Constructing an image indexing template for the Children's Society: Users' queries and archivists' practice

Conduit, Neil; Rafferty, Pauline

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Constructing an image indexing template for The Children's Society

Users' queries and archivists' practice

Neil Conduit
The Children's Society, London, UK, and
Pauline Rafferty
Department of Information Studies, City University, Coventry, UK

Abstract

Purpose – The purpose of this research is to describe the development of an indexing template to guide the indexing of images using keywords. The template is designed to be used for indexing the image collection held at The Children's Society.

Design/methodology/approach – A facet matrix based on analysis of existing studies was used to identify the most popular user query facets from user studies in the literature. A total of 33 archivists were surveyed regarding indexing practice and indexing wish-lists. The results of these investigative activities were synthesised to produce an indexing template.

Findings – The results of this study suggest that indexing general entities and activities could be more comprehensive than is currently the case. A practical indexing template is proposed for organisations wishing to index image collections.

Originality/value – This article reports a project undertaken on behalf of The Children's Society to design an image indexing system for use with their photographic collection. Its method of enquiry is based on an application and interpretation of the Shatford-Ensor matrix.

Keywords Image processing, Indexing, User studies, Archiving

Paper type Research paper

Indexing images

Subject indexing is fundamental to the process of information retrieval generally. In image indexing, subject indexing requires some kind of image analysis and subsequent representation of the subject. There are two basic approaches to this problem, text-based image retrieval (TBIR) and content-based image retrieval (CBIR). CBIR approaches are based on indexing images without using words. This can be done using content descriptors such as colour, texture or shape (Eakins and Graham, 1999), and is used in trademark recognition and fingerprint matching (McDonald *et al.*, 2001). The alternative to CBIR is text-based image retrieval. The chief problem acknowledged by virtually all commentators on text-based image indexing is that of the subjectivity of the indexer (e.g. Shatford, 1986; Markkula and Sormunen, 2000). It is unlikely that two indexers would use the same terms to describe an image, and it has even been suggested that the same indexer may well index an image differently at different times (Bjarnestam, 1998, p. 6).

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A novel approach to the notion of subjectivity has been proposed in the development of user-based indexing. Clusters of user-generated subject terms are sometimes called "folksonomies" (Vander Wal, 2005). This approach to indexing is used on the Flickr (2007) website (www.flickr.com), in which users are invited to "tag" (index) images, usually their own photographs. The approach seems to be largely self-regulating. This is perhaps a way for a fairly small homogeneous group to index their photographs, but it is arguable whether it is suitable for image retrieval generally (Rosenfeld, 2005).

The question of determining meaning in images is a complex one, acknowledged by many writers in the field (e.g. Burke, 1999; Enser and McGregor, 1992, 1995b; Krause, 1988; Shatford, 1986; Shatford-Layne, 1994; Svenonius, 1994). Effective access to an image collection requires comprehensive subject metadata (Enser, 2000, p. 201), and despite the increased strain on resources, aspects to consider for indexing include context and emotion (Markkula and Sormunen, 2000, p. 32).

In "Iconography and Iconology" Erwin Panofsky (1993, pp. 53-4) [1955] identified different types of meaning in art, and constructed a framework of meaning, which he applied to the interpretation of Renaissance art. This model has since been used by information scientists interested in mapping the specificities of meaning in images. Panofsky distinguished between primary, secondary, and intrinsic meaning in renaissance artworks. Primary or natural subject matter, subdivided into factual and expressional subject matter, is the pre-iconographical level of art, which is "apprehended by identifying pure forms, that is: certain configurations of line and colour, or certain peculiarly shaped lumps of bronze or stone, as representations of natural objects such as human beings, animals, plants, houses, tools and so forth; by identifying their mutual relations as events; and by perceiving such expressional qualities as the mournful character of a pose or gesture, or the homelike and peaceful atmosphere of an interior. The world of pure forms thus recognised as carriers of primary or natural meanings may be called the world of artistic motifs".

Secondary or conventional subject matter depends on cultural knowledge and is called the iconographical level of art. Intrinsic meaning or content "is apprehended by ascertaining those underlying principles which reveal the basic attitude of a nation, a period, a class, a religious or philosophical persuasion – qualified by one personality and condensed into one work" (Panofsky (1993, p. 55) [1955]. Intrinsic meaning is a synthesis of information gathered at the first two levels of meaning with additional information, which might include information about the artist and the socio-political cultural moment of production. Iconological interpretation depends on "synthetic intuition", an attribute that might be more often found in the talented layman than the erudite scholar. Where this level of meaning depends on "subjective and irrational" sources it is all the more important that "objective" correctives relating to documentary sources and history are applied.

Peter Enser (1995a) relates Panofsky's levels of meaning to images in general, arguing that iconography refers to specifics, pre-iconongraphy refers to generics, and iconology refers to abstract meaning, while Mary Burke constructed her own version of Panofsky's table of levels of meaning (1999). Both Burke and Enser emphasise the subjective interpretational aspects of iconological content, but Rafferty and Hidderley (2005, p. 14) remind readers of Panofsky's own insistence that the more such interpretation is based on individual psychology and "Weltanshauung", the more crucial it is that objective correctives be applied.

Project research method

In this project, a facet matrix based on analysis of existing studies was developed as a methodological tool to identify and rank the most popular user query facets from user studies in the literature. The results of this activity produce what we call "the users' view". A small number of online image databases were surveyed and the most widely used access points identified. A number of archivists were surveyed regarding these access points to evaluate current indexing practice and indexing wish-lists. The results of these activities produce what we call in this study "the archivists' view". The users' views and archivists' views were used to inform the design of an indexing template.

Determining the users' view

A number of studies of user queries have been conducted in order to ascertain the needs of users for image retrieval. Some of these studies were carried out on collections that were quite limited in subject matter (e.g. art history; medicine). The rationale for this present research was to attempt to analyse as broad a range of user queries as possible, thereby trying to represent the diverse range of potential user groups that may require access to an image collection. To this end, ten previous user query studies were identified from the literature, and of these seven were included in the present study. The seven studies analysed are briefly described in Table I.

