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DEMOCRATIC INDEXING: AN APPROACH TO THE RETRIEVAL OF FICTION

Abstract. This paper builds on work begun in the field of image indexing [5,7] and examines how an analytical framework to describe the contents of images may be extended to deal with time based materials like film and music. The indexing approach is then considered in relation to fiction.

Our project evolved from an analysis of problems related to image retrieval and of solutions currently available [4]. A "levels of meanings" table has been developed by the authors and is

being used as an "indexing template" for image retrieval purposes. An image database offers an opportunity to test the image retrieval innovations in a pilot study. Central to the project is the development of the concept of democratic indexing [6]. The authors argue that this concept could be used in many types of information retrieval.

Democratic or user based indexing is intended for use in a dynamic retrieval system which would allow users to contribute to the indexing and retrieval process. By focusing on user interpretation, democratic indexing differs from traditional IR models which assume that retrieval mechanisms are constructed by the librarian/indexer. User groups might include newspaper journalists or researchers, but it is clear that the users would have to have something significant to gain from using the system. Users would need to feel that it is worthwhile to contribute as well as to receive. Our approach to image or pictorial information retrieval has incorporated a number of novel features:

- the information which is to be recorded for each image includes descriptive cataloguing and subject indexing based on user perceptions of the image and objects within the image [4];
- the collection of user generated indexes will be used to compile a "public" index through a process which we have called "reconciliation"; and
- the ability of individual users to record their private indexes offers a "democratic" approach to indexing.

1. Introduction

A number of commentators have addressed the problems of indexing pictures [4-6,8,9,11,20,22]. Difficulties arise partly from the nature of indexing itself [20] and partly from the intrinsic non-verbal symbolism of pictures and the "reading" process. Pictures, as Enser [11] has noted, are worth a thousand words. Keefe [15] describes pictures as documents without literary texts. She explains that the text is there: we are processing and 'reading' the picture as we view it, while Barthes [2] believed that reading a photograph depends on the reader's knowledge just as though it were a 'matter of a real language' which is intelligible only if one has learned the signs.

Image retrievalists need to know whether they should be satisfied with addressing only the 'material' or concrete, in the sense of identifying objects in pictures and descriptors in accompanying text, or whether there is some shared 'aboutness' in relation to a picture which could be used for indexing and retrieval purposes. Krause [16] discusses the sliding scale of image indexing which ranges from 'hard', factual to 'soft' or interpretative indexing and claims that when indexing pictures, librarians are inevitably drawn towards 'soft' indexing in order to do justice to the context, the nuances and the subtleties of images.

Issues relating to meaning, interpretation and indexing are of importance in any information retrieval environment, but with pictures the problems are compounded because pictures are documents without text. Text might accompany the picture, but even then it might be misleading or biased, e.g., text accompanying politically sensitive newspaper pictures. The picture itself may well have symbols which can be read but might not have the mediating interface of language to help interpret the symbols.

Essentially, meaning in pictures is difficult because it very often relates to individual interpretation. Enser's [11] research showed that an image can provoke many different responses, including responses which were largely invented by the viewer. Pictures, perhaps more than texts which lock the reader into shared language, have the power to generate denotative and connotative responses in the viewer. Studies recently completed at UCE tend to agree with Enser's findings but suggest that viewers and, potentially, indexers' responses may be more focused, detailed and directed using a 'level of meanings' template.

Our preparation for holistic image retrieval began with an analysis of 'meaning' in relation to pictures. In particular, we have focused on the work of Panofsky [17] and Barthes [2] and have considered Shatford's [20] distinction between 'ofness' and 'aboutness' based on Panofsky's work. We have used these analytical approaches to image analysis to create our own level of meanings framework (Table 1).

Meaning, in relation to images, works on at least three different levels. At the first level it would include structural information to help describe the image and the objects therein. In terms of a retrieval system, this level also includes cataloguing information. The second level includes information which can identify the image and the objects. The third level is more concerned with the 'soft' interpretation of the image rather than 'hard' objective information.

Having identified the various levels of meaning which may be used to retrieve pictures, we have embarked on a project to build a test picture database which, in its final form, will attempt to incorporate retrieval access points at all levels of the table. As part of our project, we aim to design a system which allows for the inclusion of individual interpretations and which can creatively exploit a multivoiced retrieval approach.

[2. Democratic Indexing](#)

The principal of Democratic Indexing is based on the concept that individuals will have their own, potentially different, interpretation of an image. The differences may be manifested as different focus on parts of the image and different use of vocabulary to describe the image. Each image may be indexed on any of the levels described in the levels of meaning table (Table 1). These are private to the individual and are not directly accessible by other users. A process called Reconciliation produces a single public view based on the amalgamation of all private views of the image under consideration.

