A Brief Walk Through the CHIP
Personalized Interface to the Rijkmuseum Collection

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1. Introduction

2. Browser

3. Recommender and User Profiler

Our demo has the form of a quiz that helps the user find out what he might like in the
Rijksmuseum collection. The quiz starts by presenting the user with artworks from the
Rijksmuseum collection for the user to rate in terms of how interesting he finds each.
Based on these user ratings, the system looks for other artworks from the collection the
user might like as well as topics he might be interested in. For example, if the user gives
high ratings to portrait paintings and low ratings to landscape paintings then the system
will deduce that the user is interested more in "Portraiture". The CHIP demonstrator will
recommend it as a topic and will recommend other portrait paintings from the
Rijksmuseum collection. The system also lets the user rate his interest in topics. Thus, the
user can agree or disagree with the recommendations given by the demo.

All explicit ratings for topics and artworks are stored in the user profile. Information from
the user profile is used by the system to provide content-based recommendations. By
presenting the user with a set of artworks to rate and then letting him to express his
opinion about recommended topics and artworks, the system gradually builds the user
profile. The intention is that this profile can be later on used by the system for generating
personalized tours through the Rijksmuseum.
When the user logs into the system for the first time, he is presented with an artwork that he has to rate.

As Figure 1 “The recommender starting display” shows, the screen is divided into four parts, which are filled in with information as the user progresses with the demo. We discuss the components of the main quiz page in the following subsections.
Figure 2 "Four parts of a recommender session" illustrates how interaction with this system typically proceeds. When the user finishes the demo session, there are two options (see two links in the upper right corner): to save the results of the current session ("Save and log out" link) and log out or log out without saving the results of the session ("Log out without save") link. In the first case, when the user resumes the session, he will return to the point where he finished the previous session. Otherwise, the user will start from the point where he started the previous session.

3.1. Main Page

An example screen display of the main quiz page is presented below.

As Figure 3 "A typical recommender display" shows, the interface consists of four main components, which we discuss further in detail:

- Artwork to rate
- Profile
- Recommended topics
- Recommended artworks.

3.1.1. Artwork to Rate

Figure 3. A typical recommender display
The dialog interface in the upper left of the interface display, illustrated in Figure 4 "Rating dialog interface", selects artworks to ask the user to rate. The user can express his opinion using five stars. The meaning of each star is shown when you hover the cursor over it: "I hate this artwork" (one star), "I do not like this artwork" (two stars), "Not interesting" (three stars), "I like this artwork" (four stars) or "I like this artwork very much" (five stars). The user can skip given artwork and press "Next artwork" button without giving any explicit ratings. If the user wants to know more about given artwork he can, just click on the image and the system will bring him to browsing artwork page.

3.1.2. Your Profile

In the user profile, which Figure 5 "User profile maintenance interface" presents, we store all explicit ratings of the user - for artworks and for topics. We use the same five stars scales for ratings of the artworks and topics. We split the topics the user rated into three groups "Like topics" (topics rated with four or five stars), "Dislike topics" (one or two stars) and "Not interesting" (three stars). We put all rated artworks in one list sorted by the number of stars. The user can change his opinion by giving the artworks and topics in the profile other ratings.

3.1.3. Topics We Recommend
Given a user profile, the system provides recommendations for topics the user might be interested in, as shown in Figure 6 "Topic recommendation interface". The system explains to the user why a certain topic was recommended. Hovering the cursor over "Why?" shows the system's confidence level in its recommendation of this topic (e.g. 75%). All topics in the list are sorted based on the confidence level. The main quiz page shows top five recommended topics. The user can see all recommended topics by clicking on "See all topics ..." link.

Similarly to artworks ratings, the meaning of the stars for topics is as follows: "I hate this topic" (one star), "I do not like this topic" (two stars), "Not interesting" (three stars), "I like this topic" (four stars) and "I like this topic very much" (five stars).
If the user wants to know more about the recommended topic, he can just click on it and the system will bring him to browsing topic page.

Note that if the user did not rate enough artworks positively, he will not get any recommendations.

### 3.1.4. Artworks We Recommend

![Artworks We Recommended (146)](image)

See all artworks ...

Figure 7. Artwork recommendation interface

*Figure 7 "Artwork recommendation interface"* shows how, based on the information from the user profile and the list of recommended topics, the system recommends artworks that the user might like. The system explains to the user *why a certain artwork was recommended*. Hovering the cursor over "Why?" shows the system's confidence level (in %) that the user might be interested in this artwork (e.g. 75%). All artworks in the list are sorted based on the confidence level. The main quiz page shows top five recommended artworks. If the user wants to know more about given artwork, he can just click on the thumbnail and the system will bring him to browsing artwork page.

### 3.2. Topic Browsing Page

On the browsing topic page, shown in *Figure 8 "Topic browsing display"*, the user sees all information about a topic. The column on the right shows all artworks related to the topic. All the properties of those artworks are taken into consideration. They are put into three groups: "Artist", "Place and Time" and "Theme." Properties within these groups are sorted based on the number of times they occur in the related artworks. The topic broadening option allows the user not only to see the artworks related to that topic but also to define what else those artworks have in common. For example, the screen display for broadening around "Gabriel, Joseph Constantin" lets the user see that all his paintings in the Rijksmuseum collection are "Dutch landscapes".

