

Crowd- and niche sourcing for film and media scholars

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ABSTRACT

There are many online and private film collections that lack structured annotations that facilitates retrieval. In this paper we explore the effectiveness of a crowd-and niche sourced film tagging platform, around a film collection from the Eye Open Beelden. There are different types of end users that have a need for descriptions of various topics in films from the 20th century. This makes that each of the end users has their own different information needs. Previous research has been read and interviews are conducted to map the information needs and developed a framework that categorizes this need. Additionally, a data model has been developed based on the literature and interviews, that holds all the meta data that is collected through the platform. The platform's backend is built upon this framework and data model. The frontend of the platform allows users to create accounts, self-declare knowledge, watch and annotate (describe) films, view provenance information, and extracting all this data from the platform. To test the effectiveness of platform an experiment has been conducted in which participants were asked to make use of the platform by creating annotations. This part of the experiment saw 37 participants creating a total of 319 annotations. The platform was perceived useful by film scholars as it could provide them with annotations that directly lead to film fragments that are useful for their research activities. Nevertheless, capturing every scholar's specific information needs is hard since the needs vary heavily depending on the research questions these scholars have.

Keywords

Crowdsourcing, nichesourcing, annotation, film scholars.

1. INTRODUCTION

There are tons of online and private film collections with hundreds of films from the 20th century. A lot of these films have basic descriptions if some at all, it would cost countless hours and resources for people to go through all this content and describe what happens in them (Dijkshoorn, 2012). There are also lots of different groups of end users (film scholars) with different information needs if it comes to descriptions of a film collection. This project researches the need of these end users and the possibility of using crowd-and nichesourcing for collecting relevant annotations over a collection of 20th century films. The correctness of annotations is paramount, as they will be used for research activities. The task of annotating is performed on a self-developed platform called "Filmtagging". This platform allows the users to watch videos, create annotations, gather provenance information from the users, and most importantly allows extraction of the data from the platform. The backend of the platform that is built upon a framework and data model, show the provenance information that is linked to the annotations and shows how the annotations are classified for the right type of end users. This framework and data model are evaluated through a small-scale user experiment.

The goal of this project is to classify the annotations provided by the users and add provenance information, this so end users get the most relevant annotations for their own research activities.

2. MOTIVATION & BACKGROUND

2.1 Motivation

Different groups of end users have different needs if it comes to annotating a film collection. To determine what kind of annotations will be most valuable to the end users, research needs to be done, and information can be extracted from previous work conducted by Melgar (2015). There are various types of annotations that can be made e.g. descriptive (title, actors, etc.), subject, and content-based annotations (the content within an image).

The different information needs of the film scholars, and the various types of annotations that can be gathered makes it hard to determine what annotation are important to which scholar. This makes it important for this project to classify the annotations accurately, so we can provide the different film scholars with the annotations that are most relevant to their information needs. Additionally, it is important to allow the scholars to see where the annotations came from (provenance information).

The various annotations will be gathered through a human-based computation method called crowd-and nichesourcing. This way of performing tasks relies heavily on the advantages humans have over computers in fields like visual recognition, and speech recognition (Bederson et al., 2011). Nichesourcing uses the knowledge of domain experts to perform certain tasks, this in contrast to crowdsourcing where no particular knowledge is required (de Boer et al., 2012).

Finding the right nichesourcing candidates is much harder than finding crowdsourcing candidates. This with the main reason that nichesourcing candidates need to have a certain set of skills that makes them experts in a certain field. Finding suitable candidates that are able to perform a complex task is not straightforward, recognizing and matching the candidates is a challenge that requires task descriptions as well as description of the level of expertise that is required for the task (de Boer et al., 2012).

For this project a tailored annotation platform (Filmtagging) is created in which the crowd can submit annotations. The platforms features are inspired by Accurator (Dijkshoorn et al., 2013), and provides additional features that allow for video tagging and data extraction which is absent on Accurator. Filmtagging also requires less effort to be implemented on a server (for more info about the implementation see <https://github.com/Aschwinx/Filmtagging>).

2.2 Film collection

For this research access to a film collection is required, therefore a large portion of the Eye Open Beelden¹ collection is used for this

¹ <http://eye.openbeelden.nl/media>

project. This collection contains 240 videos (of which 228 are used) with metadata detailing: title, director, producer, year, country, description, and language. Videos can easily be added or removed from the platform, but the 228 videos are sufficient for the research.

2.3 Background

2.3.1 Crowd and Nichesourcing

Crowdsourcing is one of the ways to apply human-based computation by dividing a large amount of tasks among a large crowd of people, e.g. a group of people that annotate different aspect of a series of images. Crowdsourcing is very useful when you want people to perform simple tasks, although it comes up short when it comes to more complex tasks. The reason for this is that crowdsourcing is geared towards getting a high quantity instead of high quality, this makes that the crowd isn't required to have any knowledge of certain domains (de Boer et al., 2012).

Nichesourcing on the other hand looks for candidates that have knowledge in domains that can be used to perform more complex tasks. This makes that nichesourcing is geared towards quality instead of quantity, although finding a large amount of nichesourcing candidates is much harder than finding candidates for crowdsourcing (Boer et al., 2012).

Annotations from domain experts (niche) and novices (crowd) can be complementary to each other:

“Experts tag in a similar fashion as novices when participating in a tagging game. In general, they enter the same number of tags, and they mostly use Factual tags. However, in the experts’ less-frequent tags, there are more domain-specific terms than in the novices groups (Melgar, 2015).”

Melgar found that there was no significant statistical difference between the novice and expert group in the context of a fast paced tagging game. Although the experts use more domain-specific terms, and could provide more annotations in topics normal people couldn't, e.g. mise-en-scene, shot types, and lighting. Therefore, allowing the tagging platform to be used by both groups of users, but requires provenance information to be gathered to determine if a user is an expert or novice. The reason to include both novices and expert's users, is because experts are scarce. Even though the crowdsourced data might be of varying quality, even bad data is better than no data at all (Geisler, 2010).

2.3.2 End users

There are many different types of film scholars, and each of these scholars focus on different research topics. This makes that each of these scholars have their own information needs, as it comes to annotations in a film collection. In Table 2 you can see two research focuses from the film scholars that have information needs in line with this project. These focuses are proven to be effective at explaining information needs of the film scholars, and are used in this project as the main two types of end users (Melgar, 2015).

Research focuses	Description
Cultural/Documental	See film and media as documents which describe historical, psychological, or social realities
Aesthetic/Narratological	Focuses on the aesthetics of film and media

Table 1. Different research focuses of film and media scholars.