This approach is based on some assumptions which still require verification. Firstly we assume that, at least for the higher levels of meaning (3.1, 3.2; Table 1), that there is no single 'correct' interpretation of an image. Secondly that there will be common terms used by viewers to index images [5]. Thirdly that the natural way to describe images is through words and phrases rather than more specialised 'picture languages' (e.g., [23,24]) which have been developed.

[3. Private and public views and their use in the retrieval of images](#)

In our system we intend to allow individual users to record their own views which will then be reconciled to produce a "public" or general index of terms supported by a thesaurus. This section explains the mechanics of this procedure.

3.1. Views in the database

A view corresponds to a mapping between an image and a set of terms associated with that image. An image may have any number of terms associated with it.

Private views. The private view corresponds to the set of terms used by an individual and the images associated with each term. The terms may exist in the system thesaurus or they may only exist in the private user's view. In both cases only the individual user may see their terms and the associated images.

Once a user has decided that an image is 'useful' they are invited to record it in their private view, at this point they may add or delete index terms from the image's public set, the changed set being recorded in their private view, the public view remaining unchanged. This indexing process will enrich the knowledge about images as time progresses.

Public view. The public view is a set of terms, all of which exist in the system thesaurus, and the associated images of each term. A term may have many images associated with it and an image may have many terms associated with it. The public view is generated automatically by the process of reconciliation, see below.

Reconciliation. This process examines each image and all the private views which index that image to create a collective index, the public view, for that image. This process is discussed in more depth in the next section. Reconciliation destroys the old public view and replaces it with a new reconciled view based upon the collection of private views.

3.2. Reconciliation process

Steps

1. The system administrator instigates the reconciliation process.
 - 2. The public view is deleted (these are the links between terms and images).
 - 3. For each image, the system checks every private view and lists the terms used, combining duplicates and adding a count (the count is the number of times a term has been used).
 - 4. Then for each term (used to describe the image) the system takes the count and divides it by the number of private views for that particular image. The result is normally expressed as a percentage.
 - 5. If this result is greater than a threshold value a link is created between the term and image.
 - 6. The process continues until all images have been evaluated and their associated terms recorded in the public view.

[4. Fiction indexing and democratic indexing](#)

Fiction indexing has long been of interest to librarians, indexers, publishers, authors, readers and various other people involved in fiction, although ideas about what should be indexed are not always the same. There are a number of articles which provide historical and theoretical overviews of fiction indexing [1,3,25].

Bradley's [3] approach to fiction indexing is based on an assumption that the indexing will be of a 'factual' nature, concentrating on the objective contents of the novel. He sees this

indexing process as being particularly useful for texts which are used as students texts. In this context, fiction is not used for recreational but as texts for analysis. Baker and Shepherd outline the history of fiction classification schemes from Baker's 1889 'Classification of Fiction', to Pjetersen's AMP system. These approaches to indexing emphasise the subject approach to information much more than the indexing approach adopted by Bradley. Beghtol [25] concludes from her review of existing fiction classification systems that 'the question of whether consistent and comprehensive fiction analysis systems can be developed has not been definitively answered, but that further research would be warranted. In particular, the present investigation shows that research is needed to ascertain which elements in fiction may be extracted in a relative (sic) objective manner and how classifiers are to decide the relative importance of these elements in a particular novel'.

There is an assumption that the indexing of fiction must focus on 'objectivity'. But it is questionable whether objectivity is an appropriate response to fictional texts. The fictional text may be read in a number of different ways. Increasingly literary critics acknowledge the multiplicity of readings available rather than prescribing the one true and canonical response. The reader reception theory of Iser [14] and Fish [12], Culler's [10] deconstruction, Elaine Showalter [21], Sandra Gilbert and Susan Gubar's [13] feminist readings, Edward Said's [19] post-colonial reading of Mansfield Park are examples of the many possibilities of reading the fictional text. In addition, readings of fiction also change over time. There is an argument that if critics are able to free themselves of the canonical, patriarchal approach to fiction which characterised Leavisite-mid century criticism then it may be time that the retrieval systems which offer access to fiction should adopt the same principle. We believe that we should explore ways in which the many readings could be incorporated into an indexing system. Democratic indexing provides a framework for private and individual readings to be recorded and for these to be reconciled in the public index to encapsulate the reading(s) shared by the majority of readers within the user group at a particular historical moment.