Table I.
Seven user studies

Authors	Extent of study and subject material covered
Enser and McGregor (1992)	An analysis of 2,722 queries submitted to the Hulton Deutsch Collection
Keister (1994)	100 queries submitted to the Prints and Photographs Collection of the National Library of Medicine between 1984-1991
Jörgensen (1996)	Images from the 25th Annual American Society of Illustrators awards, subject-matter from the realistic to fantasy. Images were presented to an academic user group who described and retrieved images. The 1996 study included the empirical results of the 1995 unpublished doctoral thesis, and thus considered suitable for inclusion in this study
Armitage and Enser (1997)	1,749 queries submitted to seven diverse image libraries
Collins (1998)	Analysis of 187 queries over a four-month period: 100 queries from the Photographic Archives of the North Carolina Collection (Wilson Library, University of North Carolina); 87 from the photographic section of the North Carolina State Archives
Chen (2001)	Three reviewers mapped image queries generated by 29 art history students to the facets/categories used in three previous studies: Enser and McGregor (1992); Jörgensen (1996). (As the original queries were unavailable, Fidel's study is not included here.)
Choi and Rasmussen (2003)	An analysis of 38 queries, 185 search terms and 219 descriptors by 38 faculty members and graduate students of American history

These seven user query studies evaluate the original natural language queries according to different facet analyses. This study attempts to identify a common approach. The raw queries were not generally available for most of these previous studies, and so an approach was sought that could be applied to each of the user studies being considered, such that all the queries could be analysed from the same point of view. Given the diversity of the facet analyses employed in these studies, it was considered that the present work would best be served by using a general, high level facet analysis. The seven user query analyses were evaluated to determine whether any common facet analysis did in fact exist. Five studies employed their own facet analysis, but two (Armitage/Enser and Choi/Rasmussen) used the same approach, based on Sara Shatford's interpretation of Panofsky's three levels of meaning of an image (Shatford, 1986, p. 43).

Shatford's mode facet matrix identifies the pre-iconographic level as "generic Of"; the iconographic as "specific Of"; and the iconological as "About" (Shatford, 1986, pp. 43-5). The facets: who, what, where, when were applied to each of these three modes (Choi and Rasmussen, 2003, p. 500), giving twelve mode facets to apply to an image. Armitage and Enser (1997, p. 287) slightly adapted this, and it is the Armitage and Enser modified Shatford matrix that is used in this study as a research instrument against which to map facets in seven user studies. Shatford's "ofness" and "aboutness" distinction mapped on to interpretations of Panofsky's model appears to be generally accepted as a useful foundation for modelling image retrieval systems (see for example, Burke, 1999; Rafferty and Hidderley, 2005; Turner, 1995), and so would seem to be a reasonable basis for constructing a research instrument. Table II shows the Shatford-Enser mode facet matrix.

The mode facet matrix was applied to each of the user studies described in order to categorise all the queries according to a common facet analysis. Enser and McGregor's study analysed 2,722 queries, of which 457 queries were listed verbatim (a representative cross section of subject matter). Codes from the matrix were applied, appropriate for each element of the query, virtually all the queries having several codes applied to them. The number of occurrences of each code was totalled, and the result converted to a percentage of the total. Keister's study analysed 100 queries, which were not strictly verbatim, but were "reconstructed [...] from staffers' cryptic notes" (Keister, 1994). Given the high level analysis employed in this study, the rewording

	Code	Iconography (specifics)	Code	Pre-iconography (generics)	Code	Iconology (abstracts)
Who?	S1	Individually named person/group/thing	G1	Kind of person/thing	A1	Mythical or fabulous being
What?	S2	Individually named event/action	G2	Kind of event/action/condition	A2	Emotion or abstraction
Where?	S3	Individually named geographical location	G3	Kind of place geographical/architectural	A3	Place symbolised
When?	S4	Linear time: date or period	G4	Cyclical time: season/time of day	A4	Emotion/abstraction symbolised by time

Source: Armitage and Enser (1997, p. 290)

Table II.
Panofsky-Shatford mode facet matrix

was not considered likely to alter the results to any significant degree. Codes were assigned as above, and results likewise given as a percentage of the total.

Jörgensen study was less straightforward to use in the context of this project than the other two as Jörgensen used her own facet analysis. Her 12 facets, referred to as classes in her study, were more specific than Shatford's model, and it was first necessary to map Jörgensen's classes to Shatford's mode facet matrix. The facets used, together with the code assigned from the matrix are given in Table III.

The classes that have two codes assigned to them were dealt with by splitting the class type into general and specific i.e. S codes and G codes from the matrix. For the queries in Jörgensen's study that generated two matrix codes, the totals were divided equally between the two codes, thus the total generated for the "people" class was split equally between S1 and G1. Without access to the original queries it was impossible to judge what proportion of "people" were named or not. As a matter of interest, this study was temporarily removed from the calculations, and as this made virtually no difference to the final results, it seems to have been a reasonable decision. Jörgensen (1996) gives the percentage figures for the occurrences of each of her classes, and these figures were then applied to the mode facet codes assigned to them in Table II.

Armitage and Enser's study, based on an analysis of over 1,700 queries, uses Shatford's mode facet matrix as the analysis tool, and their empirical results were used directly in this project. Collins, like Jörgensen, used her own facet analysis, and it was necessary to map her facets to Shatford's matrix. Results for mode facets that occur more than once were aggregated. The original facets and the matrix codes assigned them are given in Table IV.

Being based on Jörgensen's (1996) study, the mapping of Chen's classes to Shatford's matrix is as in Table III. The Choi and Rasmussen study also used the Shatford matrix as the analysis tool, and the results were used as given in the original study.

