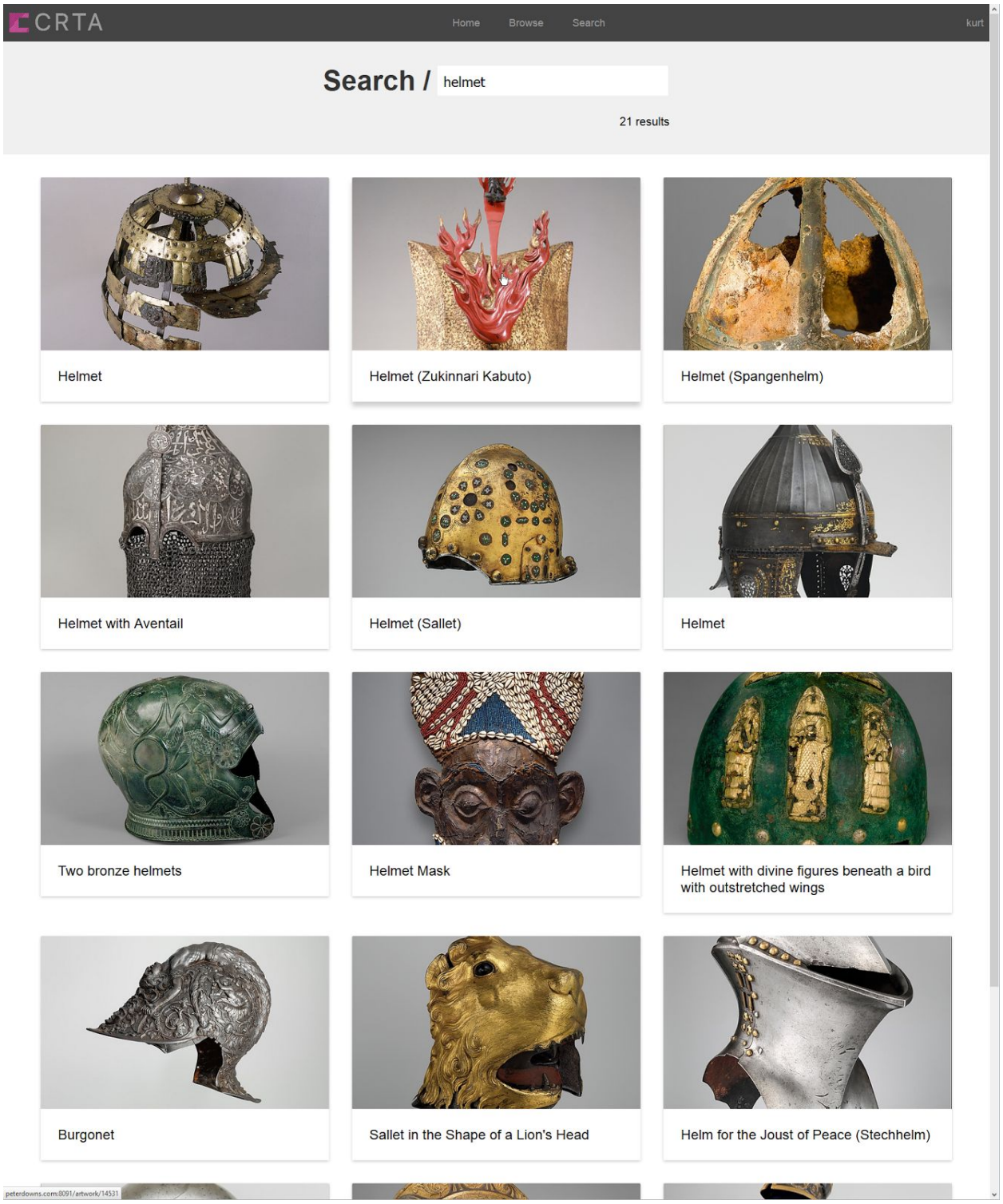
The Virgin of Guadalupe with the Four Apparitions