Cultural/Documental researchers are mostly interested in the historical, psychological, and social relations information in film (e.g. how are events in history portrayed in a film, does the film

take in account the concerns of society, and how is the past interpreted in movies).

Aesthetic/Narratological researcher's focuses on the aesthetic style that has been used throughout film history, there is also an emphasis on movie directors and genre (e.g., German crime movies between 50's to late 60's, first person videos, and movie themes like apocalyptic, covenant, decision, etc.).

2.3.3 Accurator (annotation platform)

For this project the decision was made to create a tailored annotation platform, by looking at other platforms for inspiration. The main platform taken inspiration from is “Accurator”², since its purpose to enable expert annotation based on crowdsourced annotations, is in line with this research.

Accurator is a web environment that allows people to describe (annotate) an online collection of items. This data can then be used to assist ongoing research in various image related domains. Accurator is aimed at finding experts on social media (Twitter) that can help annotate images in their domain of expertise. These users can then self-declare their knowledge in the various domains, resulting in Accurator tailoring the annotation task to their knowledge by only showing the user items that match to their expertise. Accurator will then evaluate the quality of the annotations provided by the user, if the user provides bad annotations the trust worthiness of the annotations will be lowered and vice versa. High trustworthy users are given the task to evaluate the annotations of other users, this will help automate the process of trust worthiness and quality checking of the annotations.

Filmtagging has taken the two main features of Accurator, the annotating of an online collection, and allowing users to self-declare their knowledge. Although the features have been changed to fit better with films instead of images.

3. RESEARCH QUESTION

Given the motivation in section 2, research needs to be conducted to get a view into the annotation needs of the scholars, and the requirements they have for provenance information. Furthermore, a data model and framework needs to be developed to give structure to the provenance information and categorize the gathered annotations. In this way, the right annotations can be provided to the right scholar, and the provenance information can give credibility to this information. Based on this understanding, the following research question was created:

“How can crowd-and nichesourcing results be gathered and enriched with provenance information, and how can it serve the varying information needs of the film scholars?”

To answer the main research question, the following sub questions need to be answered first:

- A. What are the film scholar's provenance requirements when it comes to crowdsourced annotations, and what kind of annotations suits their research activities?
- B. How can provenance information be gathered with the annotations that are created by the crowd?
- C. Are the gathered annotations relevant for film scholar's research activities?

4. APPROACH & METHODOLOGY

For this research further literature has been read and interviews have been conducted. Additionally, a framework and data model are created based on the findings of the interviews and literature.

² <http://accurator.nl>

4.1 Requirements Interviews

Two candidates of the film domain had been invited to participate in this research. The interview sessions that were held at the University Utrecht took approximately 1 hour. The choice was made to conduct semi-structured interviews, this with the reason that different topics, then the predefined question can be explored that might come up during the interview. This interview technique provides a solid guide throughout the interview, but does not restrict the interviewer to change and adapt the questions based on the answers given by the interviewee.

The interview started with a short introduction into the research that is performed, and was followed up by 3 parts:

- Part 1. Information needs
- Part 2. Provenance information
- Part 3. Interview wrap-up

Part 1 and 2 of the interview were used to ask question that lead to answering RQA. For the interview questions see appendix A.

4.1.1 Interview results

With the results from the interviews, RQA can be answered. From part 1 of the interview it became apparent that no interviewee made use of annotations or crowd gathered data in any current or past research. This with the note that they prefer to look at films themselves, instead of relying on others.

When asked what kind of information could make them use crowd gathered annotations, it was heavily dependent on the research question of their current or future research. Although, there was a preference for location based annotations among the interviewees. This since they are applicable to a wide variety of research questions. When asked if the interviewees would prefer long or short annotations the general answer was that short annotations can be more easily searched through, but long once can give more background information. With the short annotations it was advised to make use of glossaries with cinematographic terms, this with the motivation that various cinematographic subjects can have multiple terms that can mean the same. The use of an autosuggestion function in the platform with predefined terms would then help make the annotations more consistent. When asking if the film scholar focuses were accurate (see section 2.3.2) the answer was that the focuses are good but can change depending on the research question. Change in research question can make that the focus of a scholar will change or overlap with other focusses, which makes it hard to place a scholar in a single box (focus).

Part 2 of the interview was aimed at asking if the interviewees used any provenance information in their current or past research activities. Granting none of the interviewees used annotations in their research, no provenance information was used. Resulting in asking what kind of provenance information would make them trust crowd gathered annotations. The response was that relevant background information of the user should be gathered in combination with the self-declared knowledge in the different domains. In addition, an admin that would monitor the annotations would make the annotations completely trust worthy, although this is not feasible option for this research. Alternatively, it was proposed if crowd review/monitoring of the given annotations could substitute for a admin, the interviewees agreed it possibly could.

4.2 Creation of framework & data model

For the development of the annotation platform an underlying framework and data model have been created. The framework and data model are based on the information gathered from the literature and interviews. The framework function as a backend of

the platform, that illustrates what types of annotations are collected from the users and how it is categorized. The data model shows how the annotation, provenance, user, and film data is stored on the platform. For more information on the framework and data model see section 5.

4.3 Implementation of annotation platform

After the creation of the framework and data model the platform can be build and implemented. The platform allows users to view films from the EYE Open Beelden collection, and submit annotations over these films. Provenance information is gathered from the users when an account is created. For more information about the platform see section 6.

4.4 Evaluation

With the finalization of the annotation platform, an experiment is conducted in which the crowd and niche are able to use the platform. After enough annotations have been collected an evaluation is conducted with end users of the platform to see if the platform works well, and if the gathered annotations with provenance information are of any use. For more information about the experiment see section 7.

5. FRAMEWORK & DATAMODEL

For the annotation platform a framework is developed that functions as a structure that shows how the different annotations are classified and categorized on the platform. Furthermore, it shows which classification of annotations is meant for which film scholar focus, that are established in section 2.3.2.