Results of user query analyses

Each of the seven user query analyses indicated the percentage of queries using a given facet. By mapping the original facets to Shatford's matrix, as described above, it was possible to generate the percentage of queries using each mode facet from the

Jörgensen's classes	Mode facet code
Literal object	S1
Colour	G1
People	S1/G1
Location	S3/G3
Content/story	S2/G2
Visual elements	X (does not map to matrix)
Description	G1
People qualities	G1
Art historical information	X (does not map to matrix)
Personal reaction	A2
External relation	G2
Abstract	A2

Table III.
Jörgensen's classes mapped to the mode facet matrix

Categories used in Collins' study	Mode facet code
Persons	G1
Geographical	G3
Objects/things	G1
Activities	G2
Concepts	A2
Personal name	S1
Organization name	S1
Geographical name	S3
Object name	S1
Building name	S1
Event name	S2
Year	S4
Decade	S4
Street	S3
City	S3
County	S3
Landscape	G3
Street scene	G3

Table IV. Collins' classes mapped to the mode facet matrix

Shatford matrix. Seven sets of results were thus generated (Table V), with all seven user query studies being analysed from the point of view of a common facet analysis.

Table V shows the distribution of facets in each of the studies. The collections in the data set covered different subject domains, and it is to be expected that the distribution of mode facets is slightly different in each case. The purpose of this study is to construct an indexing template for a specific collection, but it is hoped that the indexing template might be broad enough to be useful for indexing other collections, so for the purposes of this study, a list of facets in approximately ranked order was produced to identify those facets which could be considered most useful as query points based on an analysis of the seven studies.

Due to the level of abstraction necessarily involved in the methodology of this study, it is not possible to produce a precise list based on raw enquiry data, because not

Mode facet code	Armitage Enser %	Collins %	Choi Rasmussen %	Enser McGregor %	Jörgensen %	Chen %	Keister %
S1	42.97	44.00	10.27	47.26	38.65	21.38	14.00
S2	3.27	5.00	3.24	8.10	3.70	0.33	0.00
S3	33.01	33.00	7.57	17.94	4.15	11.31	3.00
S4	12.77	45.00	5.41	29.10	0.00	0.00	14.00
G1	28.41	49.00	23.78	30.20	24.75	10.61	59.00
G2	16.51	16.00	25.41	17.94	7.00	0.92	32.00
G3	11.11	4.00	15.68	5.25	4.15	11.31	4.00
G4	0.31	0.00	0.00	1.09	0.00	0.00	0.00
A1	1.91	0.00	2.70	0.66	0.00	0.00	3.00
A2	1.24	4.00	4.86	4.38	6.70	3.06	12.00
A3	0.00	0.00	1.08	0.22	0.00	0.00	0.00
A4	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table V. Percentage of queries using each mode facet, as determined from the seven user query analyses described all of the studies include all raw data in the text or in the appendices, but it is possible to identify the order of ranking of queries in each study. Using this as a starting point, we were able to consolidate the ratings, showing the most important and least important facets in the seven user studies. Table VI shows the first six facets in ranked order in each of the studies. In Table VII, the ratings shown in Table VI are consolidated.

The framework that is chosen to interpret this data necessarily determines the final rankings. It would be possible to simply count the number of occurrences of the facet in the studies, in which case, G1, S1 and G2 would rate most highly. It would be possible to assign a greater weight to facets that are used in first, second and third place than to facets that appear in fourth or fifth place, and this would affect the position of G2. It is not possible to measure rankings completely scientifically, but for our purposes this is probably not too important. We want to identify trends, and we accept that the specific distribution of facets will be influenced and determined by the particular needs of individual collections of images. We can, however, tell from Table VII that the facets G1, S1, G3, S3, G2 and A2 are to be found in the top six positions in all seven studies. These facets are listed below in approximate order:

(1) G1: Kind of person/thing.

(2) S1: Individually named person/group/thing.

(3) G2: Kind of event/action/condition.

(4) S3: Individually named geographic location.

(5) G3: Kind of place geographic/architectural.

(6) A2: Emotion or abstraction.

Beyond these six, the following facets are in ranked order, depending on the number of studies in which they make an appearance, so that there are no queries for A4

Position facet code	Armitage Enser	Collins	Choi Rasmussen	Enser McGregor	Jörgensen	Chen	Keister
1	S1	G1	G2	S1	S1	S1	G1
2	S3	S4	G1	G1	G1	S3	G2
3	G1	S1	G3	S4	G2	G3	S1
4	G2	S3	S1	S3	A2	G1	S4
5	S4	G2	S3	G2	S3	A2	A2
6	G3	S2	S4	S2	G3	G2	G3

Table VI.
First six facets in each of the studies

Facet	1 + 2	1 + 2 + 3	1 + 2 + 3 + 4	1 + 2 + 3 + 4 + 5	1 + 2 + 3 + 4 + 5 + 6	
G1	5	6	7	7	7	G1
S1	4	6	7	7	7	G2
G3	0	2	2	2	5	S1
S3	2	2	4	6	6	S4
G2	2	3	4	6	7	A2
A2	0	0	1	3	3	G3

Table VII.
Consolidated ratings results

identified in any of the seven studies. The relative positions of S2 and S4 are debatable. S2 appears in six studies, whereas S4 appears in five studies, but in percentage terms, where S4 appears, it seems to be of greater importance:

(1) S2: Individually named event/action.
(2) S4: Linear time: date or period.
(3) A1: Mythical or fabulous being.
(4) G4: Cyclical time: season/time of day.
(5) A3: Place symbolised.
(6) A4: Emotion abstraction symbolised by time.

The list is not definitive or precise in any scientific sense. This is unsurprising given that the image collections range over such a broad area, but the exercise does allow us to identify the most important and least important facets in the studies, even if the precise placing of the higher ranking facets is open to interpretation and debate. This analysis produced a list of facets against which to interpret the results of the archivists' approach to indexing.

Determining the archivists' view

A questionnaire was designed and distributed to 38 institutions to elicit information regarding current indexing practice. These archivists were based at institutions other than the institutions included in the users' study part of the analysis because we were looking to elicit a broad view of indexing practice to determine whether it is possible to produce a useful list of facets for our template. The final analysis was based on 33 responses received from the institutions listed in Table VIII.

Although this is a rather limited number, the respondents represented a diverse range of institutions and so the sample was considered to be usable and indicative. Section 1 of the questionnaire elicited information concerning archivists' organisations and collections. Section 2 listed a number of indexing and categorisation methods, and respondents were asked to indicate which were used in their collections. Sections 3 and 4 listed specific indexing features. Respondents were asked to indicate whether or not they used that particular feature in their collection, and to rate each feature from 1-5 (low to high) whether or not they used that feature. Section 5 gave respondents the opportunity to indicate any indexing features or concepts that they used but that were not listed elsewhere on the questionnaire. These are referred to as "individual" features in the subsequent analysis, the features on the original questionnaire being referred to as "defined".