Appears In

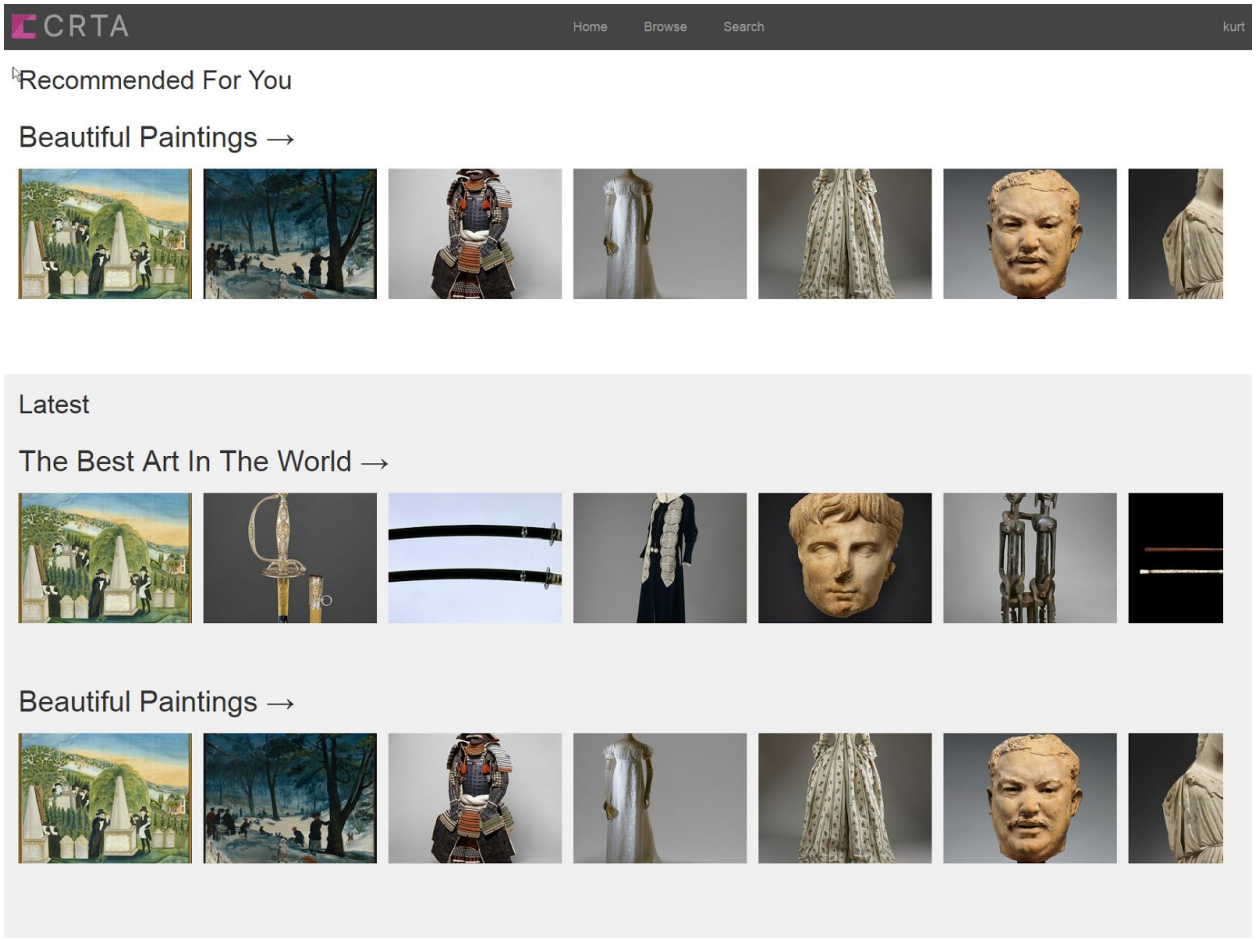
Appears In

Beautiful Paintings →

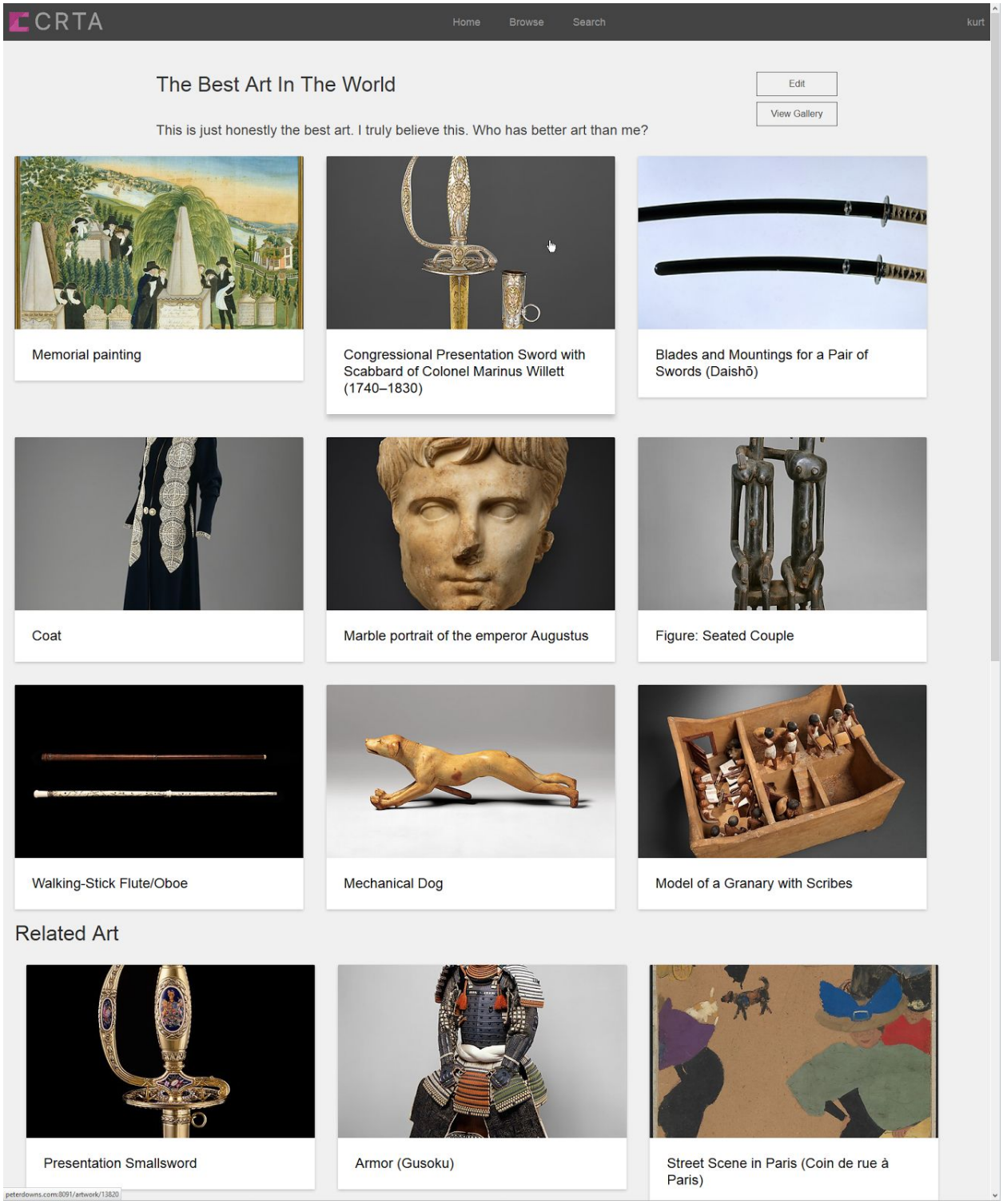
Search


CRTA
Home
Browse
Search
kurt
Search / helmet
21 results
Helmet
Helmet (Zukinnari Kabuto)
Helmet (Spangenhelm)
Helmet with Aventail
Helmet (Sallet)
Helmet
Two bronze helmets
Helmet Mask
Helmet with divine figures beneath a bird with outstretched wings
Burgonet
Sallet in the Shape of a Lion's Head
Helm for the Joust of Peace (Stechhelm)
peterdowns.com:8091/artwork/14531