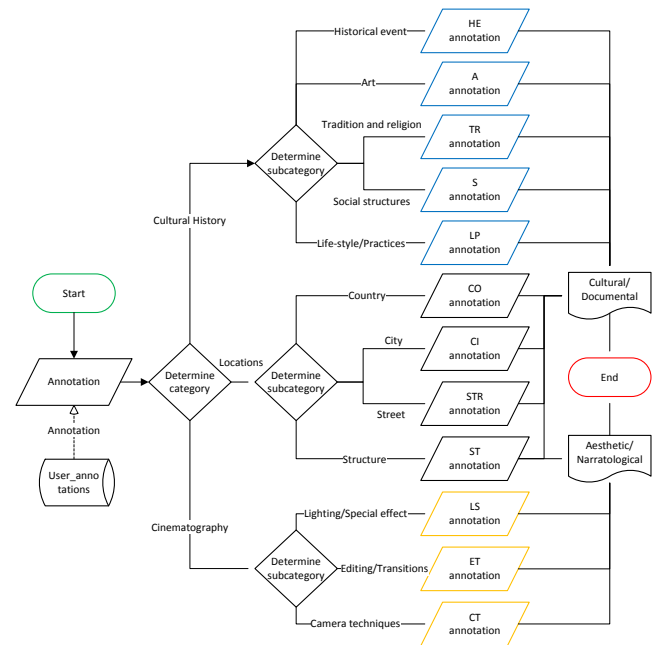


Figure 1. Annotation Classification Framework

The framework as seen in Figure 1, has three main categories called Cinematography, Locations, and Cultural History. Additionally, each category has its own sub categories:

- Cinematography
 - Lighting/Special effect
 - Editing/Transitions
 - Camera techniques
- Locations
 - Country
 - City
 - Street

- Structure
- Cultural History
 - Historical event
 - Art
 - Tradition and religion
 - Social Structures
 - Life-styles/Practices

These categories are based on the data gathered from the interviews, and literature. For a bigger version of the framework see appendix C.

Next to the framework a data model has been developed that shows what provenance information is gathered from the users, and what other metadata is available for the films, users, and annotations. With the creation of this database inspiration was taken from Hollink (2006), on how to store the various descriptions of the users.

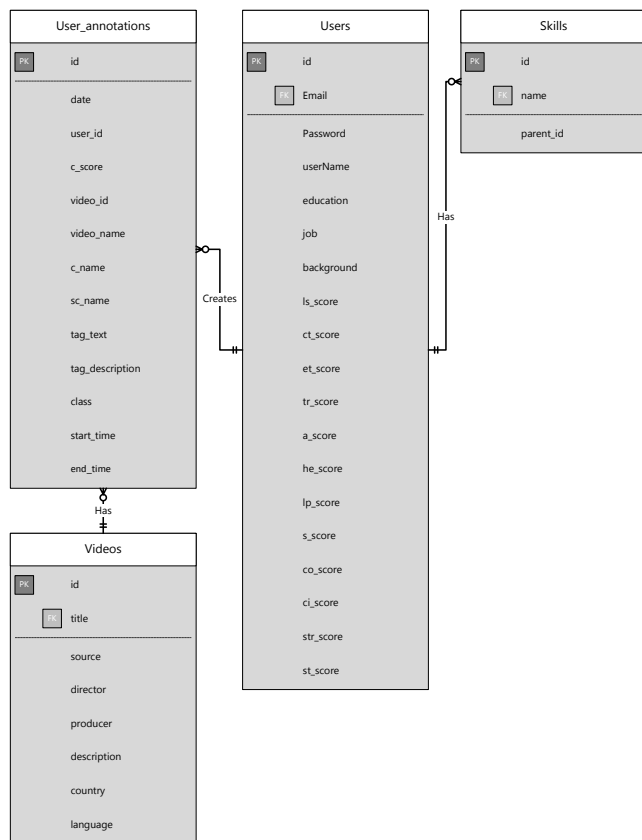


Figure 2. Filmtagging Database

The data model as seen in Figure 2 contains four tables, each of the tables contains specific metadata on which the annotation platform will run.

- Users: contains the account details and provenance information of the users
- Skills: contains the different (sub)categories people can use to categorize their annotations
- User_annotations: contains all the made annotations on the platform
- Videos: contains all metadata from the videos available on the platform

The user table holds the user’s personal information such as their e-mail, username, password, education, and job. Additionally, the table holds provenance information containing the knowledge people have in the domains of which annotations are made.

- ls_score = Lighting/Special effect
- ct_score = Camera techniques
- et_score = Editing/Transitions
- co_score = Country
- ci_score = City
- str_score = Street
- st_score = Structure
- tr_score = Tradition and religion
- a_score = Art
- he_score = Historical event
- lp_score = Life-style/Practices
- s_score = Social Structures

This knowledge is portrayed with scores, users are able to self-declare their knowledge on a scale from 1 to 5 (1: no knowledge, 2: little knowledge, 3: general understanding, 4: good understanding, 5: expert). Next to the self-declared knowledge users can also write a short background explaining any relevant information that might give credibility to the annotations they make. The choice for what provenance information is gathered for this research is primarily based on the feedback from the conducted interviews (4.1.1). Provenance information will allow the film scholars to see where each individual annotation came from and what knowledge the person had that made it. This helps in verifying the trustworthiness and quality of the annotations. For a bigger version of the database see appendix D.

6. ANNOTATION PLATFORM

In this section, the technical details, feature/design decisions, and annotation process are explained of Filmtagging³.

6.1 Features and Design

Filmtagging provides many features that allows users to make annotations, gather provenance information from the users, provides end users with tools to extract the annotation, and view all the provenance information. The main features of the platform are:

- Annotating films
- Creating user account
- Self-declare knowledge levels
- Viewing provenance information of users
- Viewing and extracting annotations

To take a look at the first feature, users are able to make annotations on the platforms “Annotate film” page (Figure 3). On this page the film with metadata (containing film title, director, producer, year, and language) are most prominent, in addition a next button is present to load a new film. On the right side of the page an annotation form is presented, this form requires users to give additional data with the annotations they create. The form consists out of six parts:

1. **Category:** Categorizes the annotation to one of the three predefined categories from the annotation classification framework. Cinematography, Cultural history, and Locations (Figure 1). Additionally, there is an info button next to the field that when pressed shows a brief description of the chosen category.
2. **Subcategory:** Categorizes the annotation to one of the twelve subcategories from the annotation classification framework. Lighting/Special effect, Camera techniques, Editing/Transitions, Art, Historical event, Life-style/Practices, Social Structures, Country, City, Street, and Structure (Figure 1). Additionally, there is an info

³ <http://astacia.eculture.labs.vu.nl/>

button next to the field that when pressed show a brief description of the chosen subcategory.