The results of Section 2 of the questionnaire regarding current indexing practice are shown in Table IX. There is no right or wrong method for indexing images, and what is immediately noticeable from these responses is the variety of approaches used. While it is true that one or two of these standards are quite specialised (e.g. ICONCLASS) and were therefore little used, most of the rest are well known knowledge organisation standards (taken from TASI) and are distributed fairly evenly among users. However, 24 of the 33 respondents use their own in-house standard, which would tend to support the notion that there is little in the way of consistent guidance for indexing.

Name of organisation
Alaska State Library, Historical Collections
The Art Institute of Chicago, MacLean Visual Resource Collection, Ryerson Library
Bedfordshire and Luton Archives and Records Service
Christie's Education, Learning Resources Centre
Darlington Borough Council, Centre for Local Studies
Derbyshire CC, Cultural and Community Services – North East Midland Photographic Record
East Midlands Oral History Archive, Centre for Urban History, University of Leicester
Hartlepool Borough Council, Libraries
Kent Institute of Art and Design, Library
London Borough of Hillingdon, Local Studies and Archives
Leeds Library and Information Service, Local Studies
Lincolnshire County Council, Heritage Services – Illustrations Index
University of the Arts London, London College of Fashion
Medway Council, Archives and Local Studies
The National Trust, E. Chambré Hardman Archive
Royal Air Force Museum, Department of Collections Management
Reading Borough Council, Central Library
Reading Borough Libraries
Royal Free Hampstead NHS Trust, Archive Centre
University of St Andrews, Special Collections
Central Saint Martins Coll. of Art and Design, University of the Arts, Slide Library
Tyne and Wear Museums, Laing Art Gallery
Architecture Visual Resources Library, UC Berkeley Architecture Department
University of Houston; College of Architecture, Visual Resource Center
RMIT University, Melbourne Australia, Library
University of Brighton, Information Services
Dalhousie University, Faculty of Architecture and Planning
Kutztown University of Pennsylvania, Fine Arts
University of KwaZuluNatal, DISA
Manchester Metropolitan University, Library
University of Memphis, Art Department
University of Richmond, Art and Art History, Visual Resources Library
University of Washington, College of Architecture and Urban Planning

Table VIII. The institutions represented in the survey

Respondents whose collections were not indexed were asked to give reasons for this, and it is interesting to note that only one archivist cited lack of clear guidelines. More often the reasons given were financial, or lack of time, and perhaps these reasons were enough to discourage an organisation from proceeding with an indexing project before the issue of guidelines needed to be addressed.

Section 3 of the questionnaire lists indexing features almost all of which are taken from image bank interfaces (Table X), the exceptions being "person name" and "institution" (i.e. specific place), these two features being considered so fundamental as to necessitate inclusion. The indexing features were taken from an evaluation of ten existing commercial image banks. The broad criteria for the set was that they were all reasonably large collections, from various domains, with free access, and between them exhibited a large variety of indexing access points. The features as listed here are present on the interfaces of the image banks indicated.

Standard	Total (33 respondents)
Art and Architecture Thesaurus (AAT)	10
Dewey Decimal Classification	4
ICONCLASS	1
ISAD(G)2	3
Library of Congress Thesaurus for Graphic Materials	7
Visual Resources Association	7
In House	24
Other (please state)	8
Collection not indexed/classified	3
Others	
CAN/CGSB 200.4-89	1
Simon and Tansey	1
Alaska native controlled vocab.	1
FOGG system	2
AHDS Visual Arts to be compatible with their other web sites	1
Thesaurus of Geographical Names	1
ULAN – Union List of Artists Names	1
SPECTRUM – maps to ISAD(G) and Dublin Core	2
If your collection is not indexed, please indicate main reason(s)	
Time constraints	6
Budget constraints	4
Insufficient personnel	6
Lack of clear guidelines	1
Is your image collection digitised, now or imminently? (Y or N)	27

Table IX. Current indexing practice – shows number of respondents using recognised indexing standards as listed in the questionnaire

Some image banks enable the user to click on a chosen image and view the keywords ("View keywords", above) used in the indexing process. A number of the features listed on the questionnaire were taken from "view keywords" categories, as opposed to being named access points on the search interface.

Google (2007) and AltaVista (2007) are rather different from the others in that they are not indexed image banks, but use web crawlers to index their images, which involves indexing terms such as HTML < img src > tags from related pages, rather than human indexing. These two image "collections" have few access points, and are largely included for completeness, as the general user is more likely to be familiar with these two search engines than with the other more specialised collections. This activity informed the construction of the features listed in Section 3 of the questionnaire (see Figure 1).

Section 4 of the questionnaire lists features that could be considered as secondary, that is they could be viewed as concepts to refine a search. The final selection of features for section 4 was largely based on the "view keywords" feature found on some image banks, and related to the kinds of elements that would be potentially useful as access points for the images in The Children's Society collection, and included more connotative aspects of images, such as "mood" and "emotion" (see Figure 2).

Section 5 of the questionnaire refers to "individual" features, that is, those features added by individual archivists.