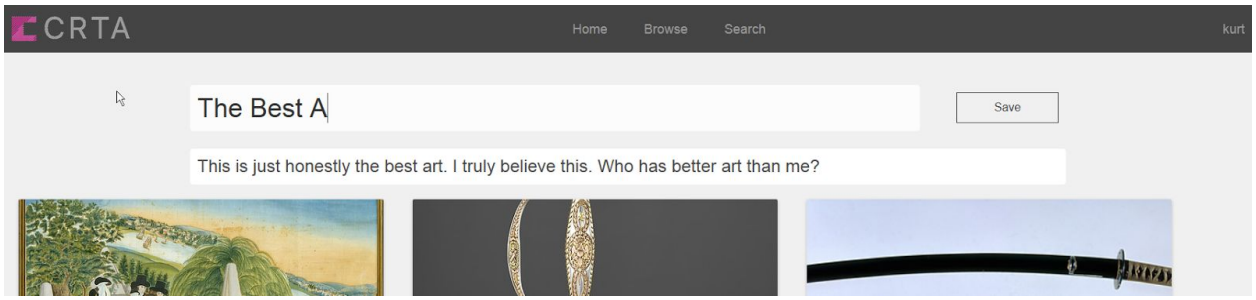
Browse Collections



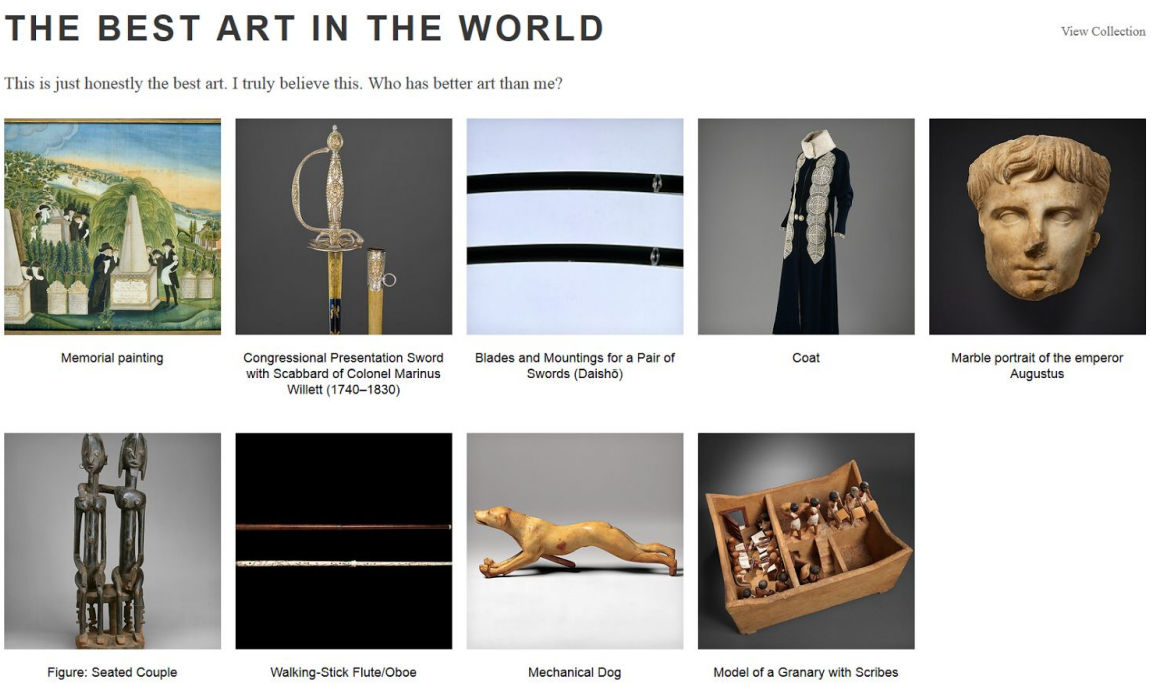
Collection Page



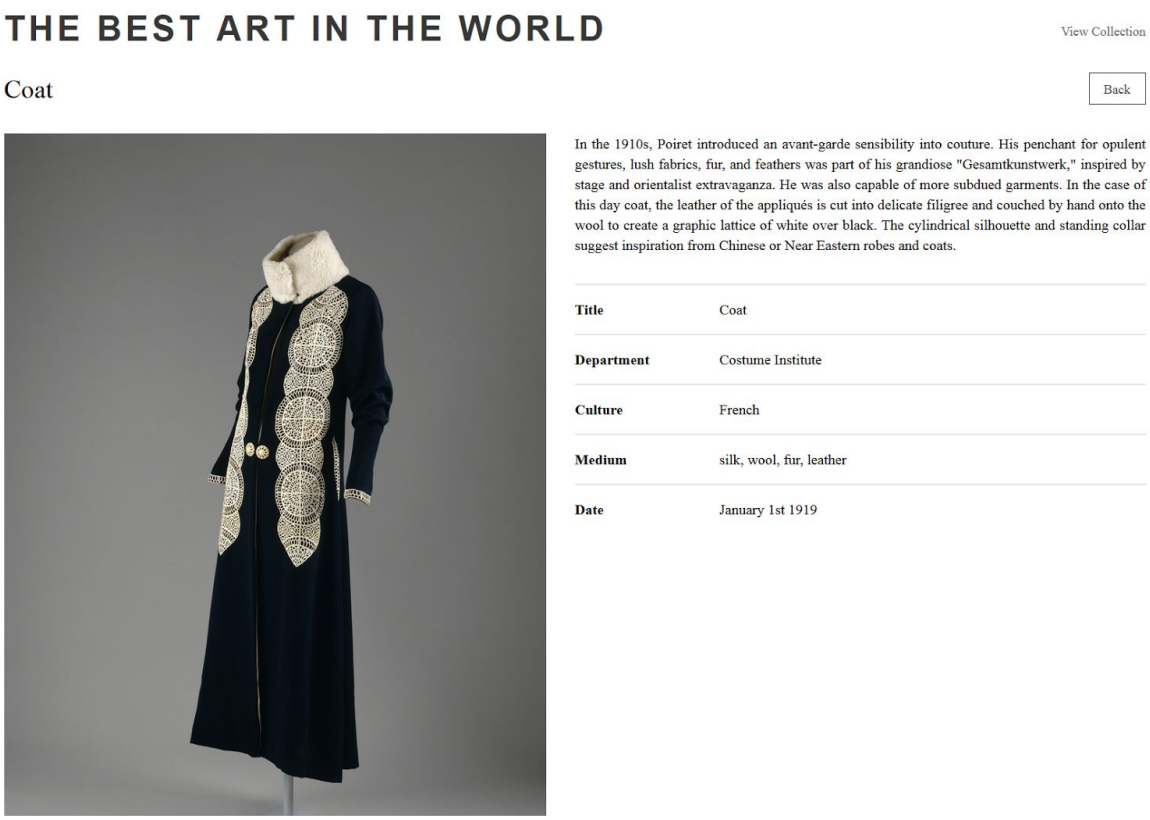
Edit Title and Description



Gallery



Close Up View



Future Directions

As mentioned in the **Project Development** section, at the time of writing we have only developed what we consider to be the **Minimum Viable Implementation**: a version of CRTR that covers the essential features, and demonstrates its core utility, but without fully exploring the designs developed over the course of the project or perfecting the rough edges inherent in any software project. Below, we identify aspects of the implementation and design that could benefit from future improvement.

Design

Although the design of CRTR's interface and features are driven by the goals described in the **Concept Overview** and the **Background Research**, we believe that the most important step in the continued development of the project is to conduct *user studies* with museums and members of the public. The digital archive around which we designed the website has incredibly high quality imagery and metadata; not all museums have such archives, yet CRTR should work for as many museums as possible. In addition, no members of the public have used CRTR to learn about an archive; both the user interface and the feature set should be informed by the needs of these users as exhibited in practice, in addition to theory.

Implementation

The **Minimum Viable Implementation** functions, we believe, to illustrate the potential use of CRTR, yet can be improved in many ways.

Missing Features

- **Artists**: There is currently no concept of an artist in the data model or in the website UI. We would like users to be able to browse works by artists, and search for artists by name.