3. **Classification:** Classifies the annotation such as a person, camera angle, object, location, action, time, etc.
4. **Tag:** Input field where the user can write their tag for the annotation. This field also provides autosuggestions for various cinematographic terms, as explained in section 4.1.1. The predefined suggestions are based on Schlemowitz (1999) glossary of film terms. In addition to the predefined terms, it also shows tags placed by other users among the autosuggestions.
5. **Tag description:** Input field where users can provide a broader description of their tag if necessary.
6. **Start time/End time:** Input field where users can provide the start and end time that shows in what time frame the annotation took place. This can be done by clicking the header “Start time” or “End time” or by manually writing in the text field.

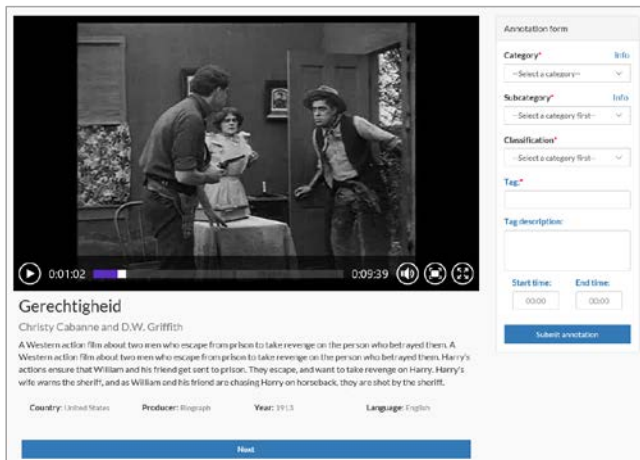


Figure 3. Snippet of Annotate film page

To be able to use any of the features on the platform, users are required to create an account. This can be done on the “Sign Up” page as seen in Figure 4. This page is used to gather the required provenance information from the user that is required for this research, as shown in RQB. Users are required to fill in an e-mail, password, user name, education, job, knowledge levels, and any other relevant background information.

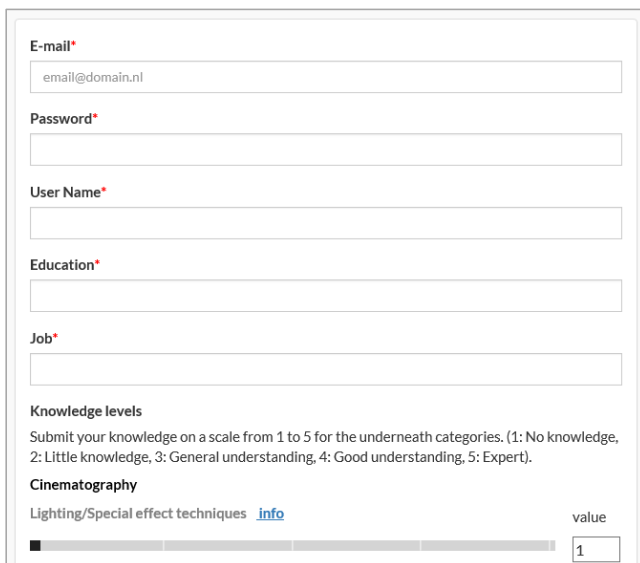


Figure 4. Snippet of Sign Up page

When users are creating an account, they have the ability to score their knowledge for the different domains. The levels can later be altered in the “Knowledge level” page as seen in Figure 5.

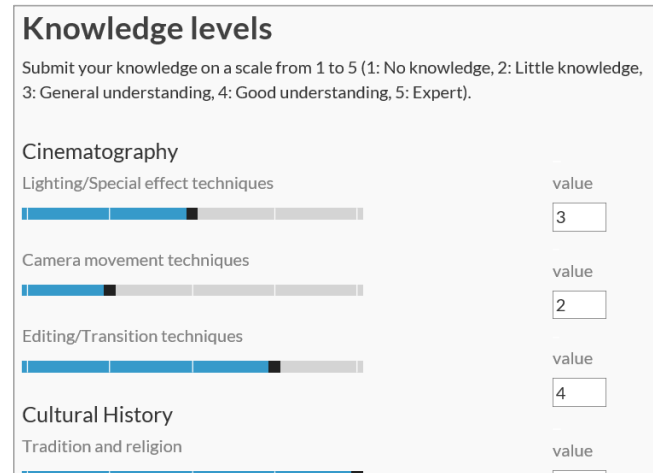


Figure 5. Snippet of Knowledge level page

Through a slider, users can indicate their knowledge level for the different domains that are presented on the page. These domains are separated in categories that are based on the framework from Figure 1.

End users of the platform have the ability to view all the annotations, and provenance information of the user. These features are present on the “Data extraction” page as seen in Figure 6. On the left side of this page a filter is present in which end users can specify the annotations they want. The filter contains filters for category, subcategory, classification, and score (corresponding to the knowledge level of the user). When the search button is pressed a table is generated showing all the requested annotations with metadata. This metadata contains the user id, tag, video title, score, category, subcategory, and classification. The end-user also has the ability to extract the selected annotations by clicking the download button, this will generate a xls file that can be viewed in Microsoft Excel. The extracted file contains additional information that is not displayed in the table on the page, such as tag description, start time, end time, video id, and the date on which the annotation was made.

Filters	User	Tag	Video title	Score	Category	Subcategory	Classification
Category: All	7	Lens Flare	Van steenvoel tot gas	2	Cinematography	Lighting/Special effect	Misc en Score
Subcategory: All	7	Colouring	Natuurwonderen	2	Cinematography	Lighting/Special effect	Special effect
Classification: All	7	Medium shot	BP113 Vrouw op bank, onbetaling, schiet man dood	2	Cinematography	Camera technique	Camera shot
Score: All	7	woman reading	BP113 Vrouw op bank, onbetaling, schiet man dood	3	Cultural History	Lifestyle/Practices	Norm
	7	soliness	BP113 Vrouw op bank, onbetaling, schiet man dood	3	Cultural History	Art	Emotion
	23	Extrema long shot	Schierpartij op de Dam (1945)	2	Cinematography	Camera technique	Camera shot
	23	close up	Spiegel van Nederland No. 8	2	Cinematography	Camera technique	Camera shot
	23	medium close up	Spiegel van Nederland No. 8	2	Cinematography	Camera technique	Camera shot

Figure 6. Snippet of Data extraction page

Furthermore, end users are able to click on the user id in the table on the page or xls file to be redirected to the user’s page. This page contains all the provenance information and annotations made by the user. The same feature is available when clicking on the video title.

6.2 Annotation process

The annotation process users will go through when annotating the various films on the platform is represented in the flowchart (Fryman, 2001) in Figure 7.