### 3.3. Topic Browsing Page
Figure 8. Topic browsing display
Gabriel, Paul Joseph Constantin

<table>
<thead>
<tr>
<th>Style</th>
<th>Realist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biography</td>
<td>Dutch artist, 1828-1903</td>
</tr>
<tr>
<td>Birth date</td>
<td>1828</td>
</tr>
<tr>
<td>Death date</td>
<td>1903</td>
</tr>
<tr>
<td>Student of</td>
<td>Koekkoek, Barend Cornelis</td>
</tr>
</tbody>
</table>

(Numbers in brackets indicate how often a certain topic appears among the related artworks)

**Theme**

- Windmills (1)
- Seasons (1)
- Dutch landscapes (3)
- Hague School (2)
- Fields, meadows (2)
- Water, ice and snow (2)
- Painting in the open air (1)
- Netherlands and the Water (1)
- Rijksmuseum collection (1)
- Brush technique (1)
- Use of colour (1)
- Perspective (1)
- Composition (1)
- Buildings in landscapes (1)
- Landscape painting (1)
- Topography (1)

Figure 9. Artwork browsing display

On browsing artwork page, shown in Figure 9 "Artwork browsing display", the user gets to see all the information about the chosen artwork, which includes its description, the name of the artist, the year of creation, location, material and a number of associated topics. The user can also see the larger image of an artwork.

Furthermore, in the right column the system shows the user to see the list of artworks related to the selected one. The artworks are related by common properties that they have. Those artworks that have the largest number of common properties with the selected artwork appear first. Only five top are presented to the user on the same page. If the user wants to see all related artworks, he should follow "See all..." link.

The user can rate artworks and topics in the same way as on the main quiz page.
3.4. Recommended Topic Explanation Page

Figure 10 "Explanation of a recommended topic" shows how the system explains to the user which positive ratings caused the topic to be recommended. In the given example Gabriel, Joseph Constantin was given as a recommendation because the user rated positively two of his presented artworks. (Later on when we have more relations in the data, we will be able to generate recommendation for topics based on positively rated related topics.)

3.5. Recommended Artwork Explanation Page

Gabriel, Paul Joseph Constantin

<table>
<thead>
<tr>
<th>Style</th>
<th>Realist</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Impressionist</td>
</tr>
</tbody>
</table>

Biography: Dutch artist, 1828-1903
Birth date: 1828
Death date: 1903
Student of: Koekkoek, Barend Cornelis

(Numbers in brackets indicate how often a certain topic appears among the related artworks)

<table>
<thead>
<tr>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windmills (1)</td>
</tr>
<tr>
<td>Seasons (1)</td>
</tr>
<tr>
<td>Dutch landscapes (3)</td>
</tr>
<tr>
<td>Hague School (2)</td>
</tr>
<tr>
<td>Water, ice and snow (2)</td>
</tr>
<tr>
<td>Fields, meadows (2)</td>
</tr>
<tr>
<td>Painting in the open air (1)</td>
</tr>
<tr>
<td>Netherlands and the Water (1)</td>
</tr>
<tr>
<td>Rijksmuseum collection (1)</td>
</tr>
<tr>
<td>Brush technique (1)</td>
</tr>
<tr>
<td>Use of colour (1)</td>
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<tr>
<td>Perspective (1)</td>
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<tr>
<td>Composition (1)</td>
</tr>
<tr>
<td>Buildings in landscapes (1)</td>
</tr>
<tr>
<td>Landscape painting (1)</td>
</tr>
<tr>
<td>Topography (1)</td>
</tr>
</tbody>
</table>

Figure 10. Explanation of a recommended topic
Data model and Vocabularies

Figure 11. Explanation of a recommended artwork

The system explains to the user which positive ratings caused it to recommend the artwork (given a confidence level), as illustrated in Figure 11 "Explanation of a recommended artwork". In the given example, "Self portrait" by Van Gogh was given as a recommendation because of previous positive ratings of "Brush technique" and "Portraiture". Furthermore, the system recommended the user topic "Artists and Society". They are recommended with quite a high confidence level.

4. Tour Wizard

5. CHIP Data Model and Vocabularies

For our demo, we use the data from the ARIA (Amsterdam Rijksmuseum InterActief) database, illustrated in Figure 12 "Model of collection data used". This was a kiosk system for the museum. The problem that we encountered with while using this data for providing recommendations was that it is very flat - there are no semantic relationships within it. For example, there are no hierarchical relationships between keywords used to
annotate the artworks. Therefore, there is no way to deduce from the fact that the user does not like mythology the fact that he might not like artworks annotated with the names of various mythological figures. In addition, there are no relationships between artists, such as that they painted in one style or one was the student of another.

With the purpose of adding more relationships within the data, we made some connections to the existing vocabularies. We used four vocabularies for adding the following relationships:

- **TGN (Thesaurus of Geographic Names)** - to represent the hierarchy of geographic locations. These relationships can be used, for example, to deduce from the fact that the user liked artworks created in Amsterdam and Den Haag the fact the user might like other artworks created in Holland.
- **ULAN (The Union List of Artist Names)** - to represent relationships between artists, such as student of, teacher of, etc.
- **AAT (The Art and Architecture Thesaurus)** - for adding information about styles/periods, techniques, material.
- **Iconclass** - to represent the hierarchy (at least partially and not for all encyclopedia keywords) of objects, persons, events, situations and abstract ideas that can be the subject of an artwork.