Table X.
Features used on the interfaces of ten commercial image banks. A "Y" indicates a feature is used, a blank indicates not used

Image Banks Features	Corbis (2007) 18	Getty Images (2007) 13	Robert Harding Picture Library (2007) 12	Alamy Images (2007) 9	Magnum (2007) 8	Inmagine (2007) 6	European Visual Archive (2007) 6	Mary Evans Picture Library (2007) 5	Google (2007) 5	AltaVista (2007) 4	Total
No. of images found	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10
Search box (free text)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10
Colour/monochrome/both	Y	Y	Y		Y			Y	Y	Y	7
View keywords	Y	Y	Y	Y	Y	Y					6
Orientation	Y	Y	Y	Y		Y					5
Photos/illustrations	Y	Y	Y					Y		Y	5
Search by collection	Y	Y	Y			Y	Y				5
Advanced search		Y	Y	Y					Y		4
Except (these words)				Y	Y	Y			Y		4
Rights managed	Y	Y	Y	Y							4
Royalty free	Y	Y	Y	Y							4
Release status	Y	Y	Y	Y							4
Photographer name	Y		Y		Y		Y				4
Period							Y	Y			2
Image No.	Y				Y						2
Location	Y						Y				2
Date	Y				Y						2
Categories (art; history etc.)	Y										1
Viewpoint	Y										1
People (with/without etc.)	Y										1
image type (vector)		Y									1
CD		Y									1
Image available (date)	Y										1

Feature	a) Indexed? (Y or N)	b) Rating (1-5) (rate all features)
Image ID number		
Person name (if applicable)		
Institution/building name (if applicable)		
Keywords (Basic – e.g. main subject of image)		
Keywords (Comprehensive – e.g. peripheral/abstract features)		
Photographer name		
Date image created		
Location (country; city etc.)		
People in image (with people/without people/how many people?)		
Historical period (e.g. 19th Cent)		
Category (Art; History etc.)		
Image orientation (vertical/horizontal)		
Photograph/Illustration		
Colour/Monochrome		
Viewpoint (close up; aerial etc.)		

Figure 1.
Features in Section 3

Feature	a) Indexed? (Y or N)	b) Rating (1-5) (rate all features)
Age range (People)		
Male/Female (People)		
Weather		
Season		
Time of day (morning; dusk etc.)		
Day/Night		
Light (bright; gloomy etc.)		
Urban/Rural		
Indoors/Outdoors		
Mood/Emotion/Feel (happy; curious; scared etc.)		

Figure 2.
Features in Section 4

Results of archivists' responses

Archivists were asked to indicate which indexing features they currently use (questionnaire sections 3 and 4), and to rate those features from 1-5 whether or not they currently use them. Mode facet codes from Shatford's matrix were assigned to features (where appropriate), and additional information about those features that scored 3 or more out of 5 was generated. The activity involved the researcher interpreting the features from sections 3 and 4 using the Shatford matrix.

Whenever research activities involve interpretation, there are always issues relating to subjectivity and replication of methodology. Although the particular interpretative activity undertaken by the specific researcher carrying out this project could not be replicated exactly by another researcher, the method of undertaking the interpretative activity could be replicated. This methodology can thus be replicated, but the results of the application of the method might not be quite the same. This is the case with any research project based on subjective, interpretative data analysis. The consistency of method comes from the acknowledgement that one researcher has undertaken all the interpretative activity, and the attempt to record the method so that it could be replicated by another, or many other researchers.

The results from the questionnaire were entered into a spreadsheet and two sets of data were recorded for each organisation:

(1) Is the feature used? Yes/No question; the number of archivists using each feature was totalled.

(2) Rate feature 1-5 (1 is low; 5 is high). Archivists were asked to give a score of 1-5 for each feature listed, and the accumulated score for each feature was calculated.

From these results, two more sets of data were then generated from the spreadsheet:

(1) The number of archivists rating a given feature "high" (scores 3 or more out of 5). An archivist may not currently use this indexing feature, as they may have inherited their particular indexing system, but if they score it at 3 or more out of 5, it is presumed to be because they regard that feature as potentially useful.

(2) The number of archivists who rated feature high and actually use that feature.

It was also considered potentially useful to chart the number of respondents who rated a feature high (3-5) and currently use that feature. In this way it would also be possible to identify features rated high but not used; this would give useful information regarding current indexing practice, and indicate areas of indexing that perhaps require more comprehensive attention.

The results spreadsheet was in the form of a list of indexing features, with all accumulated scores calculated and converted to percentages. Those features that are considered to be purely structural were left blank. The features with a blank mode facet code were removed from the table, leaving a list of coded features. Finally the table was sorted by accumulated score, giving a ranked table of access points as judged by archivists across a wide range of collections (Table XI).

Sorting the table by accumulated score is more informative than sorting by number of users of a feature since an archivist may have inherited a system that does not use a particular feature, even though the archivist may well acknowledge that feature as being potentially very useful. Part of the purpose of the questionnaire was to ascertain what features the archivists would index if they had a choice. To that extent, the questionnaire can be regarded as something of a wish list, as well as providing information about features that are actually used.

In addition to helping inform the development of an indexing template, the results of the questionnaire also give interesting information regarding indexing practice.

A chart (Figure 3) was generated from the above results, plotting the number of users of a given feature against the accumulated score for that feature. Both sets of results were converted to percentages so that they could be plotted on the same chart. All "individual" features (shaded in Table XI) have been removed from the chart, as their accumulated scores were so low as to be rather meaningless. These are features added by individual archivists, which were not listed on the original questionnaire. The low scores for these features can be explained by the fact that, while the features listed on the original questionnaire were reviewed and rated by all respondents (as they were asked to do), these "individual" features were not seen by all respondents and could therefore not be rated by anyone but themselves. While these "individual" features were used to help inform the design of the indexing template, user figures of 2.94 per cent and 5.88 per cent (Table XI) correspond to one and two users respectively,

Table XI. Ranked list of indexing features as judged by archivists across a range of image collections. Shaded features are those "individual" features added by archivists in section 5 of the questionnaire