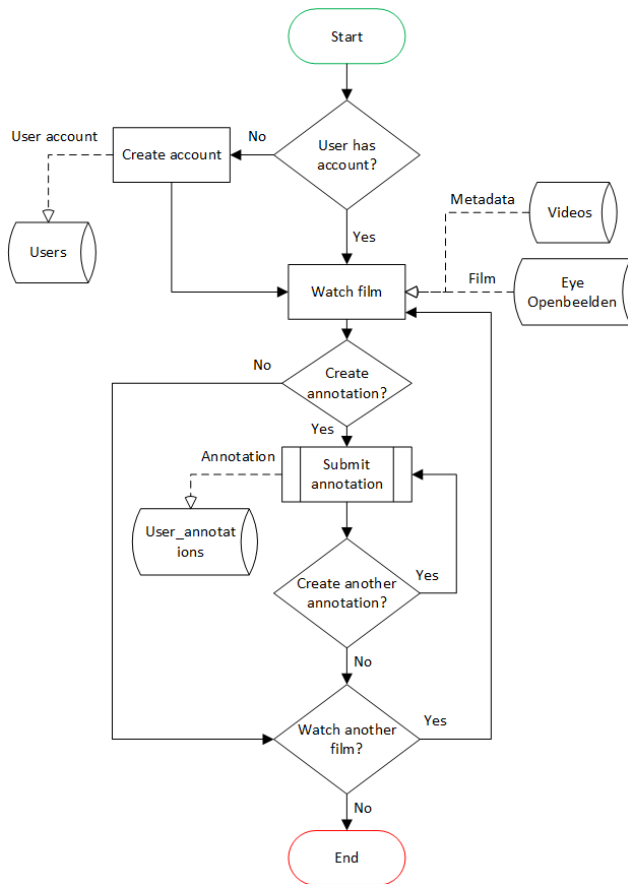


Figure 7. Annotation process

The process starts with the creation of an account (if the user has no account), this account is uploaded to the “Users” table from the platforms database. After the account has been successfully created the user is able to watch films. The film data is pulled in from two sources, the metadata is located in the platforms “Videos” table, and the actual film file is extracted from the Eye Openbeeld webpage. While watching the film users can create an annotation and submit it to the server. This annotation is then uploaded in to the “User_annotat ions” table. After submitting the user is able to submit more annotations for the same film or can click on “Next” to go to a new film.

6.3 Technical details

Filmtagging is hosted at the VU, on the server space Apache⁴ server, MySQL⁵ database, and phpMyAdmin⁶ have been installed to run the platform. The database is administrated through the tool phpMyAdmin, which is a commonly used tool for managing databases. The structure of the database is based on the data model seen in Figure 2. Filmtagging’s front-end (design/interface) is created with the use of Bootstrap⁷. Bootstrap is a free library for creating websites, and makes use of HTML and CSS. On the back-end, Filmtagging makes use of PHP⁸ and Ajax⁹ to send and pull data from the sever. PHP does this by running scripts that pull various data from the server such as film metadata, and

⁴ <https://httpd.apache.org/>

⁵ <https://www.mysql.com/>

⁶ <https://www.phpmyadmin.net/>

⁷ <http://getbootstrap.com/>

⁸ <https://secure.php.net/>

⁹ <http://ajaxian.com>

annotations. PHP is also used in combination with Ajax to send user created annotations to the server. The choice was made to use Ajax as it allows for asynchronous operations, making that the webpage is not required to be refreshed upon submitting data to the server. Additionally, JavaScript¹⁰ programming is used to help in the various front and back-end actions described above.

7. EXPERIMENT SETUP

With the completion of Filmtagging, a small-scale user experiment has been conducted that evaluated the design of the platform.

7.1 Part 1 - Annotating

In the first part of the experiment users needed to be recruited to use the platform by making annotations. The experiment is conducted with every day people (crowd) and experts in the film domains (niche). This so a wide variety of annotations can be collected.

Users are informed in what the platform is and how the experiment works, this to make sure the users understand what they are doing and for what reason they are doing it. Before users can start annotating, an account has to be created. Users can sign up on the websites “Sign Up” page, this page requires users to fill in different information such as their e-mail, username, and password. Additionally, users are required to score their knowledge levels, as shown in Figure 5.

After an account has been created, users can log in and go to the “Annotate film” page. This page provides users with a random picked film from the 228 films of the Eye Openbeeld collection, and allows users submit annotations after or while watching the film. The choice was made to show the films in a random order to make sure not only the first couple of films would be annotated when presenting them chronological. In the annotation form users are required to fill in certain information with the tag they want to make. First users must select one of the three categories for which annotations are collected (as seen in the Annotation Classification Framework).

- Cinematography
- Social History
- Locations

Next users are required to select a subcategory and classification to further specify the annotation they want to make. After the categorization and classification has been selected, users can write the tag corresponding with what they observed in the film. If a simple tag of 2 or 3 words is not sufficient users can write a description in the “Tag description” field. After the tag has been written, the user can fill in the “Start time” and “End time” to specify in which timeframe the tag took place. Users are now able to submit the annotation by clicking the “Submit annotation” button.

After an annotation has been submitted, input fields in the form are emptied and more annotations can be submitted for the same film. If the user is done with the particular film, he/she can click the “Next” button underneath the video to move to another random film.

7.2 Part 2 – End users

After enough annotations had been collected, the second part of the experiment started.

First, end users were informed in the experiment that is conducted. The end users start with the same process as in part 1 of the experiment, they have to create an account and create some annotations. While performing this task, the end users are asked to

¹⁰ <https://www.javascript.com/>

think aloud, this so any annoyances in the platforms user experience can be captured.

Second, end users are given a scenario in which they need certain film fragments for their research activities. The end user starts with extracting the relevant annotations from the platform to Excel.

End user must think aloud when extracting and viewing these annotations, in addition to explaining which annotations are of quality with the given provenance information and could lead to a film that is relevant for their scenario.

Research scenario: Amsterdam cultural history

This research is aimed at investigating the city life of Amsterdam in film between 1900 and 1960. Here the focus is on identifying key points of interest in the films such as places and structures throughout Amsterdam. Additionally, it’s important to identify the events and activities of people’s daily lives in the city.

7.2.1 Experiment evaluation

After part 2 of the experiment has been completed, the participating end users are evaluated through a structured evaluation. The evaluation determines the user experience of the platform (Davis, 1989), the relevance of the annotations, provenance information, and if end user would consider using the platform for their own research activities. The data that is gathered from this evaluation and the rest of the experiment was used to improve the platform, framework and data model. For the interview questions see appendix B.

