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Europeana: What Users Search For and Why

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Abstract. People use digital cultural heritage sites in different ways and for various purposes. In this paper we explore what information people search for and why when using Europeana, one of the world's largest aggregators of cultural heritage. We gathered a probability sample of 240 search requests from users via an online survey and used qualitative content analysis complemented with Shatford-Panofsky's mode/facet analysis for analysing requests to visual archives to investigate the following: (i) the broad type of search task; (ii) the subject content of searches; and (iii) motives for searching and uses of the information found. Results highlight the rich diversity of searches conducted using Europeana. Contributions include: collection and analysis of a comprehensive sample of Europeana search requests, a scheme for categorising information use, and deeper insights into the users and uses of Europeana.

Keywords: Search tasks, digital cultural heritage, Europeana

1 Introduction

Users from diverse backgrounds are coming to cultural heritage websites and information services with increasingly varied goals, tasks and information needs [19]. There is a need to provide systems that go beyond keyword-based search and support wider information seeking behaviours, such as browsing and exploration [11,22]. Users' individual differences (e.g., age, gender, domain knowledge and learning style), search task and context (e.g., location and time), are known to affect the ways in which people search for information. Typically people search such sites not as an end in itself, but rather as part of their broader work (and leisure) tasks and informational goals: "Searching is merely a means to an end - a way to satisfy some underlying goal ... 'why are you performing that search?'" [16, p. 13]. Having a better understanding of users, their goals and tasks can therefore help with the design of more effective information systems.

Task-based information retrieval is a popular area of study. Byström and Hansen [4] characterise tasks at three levels: (i) information intensive *work tasks*; (ii) information *seeking tasks*; and (iii) *information search* (or information retrieval) tasks. The work task is often a trigger for someone's interaction with a search system. However, focus has increasingly turned to non-work settings,

e.g., casual-leisure, where other factors such as curiosity or free time can trigger people's information seeking activity [7]. For cultural heritage information services, such as Europeana, users carrying out both work and casual-leisure tasks will initiate their interactions and therefore should be studied [18]. In this paper we provide an in-depth study of tasks for Europeana, mainly at the level of the search task, which has previously not been conducted. In particular we consider the following research questions: [RQ1]: What information do users search for using Europeana? and [RQ2]: What do users use this information for? The paper is structured as follows: Section 2 describes related work; Section 3 describes the methodology used in this study; Section 4 describes the categorisation of search tasks; Section 5 provides the results and Section 6 concludes the paper and provides avenues for future work.

2 Related Work

2.1 Goals, Tasks and Activities

The terms 'task', 'goal' and 'activity' are often used interchangeably when describing users' seeking behaviours. More formally a *task* is "what someone does to achieve a goal" [9, p. 56]. In the context of information seeking, a task is defined as "the manifestation of an information seeker's problem and ... what drives information seeking actions" [14, p. 36]. Tasks are driven by underlying *goals* (the purpose or intent of the activity) and can be differentiated based on the specificity of the goal, the quantity of information to be searched and the expected time to complete the task. The lowest level of task (search task) involves a user searching using a specific application (e.g., search engine). White [21] defines a search task as an "atomic information need resulting in one or more queries." Ingwersen and Jarvelin [10, p. 20] define a search task as "... a means to obtaining information to fulfil a work task, and include information need generation, information interaction and search task solving." Tasks invoke *activities*, which can occur at multiple levels [4]. For example, at the level of information seeking this could include query formulation, results examination, etc. Studies have been carried out to investigate the broad range of information-related activities people undertake, particularly on the web. For example, Sellen et al. [17] describe six types of activity carried out on the web: finding, information gathering, browsing, transacting, communicating and housekeeping. Similarly, Kellar et al. [12] use the following categories (and sub-categories): (i) information seeking (fact-finding, information gathering, browsing); (ii) information exchange (transaction and communication); and (iii) information maintenance. In this paper we consider search task level as people search using Europeana.