Mode facet code	Feature	No of archivists using feature %	Accumulated score of feature %	Archivists rating feature high %	Archivists rating feature high and using %
S1	Specific person/thing	85.29	92.35	94.12	85.29
S3	Location (country; city etc.)	88.24	92.35	97.06	88.24
S4	Historical period (e.g. nineteenth century)	76.47	85.88	88.24	70.59
S3	Institution/building name	79.41	84.71	88.24	79.41
S4	Date image created	79.41	81.76	88.24	76.47
G3	Indoors/outdoors	52.94	59.41	58.82	50.00
G1	People (1, 2, 3-5, group)	47.06	54.12	52.94	44.12
G1	Male/female (people)	47.06	51.18	52.94	41.18
G3	Urban/rural	41.18	46.47	32.35	26.47
G1	Age range (people)	41.18	44.12	41.18	29.41
G4	Day/night	41.18	41.76	32.35	26.47
G4	Season	26.47	38.82	26.47	14.71
G4	Time of day (approx.)	17.65	35.88	17.65	11.76
A2	Mood/emotion/feel	5.88	34.12	14.71	2.94
G2	Weather	14.71	33.53	17.65	8.82
G2	Light (bright; gloomy etc.)	5.88	30.00	5.88	2.94
S4	Date object in image built/created	2.94	5.88	5.88	2.94
S1	Alternate object name/translation	5.88	4.71	5.88	5.88
S3	OS grid reference	5.88	4.12	5.88	5.88
G1	Specialised controlled vocabulary	2.94	2.94	2.94	2.94
G1	Building material, construction type	2.94	2.94	2.94	2.94
G1	Colour	2.94	2.94	2.94	2.94
G1	Description of garment	2.94	2.94	2.94	2.94
S1	Brand name/label (fashion)	0.00	2.94	2.94	0.00
S4	Date of acquisition	2.94	2.94	2.94	2.94
G1	Group portraits	2.94	2.35	2.94	2.94
G1	Self-portraits	2.94	2.35	2.94	2.94
G3	Associated locations	2.94	2.35	2.94	2.94
S1	Model's name	0.00	1.76	2.94	0.00

Notes: Mode facet code: as defined in Shatford-Enser matrix (see Table I); Feature: access point used for indexing; No. of archivists using feature: number of archivists using feature in their current indexing; Accumulated score of feature: possible total of 170 (33 archivists each giving possible score of 5); Archivists rating feature high: number of archivists rating feature with score of 3+ out of 5; Archivists rating feature high and using: number of archivists rating feature 'high' and actually using that feature

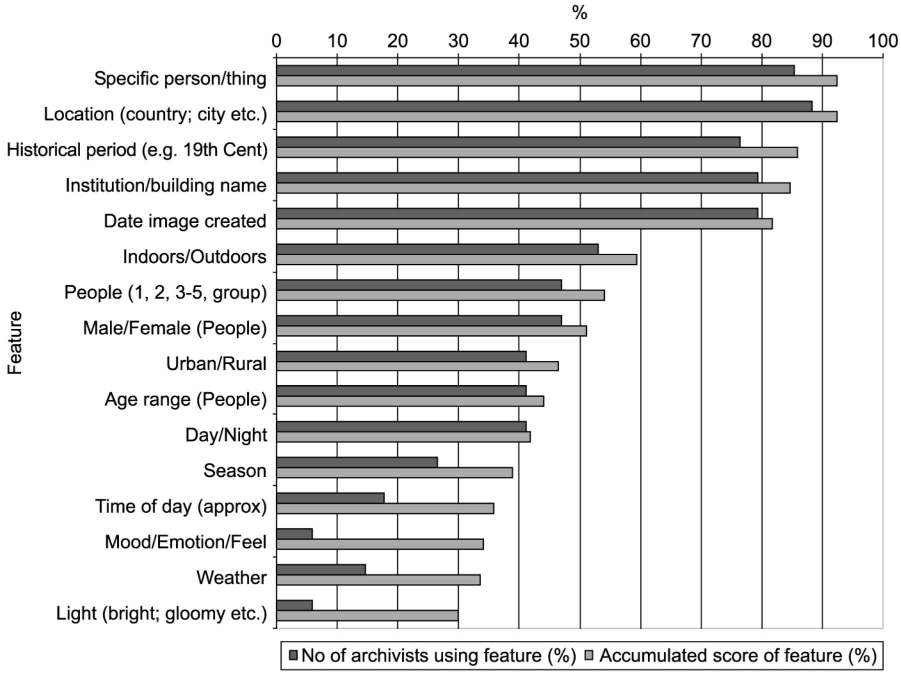


Figure 3.
Chart comparing number of archivists using a feature against the accumulated score for that feature

Note: Both figures have been converted to a percentage

and it was decided to remove them from the chart data here as being of little significance.

Even though both sets of figures are percentages, they are not directly comparable, but rather indicate a trend. If an archivist rates a feature at 5 (out of 5), but does not use that feature, it might suggest that that particular archivist's need is not being met. Likewise if the accumulated score from the 33 respondents is high but only half the archivists use that feature, it would suggest that indexing practice is not satisfying perceived usefulness as indicated by archivists.

Figure 3 shows that, by and large, the two plots for each feature are roughly commensurate, in other words features are used more or less in line with their perceived usefulness. However, this is not the case towards the bottom of the chart, where features from "Season" onwards show a marked disparity. For example, "Light", received an accumulated score of 30 per cent but only 5.88 per cent of archivists use it (i.e. two). It is not possible to infer that five times as many archivists want the feature as actually have it, but it is possible to ask why a feature with an accumulated score of 30 per cent (judged to be reasonably useful), is used by only two archivists. The answer is almost certainly that many indexers will have inherited their systems, and these features were not regarded as useful access points when the indexing was first carried out. Features showing this degree of difference (largely the bottom five features here) could usefully be included either if re-indexing a collection (perhaps part of a digitisation project), or indeed if indexing from scratch.

The top five features that score highly would appear to be those that are regarded as traditional access points in image indexing, while the others are features from the questionnaire that corresponded to keywords gleaned from online image banks. This would seem to indicate that archivists are comfortable with traditional access points, but are less sure of the usefulness of some other terms.

Figure 4 is a 3-way plot comparing the number of archivists using a given feature; the number of archivists giving that feature a high score (3 + out of 5); and the number of archivists who give a high score and actually use the feature.

It was considered potentially useful to know how many respondents rated a feature "high", i.e. 3 or more out of 5. Features rated "high" are clearly those that are considered potentially very useful, and Figure 4 illustrates this. It is immediately evident that in general, the number of users rating a feature "high" is greater than the number who have it as an access point, although not by much. Most features rated "high" appear to be present on archivists' current systems.

There are two features that are used more than they are rated "high" (urban/rural and day/night). This would indicate that these features are being indexed even though archivists do not regard them as being particularly useful. The most illuminating comparison is between those who rate a feature "high", and those who rate it "high" and use it in their indexing (Figure 4). The shortfall between the two plots shows that there are a significant number of archivists not indexing a feature, even though they recognise its potential benefit, an area that could be addressed in future indexing projects.