7.3 EXPERIMENT RESULTS

7.3.1 Part 1 results

Part 1 of the experiment had 37 users participating in the Filmtagging platform, in which 319 annotations have been collected. From the 37 participants, 5 only created an account but 32 had created an account and placed on average 10.29 annotations each. When creating an account user were required to self-declare their knowledge on a scale from 1 to 5. None of the participants have filled in a level of 5 for any of the subjects, even photographers, media historians, and film researchers did not go higher then level 4. This could mean that some participants are very modest, or that the term “experts” for level 5 is a big statement to be making.

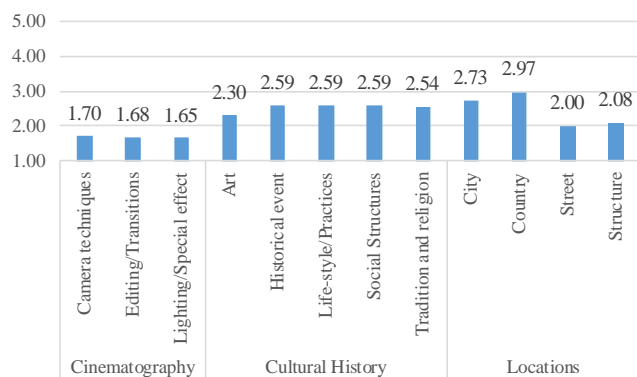


Figure 8. Average knowledge of participants

Figure 8 shows the average knowledge level of the 31 participants who submitted annotations. This figure shows that the average of the subcategories in “Cultural History” are the highest, followed by “Locations” and “Cinematography”. This shows that the participants think to have on average more knowledge about “Cultural History” and “Locations” than about “Cinematography”. From the 319 annotations 186 were categorized within the “Locations” category, 84 in “Cultural History”, and 49 in “Cinematography”. The data has a population

(n) of 444, with a mean of 2.29 that results in a standard deviation (σ) of 1.16.

A distribution of the amount of tags for each subcategory is shown in Figure 9. The high amount of “Locations” tags were expected based on the approachability of the category (in contrast with the other categories), and the fact that a lot of the answers could be found in the film’s title and description. Of the 319 annotations, 242 have timestamps. This demonstrates that even though timestamps are not required, still a lot of users used them to indicate in which time frame their annotations took place.

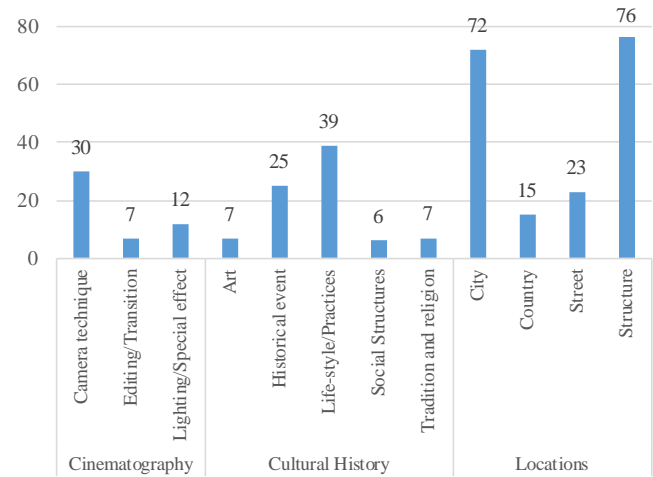


Figure 9. Tag subcategory distribution

The tags that were created contained on average 1.89 words, showing that short 1 to 2 word tags were used very commonly. Additionally, 114 annotations also contained long descriptions providing more information with the made tag then the 1 to 2-word tag.

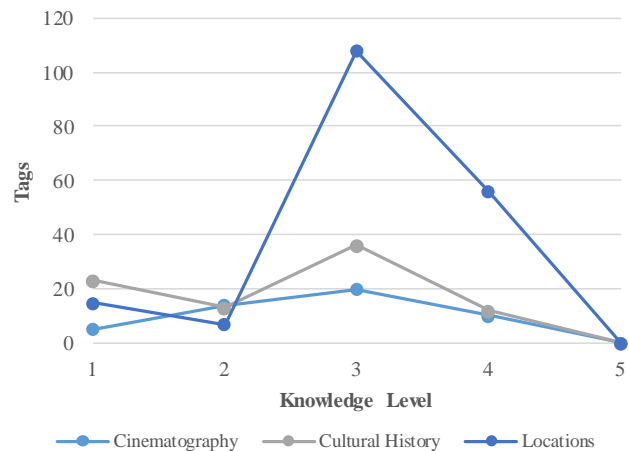


Figure 10. Tags per category distribution

Most of the annotations made by the users have a knowledge level of 3 and 4 (see Figure 10).

7.3.2 Part 2 results

Part 2 of the experiment has been conducted over two participants with a high level of domain expertise. During the experiment we observed that the participants had no issue with using the platform and it’s features. The participants went fast through the process of creating an account and submitting some annotations. The participants noted some issues with the user experience of the platform. First was mentioned that it was not clear that when hovering your mouse over the categories in the sign up page descriptions would pop-up. This could be addressed by

underlining the text or putting an info button next to the category. Participants also mentioned that it would be nice if the table could offer sorting options, this so the table can be sorted alphabetically or chronological. Overall the participants found the platform logical and easy to use.

Participants mentioned that the collected annotations do provide added value as it could show you how a film is structured. Participants were not sure if they would use the platform, mostly due to the current film collection. But when noted that the platform has the ability to change film collections and (sub)categories, participants were interested and could see many applications for the platform. It could be used by various researchers, institutes and museums with film collections. Participants mentioned it would be interesting to see what will happen if the platform is made available online for public use, and who would pick it up.

When participants started to extract the data from the platform, we observed no annoyances in the user experience. Annotations that were not relevant for the given scenario were deleted by one of the participants from the xls file, to streamline the experience. Finding relevant film fragments for the given scenario was easy and straightforward, with no participant having any problem. All the evaluated tags by the participants were correct and lead to relevant film fragments.

Participants found the gathered annotations useful and of quality for the given scenario but not for their own current research. If the participants could change the categories and film collection, it could be of use for them. The provenance information was not really relevant for the given scenario, and would not be used by one of the participants. Participants mentioned that the provenance information can add value if tags are collected over domains that are different from their own field(s) of expertise (an example was given of vehicle types in films).

8. DISCUSSION

In this section the findings of this research are discussed.