2.2 Search Tasks and Goals in Cultural Heritage

Amin et al. [1] investigated the information seeking behaviours of cultural heritage experts as they carry out their daily search activities. This included identifying their search motivations, types, sources and tools, and categories of information task (based on [12]). For experts, a majority of search tasks involved

complex information gathering (e.g., finding information to compare similarities and differences between objects). Contrasting with experts, Skov [18] carried out a study of online museum visitors in an everyday life information-seeking context. Based on results from a web-based questionnaire and follow-up interviews with 24 participants, the information needs of enthusiasts were identified and generally were found to be for well-defined known items and not for more exploratory information needs, e.g. "Seek information on King Christian the Tenth's hunting weapons (writing a journal article)." In this study we specifically consider types of information seeking and searching tasks from multiple user groups (e.g., professionals and casual users).

A number of prior studies have also been conducted to understand Europeana's users. For example, Europeana's 2014 survey [8] showed that the majority of users were in the 25-54 age group and many (27%) were first-time users with 72% visiting the site a few times a month or less. The most common reason for visiting the site was exploration within a topic (32%) with finding out more about Europeana a close second (30%). Most respondents came to Europeana through a link from another website. Results and further data collected from user studies and transactions logs has served to inform a series of Europeana personas: "each persona represents many users and a set of personas represents a spectrum of the target user groups" [15, p. 106]. In addition, user studies lead to the specification of two distinct types of Europeana user (see D3.1): (i) 'culture vultures' and (ii) 'culture snackers'. The former group are dedicated enthusiasts and professionals: they have domain expertise and likely lifelong enthusiasts of cultural heritage (likely to be returning users and mainly wanting to use Europeana to find resources to use in their own work, gain knowledge, expertise or inspiration). The latter group are more representative of the novice or general user who come with lower levels of technical/domain expertise and typically engage for general interest. Our work complements these existing studies.

3 Methodology

Various approaches have been employed to investigate search tasks, including diary studies and interviews [1], analysing samples from query logs [2,3] and pop-up web surveys [3]. In this study we made use of a web-based pop-up survey from which we could gather responses from actual users of Europeana as they carried out their searching activities. Such approaches are commonly employed in web surveys (e.g., usability testing and gathering feedback) and in the future we plan to aggregate this with other methods of data collection to provide richer insights of users' information searching behaviour.

3.1 Pop-up Web Survey

The pop-up web survey is a form of intercept survey where systematic sampling is used to intercept visitors of a website. Creating the pop-up survey involved multiple iterations (including pilot testing), particularly in relation to question

Table 1. Questions (first 6 out of 10) used in the pop-up survey.

No.	Question	Response
1	How often do you visit Europeana?	*[Everyday, At least once a week, At least once a month, Less than once a month, This is my first visit]*
2	How would you identify yourself	*[Cultural heritage enthusiast, Student, Academic, Teacher, Cultural heritage professional, Other]*
3	How did you get to Europeana today?	*[Via a link from a search engine, Via a link from social media, I knew about the site already so came directly here, Via a link from teaching resources, Other]*
4	What information are you looking for right now?	*[Open]*
5	Why are you looking for this information?	*[Open]*
6	After finding this information, you will:	*[Look for more information on the same topic using Europeana, Look for more information using other resources, Browse Europeana (e.g., look for other interesting things), Have completed everything you need to do, Other]*

design. We attempted to balance participant time and effort against the need to capture sufficient detail about users' current search activities in a fairly unconstrained manner. We therefore devised a set of 10 questions (the first 6 shown in Table 1, the remainder asking participants' level of subject knowledge and suggestions for further improvements to Europeana) that could be shown to users at any point during their interaction with Europeana.

The design of Q4 and Q5, the main focus of this paper, were modelled on Broder's pop-up survey [3] to investigate users' search goals. The wording of other questions was based on prior literature and surveys, including past Europeana studies. To aid users' interpretation of questions we provided additional text. For example, in the response options for Q2: "Cultural heritage enthusiast (e.g., hobbyist, genealogist, amateur historian)". Also, in Q4 and Q5 we provided example text to ensure sufficient input. For example, in Q4 we provided the following examples: " 'I want to find an image of the Mona Lisa', 'I'm trying to explore what's available in Europeana on World War I', 'I am looking for photographs of Sheffield in the 1980s', 'I am looking for artwork by Leonardo Da Vinci', or 'Don't know / nothing specific' ".