Democratic indexing could be used within a fictional text as an aid to interpretation. It could also be used within a library or within a library/libraries system to index a collection of fictions making access easier and more interesting because it could identify emotional responses as well as more factual information. Some libraries use review systems to encourage and help their fiction readers choose books, the reviews written sometimes by librarians, sometimes, especially in children's libraries by the readers themselves. Our system would use this principle, but rather than reviews, the reader would be encouraged to assign indexing terms or descriptors to help others in their search and identification of readable fiction. Democratic indexing makes it possible for a system to be constructed which could be used to indentify what the majority of readers believe to be a happy book, or a romantic book or a book which contains a character who scores highly as mean, moody and magnificent. As a result, users choice and access would be enriched.

4.1. Democratic index fiction framework

[5. Conclusions](#)

The ability to record information about the contents and interpretation of still and moving images will improve our use of such image collections. Capturing information, particularly the interpretation and 'response' to images, will help us to understand the range of meaning that an image provokes and to assess the agreement that a user population exhibits when those images are viewed. A long term objective for our system is to enable the interpretations

to be examined over time so that any changes in the ways images are perceived may be identified and studied.

The still and moving image systems are focused, initially, on the structure of the image and from that structure (e.g., image and objects within the image) interpretation may be built. From the point of view of images this approach is attractive because few images contain words and a 'picture' based language seems unlikely to succeed [4].

Most of our research activity to date has focused on the problems of image retrieval. Where image retrieval and fiction retrieval overlap is the relative subjectivity of interpretation. We believe that our ideas concerning democratic indexing have great potential in relation to fiction, but currently our research is in its infancy. Our preliminary thoughts on applying Democratic Indexing principles to collections of fiction indicate parallels between moving images and works of fiction. The parallels concern the structure of the 'document' (moving image or fictional text), namely 'chunks' which we refer to as 'events' in moving images and 'passages' in fictional texts. Both share the idea of 'objects' (characters, buildings, places, etc.) which are of interest to the 'viewer' (or reader) and upon which 'interpretation' may be built. However, the structure of a moving image may be easier to identify than the structure of a text although there may be a temptation to simply identify scene changes or chapter separations, respectively, as the only identifiable structure.

Unlike moving images, fictional texts do contain words and it is tempting to see these words as the entire contents of the index rather than the subject of interpretation. For example, in an image the indexer supplies the name of a 'character' whereas a text supplies that name (if one exists). Therefore, fictional text may supply more help to complete some of the levels of meaning than moving images do. Level 2.2 contains the words of the passages identified in level 1.2. The objective of our indexing system remains the same whichever media type is considered, namely to record individual's interpretation of part or whole items. This information is not found within the media but rather as a response to that media.

Interestingly, the concept of linked sets of passages and the ability to link to other 'external' works creates a hypertext. However, because individuals may create their own links there is the possibility of being able to develop a 'democratic hypertext' which may produce interesting 'readings' and 'analyses'. This idea is, as yet, undeveloped but is one that we intend to pursue in our future research.

Democratic indexing could also be used in relation to film retrieval as film, like fiction and still images, is open to multiple readings. Films normally contain both a linear plot and the formal, filmic arrangement of the plot which need not necessarily be linear. Moreover, film is made of scenes and frames, any of which might be of interest to the user, all of which might be read in a variety of ways. Fragments of film, for example where clips are used for music videos or advertisements, can be dislocated from their original context and can be used as signifiers in a completely new, contemporary context. In this new context, a film fragment may be used because it evokes a particular emotion, a happy clip, a clip of the 'Wise Fool'. It would be useful to develop a retrieval system which enabled subject descriptors to be allocated to whole films, scenes, frames and which recorded the majority reading of those complete works or fragments of work. As part of our project, we intend to develop the ideas of levels of meaning and of democratic indexing in relation to film as well as to the original image work and fiction. The table below represents a preliminary attempt to construct a level of meanings table.

Table 1 Levels of meaning for still images

Level and category	Description	Some examples
1.1. Biographical	Information about the image as a document	Photographer/artist, date and time of creation, colour/B and W, size, title
1.2. Structural contents	Significant objects and their physical relationship within the picture	Object types, position of object in the frame, relative size (or importance?) within the picture, e.g., person bottom left, car top right...
2.1. Overall content	Overall classification of the image	Type of image, 'landscape', 'portrait',...
2.2. Object content	Classification of each object defined in 1.2	Precise name and details of each object (if known), e.g., person object is Margaret Thatcher, car object is Ford Orion...
3.1. Interpretation of whole image	Overall mood	Word or phrase to summarise the image, e.g., 'happy', 'shocking'...
3.2. Interpretation	Mood of individual objects (when relevant)	e.g., Margaret Thatcher triumphant, defeated...