- **Gallery Template Selection**: all galleries currently display with the same template. In order for users to express themselves as we desire, for each collection they should be able to choose an appropriate template and customize it as they desire.
- **Social Interaction**: users should be able to comment and discuss the artwork and collections, in order to encourage peer-to-peer education.
- **Metadata Extraction**: color palette, hue, lightness, image subject, etc., are all features that we should extract from each artwork image in order to better allow users to find related artwork.

Existing Features

- **Account System**: users should be able to log in with their existing social network accounts, in order to reduce sign-up friction and make sharing easier.
- **Machine Learning**: the VGG model used to create representations of images for our recommendation system is built around a highly particular set of training images that bear little relation to images of artwork in a digital archive. Future versions of CRTR should train using a museum's own artworks to improve recommendations.
- **Viewing Artwork**: currently, viewing the full-size image of an artwork is done using the browser's built-in image viewer, which is not ideal for zooming and panning over a large image with fine details. Users would be better served by a custom image viewing interface.

Works Cited

- Samir Bhowmik: Digital Museum: Community Participation
- Samir Bhowmik: personal home page
- Samir Bhowmik: Crowdsourcing the Museum! A Digitization Strategy for Small Museums in Finland
- Tate Digital Strategy 2013–15: Digital as a Dimension of Everything
- Shelley Bernstein: Rethinking the museum collection online
- The Metropolitan Museum of Art Open Access