The survey was administered using the Hotjar service Europeana routinely employs for user surveys. The survey was administered in English and was shown to 30% of users (later increased to 66% to increase response rates) who visited Europeana using desktop or tablet devices. The survey was triggered when users scrolled halfway down either a search results page, or a Europeana item page. Users who completed the survey were given the opportunity to enter a prize draw to win a €50 Amazon voucher. In addition to the questions posed in the pop-up survey, Hotjar also captured the date and time of submission and the respondent's country of origin. The study was approved by the University of Sheffield's Ethics Committee.

3.2 Data Analysis

The majority of analysis effort required for this paper related to the free-text responses for Q4 and Q5. These were used, along with responses from other questions, to investigate the following aspects of users' search tasks: (i) the broad *type* of search activity; (ii) the *subject content* of the search request; and (iii) the *motive* for conducting the search and *use* of the information found. The general approach adopted in analysing the data was *qualitative content analysis* based on Zhang and Wildemuth [24]. This was mainly an inductive approach, but informed by existing frameworks where applicable. For example, we utilised an approach for analysing requests to archives and libraries serving audiovisual content [2]. Following the development of various categorisation schemes (see Section 4) we involved a further researcher to validate the scheme (a sample of 50 responses, achieving around 76% agreement) after which we discussed differences and refined the scheme (and amended our coding) where necessary. For statistical analysis IBM's SPSS (version 22.0.01) was used.

3.3 Participants

The pop-up survey ran for 2 weeks (21 March – 4 April 2017) and elicited responses from 240 users of Europeana from 48 different countries (Spain 12.9%, US 8.9%, Italy 8.9%, France 7.1%, Germany 6.7%, UK 6.3%, Netherlands 4.2%, Sweden 3.3%, Hungary 3.3%, Brazil 2.9%). The majority of users were first time visitors to Europeana (27.1%); with 26.3% visiting at least once a month, 22.9% visiting less than a month, 20% visiting at least once a week and 3.8% visiting every day. Participants mainly came to Europeana having already known about the site (48.8%); with 34.2% arriving via a link from a search engine; 5.8% via a link from teaching resources; and 5% from a link via social media. The majority of respondents (30.4%) described themselves as academic. This group was followed by cultural heritage enthusiasts (24.6%); cultural heritage professionals (18.3%); students (13.3%); school teachers (4.6%); and others (8.8%).

4 Analysis of the Search Requests

One of the major challenges was analysing the rich data provided by the free-text responses describing users' search requests: Q4 (mean=10.1 words, min=1, max=49) and Q5 (mean=8.3 words, min=1, max=72). In the end we made use of the categorisation scheme by Armitage and Enser [2] for analysing the subject content of user requests for still and moving visual images. This approach has been applied in various previous studies [5,6] and proved to be readily applicable to Europeana's search requests (Q4), which commonly refer to audiovisual content. In this approach to subject analysis search requests are represented in a 2x2 matrix of unique/non-unique, refined/unrefined queries. Unique (or specific) subjects are "those concerned with named individuals, one-off events, singular objects or location" [2] (p. 288) - for example, 'images of Stuttgart', 'rare old

images or texts about constantinople'. Non-unique (or general) subjects concern more generic subjects, kinds of people, events and places. For example: 'I am looking for images that convey the scope of humanitarian aid today' and 'I want to find informations about caricatures'.

In situations where the request contains both unique and non-unique aspects (e.g., 'Rio carnivals') then refinements can be used (e.g., a non-unique subject 'carnivals' refined by location 'Rio'). Although conceptually this offers a simple approach to analysing requests there are a number of difficulties faced when applying this in practice, especially in determining between the main subject of the request and its refiners [2]. For example, 'maps of Dublin' - is the request a general subject (maps) refined by location or vice-versa? Also, in the simple categorisation details of the subject content of the request are lost; therefore, Armitage and Enser [2] make use of Shatford-Panofsky's modes of image analysis in the form of mode/facet analysis. In this approach each subject element of the query is categorised as specific or general capturing aspects of 'who', 'what', 'where' and 'when' (see Section 4.2).