Table 2 Levels of meaning for fictional text

Level and category	Examples	Description
1.1 Biographical	Author, publication date, edition, ISBN, title	Information about the text as a document
1.2 Passages	Whole book, chapter, paragraph, sentence, phrase, word	A sub-division of a text defined by a start and end point, the smallest part being an individual phrase or word
1.3 Linked passages	User set of linked passages (identified in 1.2), possibly	An identified set of passages defined in 1.2 which have a

	resequenced from the printed text	defined sequence, possibly independent of the written sequence
2.1 Overall content	Interpretation of the whole text	Overall classification of the text
2.2 Passage content	The words from the text identified in 1.2	The text
3.1 Interpretation of whole `text'	User identified theme of the passage, e.g., `tragedy', development of character	Response to individual passage
3.2 Interpretation of identified individual parts of book or linked passages.	Role of character, symbol or place or interpretation of linked set of passages	Mood of individual objects (when relevant) or mood or theme of set of linked passages

Table 3 A small worked example

1.1. Biographical	Author, title, publisher, ISBN etc., authors' gender, author's nationality	Gerald Seymour, Harry's Game, Harper Collins, 1976, male author, English author
1.2 Passages	This level contains links which relate the higher levels of meaning to the text	Word 100, (Start, word 1020; finish word 1035)
1.3. Linked passages	Occurrences of a place, object, character, conjunction of characters, names, author motifs	An identified set of passages defined in 1.2 which have a defined sequence, possibly independent of the written sequence
2.1. Overall content	Gentre, plot overview audience, setting	Thriller, British in Belfast works undercover in Belfast to track the IRA activist who shot a British politician. Popular adult
2.2 Passage content	The contents from the fictinal text indentified by	Harry Brown Downes Josephine Laverty

	the passage marker from 1.2	Theresa McCorrigan Belfast British politician is killed by IRA activist, Downes Harry Brown, Northern Ireland born soldier in British Army, is prepared for undercover work in Belfast Downes spends the night at the McCorrigan house Harry goes to the dance with Josephine tells Harry Theresa's tale Theresa's suicide Downes fails to murder RUC policeman Harry Kills Downes Down's wife kills Harry
3.1 Interpretation of whole `text'	Style, emotion, other similar texts	Exciting, action novel, beating the IRA British establishment attitude to Troubles The Journeyman Tailor/Gerald Seymour
3.2 Interpretation of identified individual parts of book or linked passages	Interpretation of characters, places, symbol, associated elements of passages identified in 1.2 interpretatio of linked passages identified in 1.3	Harry Brown: loner, hero Downes: professional, cold, villain Josephine: betrayed, betrayer, used, victim Theresa: victim Theresa's suicide: no escape Powers: The Whoremother/Sean Herron

Table 4 Levels of meaning for moving images

Level and category	Description	Some examples
1.1. Biographical	Information about the image as a document	Photographer/artist, date and time of creation, colour/B and W, size, title, etc.
1.2. Events	A sub-division of	Scene - an editorial

	a film defined by a start and end point, the smallest part being an individual frame (corresponding to a still image)	division of a film where subject matter and contents change from the previous sequence Viewpoint-camera's eye, a sub-division of a scene, a filmic device Time-based narrative event, determined by an interpretation of a sequence of frames
1.3 Linked events	An identified set of events defined in 1.2 which have a defined sequence, possibly independent of the film sequence	A characters interactions, linking the events which the character directly participates in A sequence of interactions between associated objects
1.4 Structural contents	Significant objects and their physical relationship within the event defined in 1.2	Object types, position of object in the frame, relative size (or importance?) within the picture, e.g., person left, car top right ...
2.1 Overall content	Overall classification of the image including references to 'external' objects	Type of image, 'landscape', 'portrait', ...
2.2 Object content	Classification of each object defined in 1.2 including references to 'external sources'	Precise name and details of each object (if known), e.g., person object is Margaret Thatcher, car object is Ford Orion ...
3.1 Interpretation of whole 'film' event or sequence, defined in 1.2, 1.3 and 1.4	Overall mood	Word or phrase to summarise the image, e.g. 'happy', 'shocking', ...
3.2 Interpretation of objects	Mood of individual objects (when relevant)	e.g., Margaret Thatcher triumphant defeated ...

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