Users' queries and archivists' practice

Figure 5 compares users' queries and archivists' practice. Since the user query analyses were based on mode facets from the Shatford-Enser matrix, Figure 5 plots users' and archivists' use of mode facets, as opposed to individual features.

Figure 5 shows the differences between users' queries and archivists' provision of relevant access points. Like Figure 3, the results have been converted to percentages to enable plotting on the same chart, and again only indicate a trend rather than absolute figures. Overall it seems that the "S" (specific) mode facets are indexed quite comprehensively, while the "G" (general) mode facets are neglected quite significantly. S2 (specific event) is an exception, but is not a common access point. While archivists are generally very good at indexing specific image information, they seem to be less likely to index Shatford's (1986, p. 43) about information. It might be the case that while specific (S) information is often provided with an image (perhaps written on the back of a photograph), general information has to be gleaned from the image by the indexer, a time-consuming process, and resources may well not permit this depth of indexing.

Given this apparent preference to index the specific, the A2 mode facet (mood/emotion/feel) deserves comment. While few queries used this as an access point and only two respondents indexed this information, it scored 34.12 per cent accumulated rating, which suggests that many archivists consider mood to be a potentially useful access point.

An indexing template

The design of the template combines the results generated from the user query analyses and the archivists' questionnaire results. Indexing should ideally be

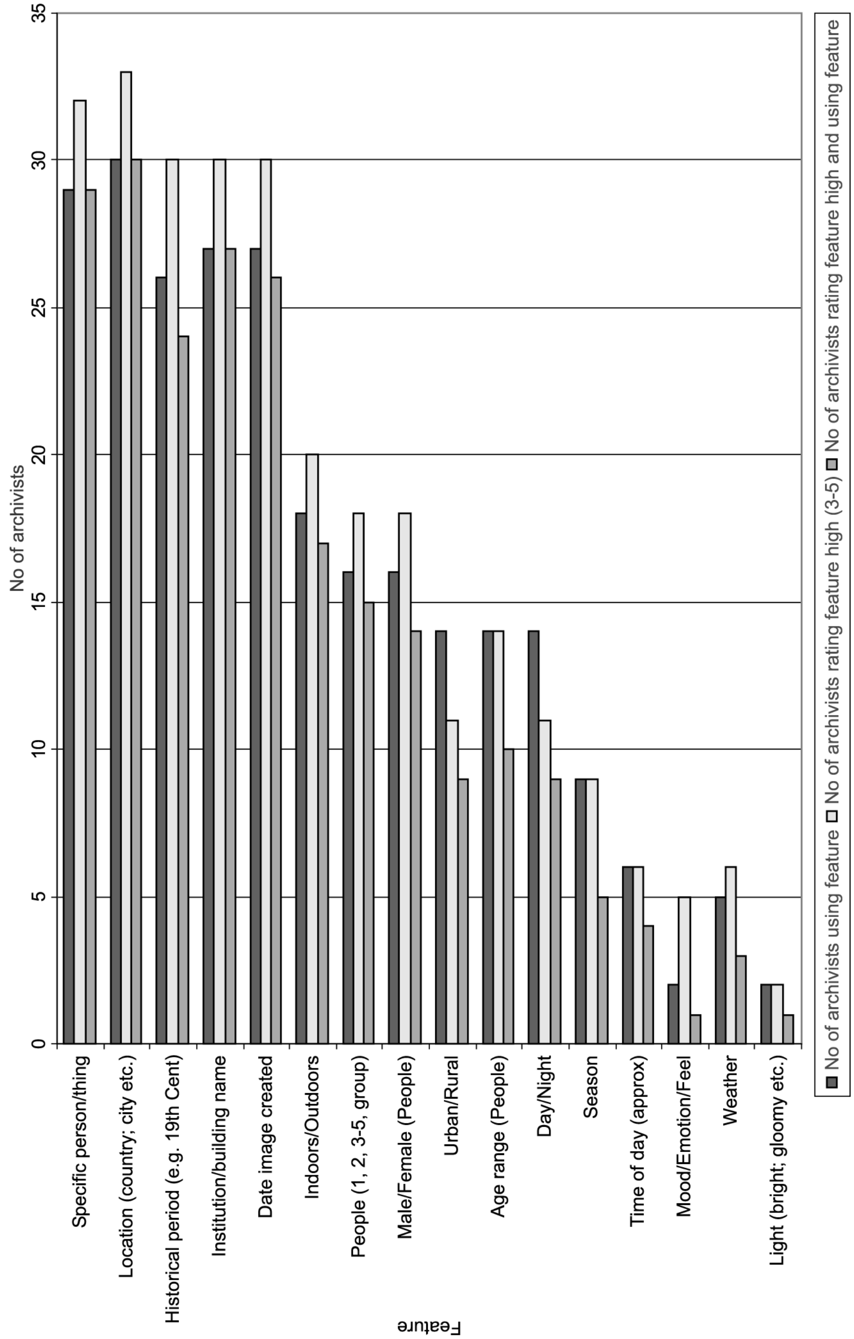
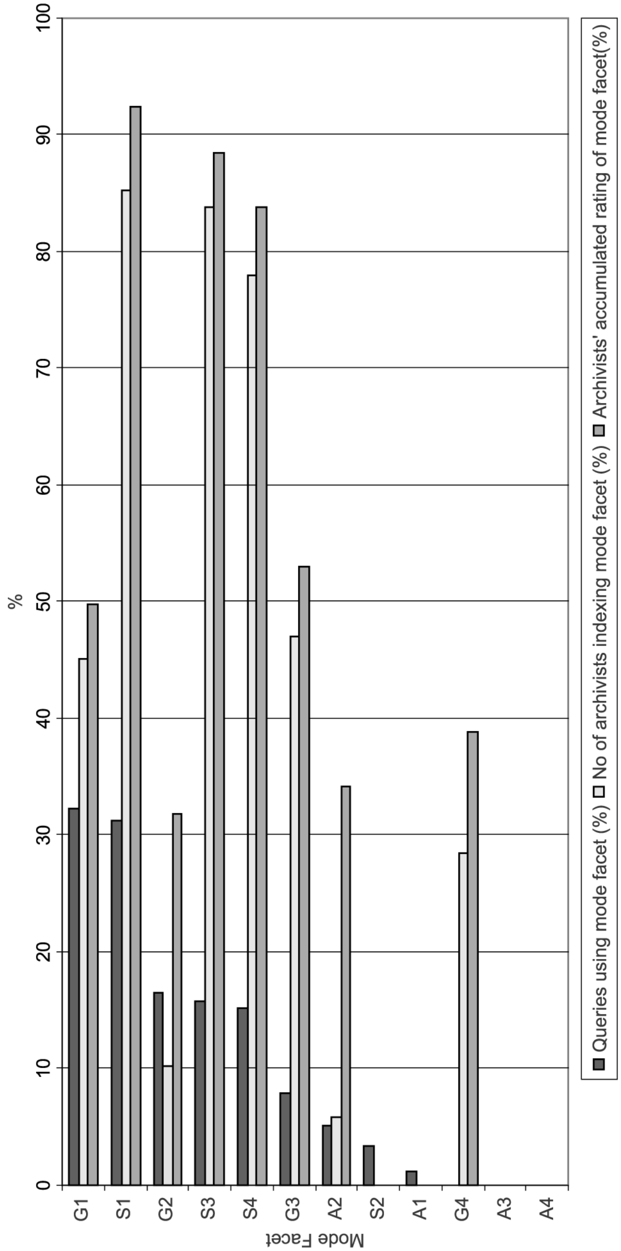