4.1 Categorisation of Search Task

Search tasks can be categorised in various ways, such as by goal or intent, complexity, search tactics and moves, timeframe and specificity [13,23]. Many of the prior schemes, however, are specific to web search and less suited to cultural heritage. In addition, there are a multitude of definitions[3] categorising information seeking and searching tasks. Toms [20] distils search tasks into two main categories: (i) specific item or information object (finding specific pieces of information, e.g. known-item, fact-finding, closed, transactional and navigational, name of person/organisation, etc.); and (ii) general topical search (finding information about a topic, e.g. informational, open, etc.). In this study we coded the search requests (mainly Q4) based mainly on the specificity of subjects expressed in the search request and search goal. The preliminary analysis of requests as unique or non-unique was useful in identifying whether people may be searching for specific subjects (unique) versus more general topic searches (non-unique). We used the following categories:

Specific-item search: Search for specific item (i.e., known-item) typically expressed precisely (e.g., using title of book), e.g., "Boletín Oficial de Instrucción Pública", "I am looking for the 1919 film 'Les fetes de la victoire.' "

By named author: Search for information by a specific named author (or provider), e.g., "to look at paintings by Henriette Ronner", "I am searching for images of artifacts from the Regional Archaeological Museum Plovdiv." If referring to a known-item, however, we treat this as a specific-item.

Specific-subject search: Find information for specified (or named) subject (i.e., person, place, location, etc.) forming the main subject of the request, e.g.,

[3] For example, see the database of search tasks developed by Wildemuth et al.: https://ils.unc.edu/searchtasks/ (site visited: 20 June 2017)

"I am looking for pictures of Stuttgart", "I'm looking for plans and images of Clermont-Ferrand."

General topical search: Find information for general subject, e.g., "Italian medieval iluminations", "Looking at examples of art made by women."

Browsing/Exploring: Used to identify searches where the user has no specific goal, e.g., "I am trying to explore the world through what is available in Europeana", "I'm just browsing your collections."

Ambiguous or unclear: Examples where the search request is unclear or difficult to determine category, e.g., "I'm an Opera lover", "book."

4.2 Categorisation Based on Mode/Facet Analysis

Analysis of the subject of the search request was based on the approach described in Armitage and Enser [2]. Components of the search request were categorised using the following codes:

- **General object/thing** (e.g., 'paintings', 'explorers accounts')
- **Specific object/thing** (e.g., 'Prelude, Op. 28, No. 7, by Frédéric Chopin')
- **General person/group** (e.g., 'working women', 'historical figures')
- **Specific person/group** (e.g., 'Saint Francis of Assisi')
- **General location** (e.g., 'public places', 'where my ancestors lived')
- **Specific location** (e.g., 'Spain', 'Norfolk')
- **General event/action** (e.g., 'working', 'privatization of school system')
- **Specific event/action** (e.g., 'Great War', 'black death')
- **General time** (e.g., 'medieval', 'today')
- **Specific time** (e.g., '1940', 'XIX century')

We also introduced additional codes we felt useful for analysing the search requests and adding further detail:

- **General subject** (e.g., 'art', 'history')
- **Creator** or **Provider** (e.g., "paintings by Van Gogh", "items from Vienna National Museum")
- **Nationality** (e.g. 'Icelandic art works')
- **Language** (e.g., 'books written in Italian')
- **Availability** (e.g., 'free open-source 3d models', 'public domain')
- **Response** (e.g., 'looking for a *nice* painting)

The categories were then used to identify the subject components of a search request. For example, "Great War photographs taken on exactly 100 years ago" would be coded as 'Specific event/action (Great War) + Specific time (100 years ago)'. The following example "I want to find information about old routes/-path in the South West of Spain" would be coded as 'General object/thing (old routes/path) + Specific location (Spain)'. During the coding, each type of subject category is applied just once (e.g., if multiple specific people are mentioned this is recorded as just one occurrence of 'Specific person/group'). In practice the requests are typically short enough that multiple occurrences of the same type do not occur. Finally, analysis is also performed to identify the **Medium** category, i.e. terms in the request where the user specifically refers to a media type (e.g., image, video, text, etc.).