The created framework that describes the classification of annotations and on which the platform is build, has had much criticism from the film scholars. With the main reason that the interests of the scholars cannot be categorized in two focusses. The needs of the scholars vary heavily depending on their research questions, which makes it hard to classify them in one simple focus (as we see in section 4.1.1). The current framework has to be adapted to this finding, by allowing the scholar to assign their own categories instead of providing a closed list of categories.

During the gathering of annotations, many users participated in the platform. Nevertheless, the amount of experts using the platform was below expectations. With no user giving a knowledge level of 5, we can say based on the clarification of one expert that “experts are modest and a level of 5 is saying like you are perfect”. Due to positive feedback on the platform's functionality, it has been made publicly available on Github¹¹ (On the Github page documentation and instructions are available, detailing the setup of the platform). The platform offers researchers the flexibility to change the films and (sub)categories, so it can be repurposed by researchers to tailor to their research activities. The platform also had some shortcomings when it comes to the way descriptions pop-up, which have improved before the platform was made available.

After analyzing the gathered annotations, there were some interesting findings. We expected the locations category to gather

the most annotations and the cinematography the least, and this was accurate. The locations category got the most annotations mainly because it does not require a lot of domain specific knowledge like cinematography. Additionally, some films also had locations within their titles and/or description, making it easier for people to create location based annotations. It would be better if more experts would be recruited so more annotations would be created for categories like cinematography, mainly because the novices lack the knowledge to do so.

We also suggested that a higher knowledge level would lead to a higher amount of tags in that specific category. We found that there is an increase in the amount of tags that are made in level 3 and 4, over level 1 and 2. Although, level 3 has double the amount of level 4, and with no annotations for level 5, making that there is no direct correlation between the two.

While talking with the film scholars we found that they prefer to look at films themselves, and are less likely to trust other people's descriptions. This preference makes the gathered annotations on the platform good shortcuts to find specific videos that may be relevant for their research activities. The annotations provide the film scholar with descriptions, hyperlink, and a timestamp referring to the specific timeframe in the video. Going through a big offline or online film collection yourself can be a time-consuming task, but allow the crowd to make annotations for these films can help immensely. We saw that the film scholars liked the idea of having a platform which can be tailored to fit their own research activities, but also noted many other applications for the platform.

9. CONCLUSION & FUTURE WORK

In this research the goal was to figure out what film scholars need when it comes to annotations and provenance information. The results would be integrated in a framework and data model, so film scholars could use them for their research activities. Furthermore, these annotations should be gathered over a crowd- and nichesourcing user base. These research goals were formed in the main research question, which has been divided in 3 sub questions (as seen in section 3).

To answer RQA, we conducted literature research to study what kind of annotations would fit film scholars research activities. With the addition to interviews in which we questioned scholars what provenance requirements they have when it comes to crowd- and niche sourced annotations. From the results we can say that scholars focus on many aspects of film, but for this research the focus was on the Cultural, Documental, Aesthetic and Narratological parts of films (see section 2.3.2). Through the interviews it has become apparent that there is a lot of overlap between focusses, and that a scholar, or annotations, cannot be simply placed in one focus. This is mainly due to the varying research questions and research activities these scholars have.

To answer RQB, a platform has been created called “Filmtagging” allowing users to create an account in which they are obligated to fill in some personal and domain related information. This data is then stored in the created Filmtagging database (Figure 2). The database not only stores all the provenance data, but also allows end users to view these data. Allowing end users to see where the annotations came from and how reliable they are. Through the course of the research we noticed that the knowledge levels users had to specify were not clearly understood by some users. We detected that no user has classified them self as an expert (level 5) for any of the domains. This could be improved by letting people have a test that covers all the necessary subjects, which will score their knowledge. Additionally, it became apparent from the evaluation with end users that scholars don't need provenance information when it comes to annotations in their own domain of

¹¹ <https://github.com/AschwInx/Filmtagging>

expertise. But would rather have them when the domain differs from their own.

To answer RQC, an experiment is conducted with end users of the platform evaluating the user experience of the platform and gathered annotations. Within these experiments end users were given a research scenario in which they would use the platform for their research activities. From this experiment we can conclude that end users found the annotations to be relevant for their research activities. Indicating that the provided links to the related film in combination with timestamps, allows users to quickly find the film fragments they need.

Filmtagging provides a good platform for film scholars that allows crowd-and nichesourcing user groups to create annotations over interesting film collections, in addition to collecting provenance information. The platform can be used by film scholars as a tool in their research activities. However, for future work the following issues are taken into account for improvement of the platform: the varying information needs of the film scholars are hard to condense in a couple of categories, and one film collection. To show the broader validity of these claims, more experts could be interviewed and the annotation experiment could be performed with more film collections and users. Furthermore, the self-declared knowledge is not an ideal way of verifying a person domain knowledge, but necessary for this research to provide a smooth and not too cumbersome experience for the users. The platform has been made publicly available and allows for changes that can be made by people with basic web development skills. Thus allowing researchers to tailor the platform to their specific needs when it comes to the film collection(s), provenance information, and annotation categories. There are more features that could improve the platform but are not implemented due to time constraints. Features like crowd reviewing of annotations and tailoring the videos to the user's knowledge would be a valuable addition to the platform.

To answer the overarching research question, crowd-and nichesourcing results can be gathered and enriched with provenance information when providing the crowd with an annotation platform like Filmtagging. However, serving the varying information needs of the scholars is something that cannot be captured in one framework. To allow the platform to serve this need, scholars should be enabled to tailor the platform's framework themselves so it will align with their own information needs.

10. ACKNOWLEDGMENTS

I would like to thank all the people that have participated in this research, either by being interviewed or participating in creating annotations on the platform. Special thanks go out to my two supervisors Victor de Boer and Liliana Melgar for providing much feedback and help throughout the project. I also would like

APPENDIX A: Pre-evaluation interview transcript

Introduction

Greet the interviewee, introduce myself, explain research project, and show demo of the annotation platform.

PART 1: Information needs

Questions:

1. What kind of research activities do you perform in which you make use of crowd or niche gathered information/annotations?
2. What types of information/annotations are relevant for your research activities?
3. Would you prefer annotations in short tags (one or two words) or broader explanations (one or two sentences)?
4. Here is an example of annotations I would like to gather for the Cultural/Documental scholar:

to thank Mitchel Austin for providing support with the creation of the Filmtagging platform.