Figure 4.
Chart comparing absolute numbers of archivists using a feature with those who rate it "high" and of those rating it "high" and using it



Note: Mode facet codes as per Shatford-Enser matrix

Figure 5.
Chart illustrating users' queries and archivists' practice. Mode facet codes as per Shatford-Enser matrix

approached from a user-driven perspective, and it was therefore proposed that the indexing template be based primarily on the results of the user query analyses, but also informed by the results of the questionnaire, as archivists were considered to have potentially valuable insights into image indexing.

Mode facet type	Mode facet code	Mode facet definition/feature
Generic	G1	Kind of person/thing
Defined	G1	People (1, 2, 3-5, group)
Defined	G1	Male/female (people)
Defined	G1	Age range (people)
Individual	G1	Specialised native cont. vocab.
Individual	G1	Building material, construction type
Individual	G1	Colour
Individual	G1	Description of garment
Individual	G1	Group portraits
Individual	G1	Self-portraits
Specific	S1	Individually named person/group/thing
Defined	S1	Specific person/thing
Individual	S1	Alternative object name/translation
Individual	S1	Brand name/label (fashion)
Individual	S1	Model's name (celebrity/fashion model)
Generic	G2	Kind of event/action/condition
Defined	G2	Weather
Defined	G2	Light (bright; gloomy etc.)
Generic	S3	Named geographical location
Defined	S3	Location (country; city etc.)
Defined	S3	Institution/building name
Individual	S3	OS grid reference
Generic	G3	Kind of place
Defined	G3	Indoors/outdoors
Defined	G3	Urban/rural
Individual	G3	Associated locations
Generic	A2	Emotion/abstraction
Defined	A2	Mood/emotion/feel
Generic	S2	Named event/action
Generic	S4	Linear time
Defined	S4	Historical period (e.g. 19th century)
Defined	S4	Date image created
Individual	S4	Date object in image built/created
Individual	S4	Date of acquisition
Generic	A1	Mythical/fabulous being
Generic	G4	Cyclical time
Defined	G4	Day/night
Defined	G4	Season
Defined	G4	Time of day (approx.)
Generic	A3	Place symbolised
Generic	A4	Emotion/abstraction symbolised by time

Notes: Mode facet type: generic features are as per Shatford-Enser matrix, defined features are those listed on original questionnaire for rating by archivists, individual features are those added by individual archivists; Mode facet code: as defined in Shatford-Enser matrix (see Table I); Mode facet definition/feature: access point used for indexing

Table XII.
Indexing template ranked by mode facet as determined by user query analysis; within each mode facet, features are ranked according to archivists' accumulated ratings

The template was developed from the ranked mode facet list generated from the user query analysis. Working down the list, the corresponding mode facets from the questionnaire results (Table XI) were then applied to this list i.e. all the features coded G1 were taken from Table XI and grouped together, then all the features coded S1 etc. This gives a final table of indexing features grouped by mode facet in the order determined by the user query analysis, and sorted within each mode facet according to the archivists' rating as per the questionnaire results. Thus the final template is driven primarily by users, with a secondary ranking according to archivists' perception of a feature's usefulness. This generates a comprehensive indexing template (Table XII) that can be applied to a given image collection.

Those organisations with sufficient resources to index their collections comprehensively perhaps hardly need a ranked table to work from, but it seems reasonable to suggest that most organisations are unlikely to be in this enviable position, and their more limited resources could be optimised by concentrating on those features nearer the top of the table, and focusing on these access points more comprehensively than those towards the bottom of the list.

Conclusion

This article described a project that explored users' approaches to image retrieval, in the form of user queries recorded in published studies, in relation to the indexing practice and indexing wish-lists of image archivists. The method of enquiry involved the application and interpretation of the Shatford-Ensor matrix, and one observation that might be drawn from the study is that the matrix is an extremely useful framework through which to analyse and interpret specific features of images, and provides a useful guideline in creating disciplined indexing.

The project was more concerned with trend spotting than with the precise and scientific measurement of a particular set of image collections. The aim was to produce an image indexing template that could be used for indexing by The Children's Society, however, during the course of the project it became clear that sometimes there are instances of gaps in image indexing activities where users' queries and archivists' wish-lists do not match with the actual indexing practice undertaken. The reason for the gap between wish-lists and practice was speculatively related to indexing inheritance. A ranked list of facets, which grew out of the research, is proposed as a practical tool for organisations wishing to construct their own indexing templates.

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Corresponding author
Neil Conduit can be contacted at: nxc@childsoc.org.uk