4.3 Categorisation of Motives and Use

A final part of the analysis considered why people were searching for information during their current activity. This typically elicited from users a specific purpose for searching Europeana (e.g., work task or personal interest) and often the use to which the information gathered would be put. No prior suitable scheme could be found to categorise information use for our data, therefore we create a taxonomy for the various motives given by users for their search:

To create a new work: In this category, the purpose of the user is ultimately to create some new cultural artefact of some kind. The most common examples of this kind of task in the responses are monographs, articles, and visual art-pieces. This category can be subdivided in terms of:

- **task closure**: works can be considered *'open-ended'* if the user is the person who chiefly decides upon the form and content of the artefact produced (e.g., academic research). Works for which the form and subject are assigned by others can be considered *'closed'* (e.g., school/university assignment). In cases where this is not apparent, the task closure were coded as '*not specified*'.
- **modification**: this sub-category describes the extent to which the found content will be transformed by the user in production of the new work. At one end are *'remediated'* cases in which the user is looking for 'inspiration': here, the contribution of the found content to the end product may be completely unrecognisable to anyone except the artist who created it. At the other end (*'unmediated'*) are tasks in which the user is simply looking for an image to illustrate, e.g. a presentation or pamphlet, where the found content is essentially cut-and-pasted into position. While judgements of degree of remediation are necessarily to some extent subjective, where the user does not specify guidance can be found in the kind of output envisaged – monographs and articles will typically involve significant remediation; presentations, flyers and Tweets will normally demand less. The user's anticipated next steps are also indicative: if the user considers that the task will be essentially complete once the content is found, they presumably envisage little modification being required.
- **type of output**: this sub-category defines the kind of output produced, e.g. textual.

For example, "a work of Edmund Husserl" (Q4) and "to write a paper" (Q5) would result in 'Create new work - Open-ended - Remediated - Textual'.

Professional activity: This category is intended to capture the activity of (chiefly) academics and cultural heritage professionals where the focus is purely research- or monitoring-oriented, and no precise output from the search is anticipated. For instance, a researcher may simply be attempting to keep abreast of current developments in their field, or a curator may be checking up on how their institution's content is displayed on the Europeana platform itself. Note that this category does not cover casual users who are simply 'checking out the site'; the search task must be specifically focused upon some job- or learning-oriented task.

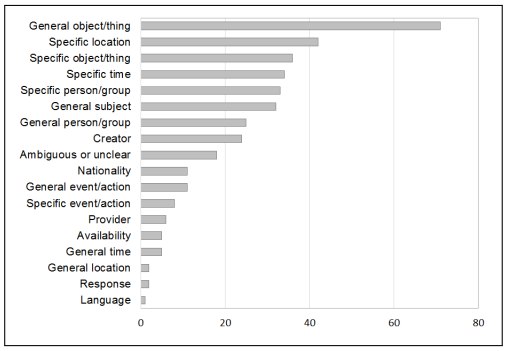

Fig. 1. Frequency of occurrence for each mode/facet in search requests.

Personal interest: The information will be used for personal or general interest. This interest may be of one of two types: *'transient'* or *'sustained'*. Transient interest is a focus that lasts for the length only of a single session: although the user's interest is piqued, they have little prior knowledge of or investment in the topic or object being searched for. Users who enter the site via social media links will often be of this type. Sustained interest lasts over the course of more than one session. Users will often speak of having a 'collection' of items related to their search, or describe antecedent searches that have led them to this point. Genealogical research can also be considered a sustained interest.

Teaching: The user is a person in a teaching role, and using the site to produce teaching resources - e.g., lesson plans and assignments.

Other: This category includes any other activities not included above.

5 Results and Discussion

5.1 RQ1: What Information are Users Searching for?

Results show that the largest single search category (47.1%) of tasks is *general topical search*. This is followed by *specific-subject searches* (24.6%); *specific-item searches* (11.3%); searches by *named author* (7.1%) and *browse/explore* (7.1%). Broken down by group, we observe that the highest proportion of specific-item searches (63%) come from academics, while the highest proportion of browse/explore searches (29.4%) come from cultural heritage enthusiasts. We also note differences based upon referrer: the greatest proportion of general topical searches (51.3%) come from people who already knew about the site and so came directly to it; whereas the greatest proportion of specific-item searches (48.1%) come from people coming to Europeana via a search engine link.

The mode/facet analysis helps to provide insights into the subject content of search requests. First, we calculate the frequency of occurrence of each type of mode/facet (not including *Medium*). As shown in Figure 1, the most frequent mode/facet is *general object/thing* (71 occurrences), followed by *specific location* (42 occurrences). Search requests comprise an average of 1.53 modes/facets

(min=1, max=5). The most common combinations are "Creator + Specific object/thing", such as "I want to find some information about a painting of Willem van de Velde, 'Het kanonschot'" (9 occurrences), and "Creator + General object/thing" (8 occurrences), e.g., "I am looking for artworks by Leonardo da Vinci". We find that the *Medium* mode/facet is commonly used to refine the search (81 occurrences), e.g., 'images of Stuttgart' and 'I am looking for photographs of The Trachian tomb near to village of Mezek, Bulgaria.'