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Social History		
Social group/position		
Place	Cultural History	
Time		
Person(s)		
Emotion(s)		
Object(s)		
Action(s)		
Relationships		
Norms		
Desires		
Interaction		
Values		
Sexual orientation		
Habits		
Engagement		
		Historical event
		Place
	Time	
	Person(s)	
	Emotion(s)	
	Object(s)	
	Action(s)	
	Visual art(s)	
	Performing art(s)	
	Tradition(s)	
	Religion(s)	

Are these annotations sufficient, are some irrelevant or should others be added?

- From previous research I found that cultural/documental scholars focus on social and cultural history in film. Are these two focusses correct, and if so are there more focusses?
- What kind of film archive would you think will be beneficial to add to the platform?

PART 2: Provenance information

- Do you have any provenance information with the data you use for research activities? If so, what provenance information do you have, if not what provenance information would you like to have?
- Here is an example of provenance information I would like to gather with the annotations for the Cultural/Documental scholar:

- User id
- Creation time
- Social structures and process (e.g. the way people in society interact and live together)
- Social life-styles/practices (e.g. exercise, sexual activity, habits)
- Historical events
- Cultural Traditions/Religions knowledge level
- Cultural art

Is this information sufficient and is the self-declared knowledge trustworthy?

- For this project a user's knowledge for a particular annotation task will be measured on a scale from 1 to 5:

Levels (definitions are likely to change)

- No knowledge
- Little knowledge
- General understanding
- Good understanding
- Expert

Would this scale help in your opinion, with the reassurance of the quality of the annotations?

PART 3: Interview wrap-up

- Is there anything that I might have forget to ask and that you would like to add?
- Is there any material you think I should read for the master project?
- Exchange email for future questions
- Thanking interviewee for their time

APPENDIX B: Evaluation interview transcript

Introduction

Greet the interviewee, introduce myself, explain research project, and let interviewee use the platform for couple minutes.

PART 1: Evaluating platform (annotating)

Questions:

- Do you find the platform easy to use?
- Do you think the platform provides added value?
- Would you use this platform if you could tailor it to your research activities?
- Would you consider using the platform, when categories etc. are changed to your needs?

5. Overall, what do you think of the platform, and what would you change?

PART 2: Evaluating gathered annotations (search)

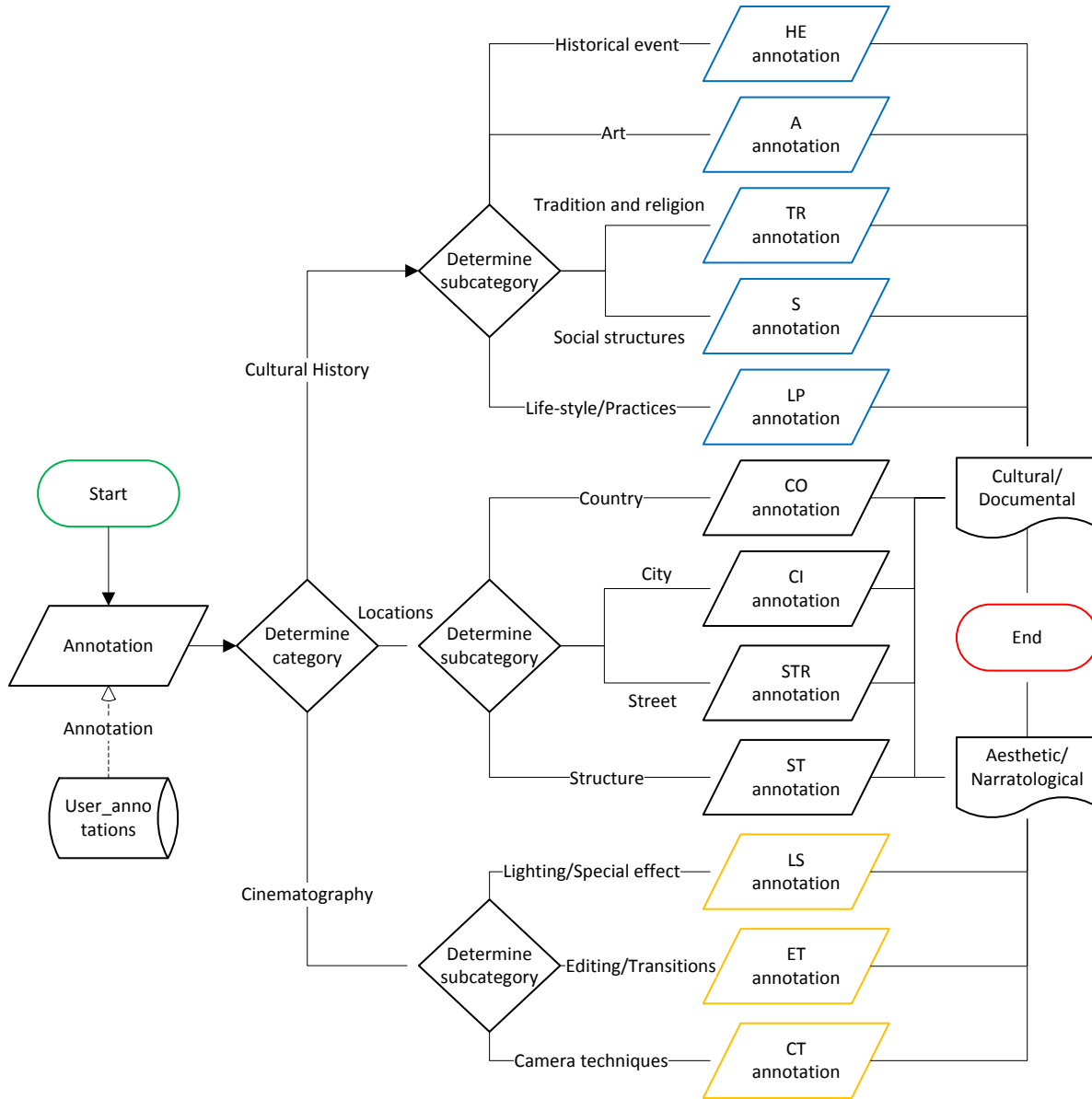
Questions:

1. Do you find the gathered annotations useful for finding video fragments you would need?
2. Do you find the annotations to be of quality?
3. Do you find the provenance information to add value to the annotation?
4. What would you change of the annotation data (add or remove things)?
5. What would you change of the provenance information (add or remove things)?

PART 3: Interview finished

1. Is there anything that I might have forget to ask and that you would like to add?
2. Thanking interviewee for their time

APPENDIX C: Annotation Classification Framework



APPENDIX D: Filmtagging database