5.2 RQ2: Why are Users Searching for the Information?

The results of analysing the search requests based on users' motives for conducting their search activities and the potential uses of the information once found also provide interesting insights into how users search Europeana. Table 2 shows the breakdown of search requests based on the analysis of motives and use carried out in Section 4.3 and cross-tabulated by search task.

The majority of users (37.1%) were searching Europeana with the intention of using the information found to *create a new work*, e.g. "to write a book", "to prepare an exhibition", "to use images for a presentation", and "to find additional material for my PhD-thesis." Inspecting this category more closely through the use of the sub-categories, we find that in 83.9% of cases the users were involved in 'open-ended' tasks (e.g., scholarly research), 14.9% in 'closed' tasks (e.g., school assignment), and 1.1% unspecified. Furthermore, in the modification sub-category, we found that 36.8% of users represent 'unmediated' cases, i.e. they would be making use of the information found (typically images) without modification (e.g., to illustrate an article or presentation), whilst 57.5% are 'remediated' cases. Our results also show that 64.4% of the newly created works would be textual in form (e.g., academic article); with 6.9% in a visual form; and 3.4% in audiovisual form.

Under the category of *personal interest* (27.5% of search tasks) we find that users are typically cultural heritage enthusiasts (e.g., family historians), with Europeana serving as one of their genealogical resources. We categorised 57.6% of cases of personal interest as 'sustained', i.e. the users are likely to have an interest in the topic beyond their current search activity on Europeana; 13.6% were categorised as 'transient'. Examples of responses for personal interest include "to enrich my personal archive" and "inspiration and general interest."

We categorised 20.8% of search tasks as *professional activities*, with examples including "it's my job", "fits in with my research project" and "to check whether the information was correct." Finally, 7.9% of search tasks were categorised under the *teaching* category, e.g., "to illustrate a university lecture." Breaking down motivation by search task (Table 2), in the case of specific-item searches information from 48.1% of searches is used to create a new work, commonly reflecting the greater search for specific-items by academics. In contrast, for specific-subject searches the majority of search tasks are split between personal interest (44.1%) and creating a new work (42.4%). The results highlight, again, the differences obtained based on the user's search task. (Dataset available for download from: http://bit.ly/europeanaSearchTasks)

Table 2. Cross-tabulation of users' motivation for searching vs. search task.

	Browse/ explore	**By named author**	**General topical search**	**Specific-item search**	**Subject-specific search**	**Total**
Create new work	17.6%	23.5%	37.2%	48.1%	42.4%	37.1%
Personal interest	35.3%	29.4%	22.1%	11.1%	44.1%	27.5%
Professional activity	11.8%	41.2%	26.5%	22.2%	5.1%	20.8%
Teaching	17.6%	5.9%	5.3%	14.8%	8.5%	7.9%
Other			0.9%			0.4%
Ambiguous / unclear	17.6%		8%	3.7%		6.3%
Total	100%	100%	100%	100%	100%	100%

6 Conclusions and Future Work

Digital cultural heritage sites, such as Europeana, are being used by increasingly diverse groups of users with varying needs and goals. In this paper we have investigated, through gathering a sample of users' search requests from a web-based survey, the types of searches conducted on Europeana, users' typical motives for searching and common uses of the information found. Existing methods for analysing the subject content of search requests to audiovisual archives were used to better understand the searches. A new scheme was designed for categorising users' search motives and subsequent uses of information found. As well as providing insights into search behaviour for Europeana, the results also help better understand search tasks more generally in cultural heritage across a wider range of users types than previously studied. We recognise there are limitations in our study (e.g., subjectivity in the coding, use of online survey only to elicit search requests) and therefore aim to pursue a number of avenues for further work. This includes validating and developing a more refined categorisation scheme, conducting deeper analysis of the current dataset, and combining the data from this study with data derived from other sources, such as search logs and diary studies, to gain deeper insights into aspects of users' search activity.

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