Report on CIR99, the 2nd UK Conference on "The Challenge of Image Retrieval"
Newcastle upon Tyne, 25-26 February 1999
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Image (including video) storage and retrieval is arguably one of the most exciting and fastest-growing research areas in the field of multimedia technology. The First Challenge of Image Retrieval Conference held in February 1998 was the first UK forum set up specifically to bridge the gap between the different research and practitioner communities with an interest in image storage and retrieval. The second Conference in the series again brought together researchers and practitioners, in order to exchange information and ideas on significant developments in related disciplines and the challenges facing the user communities.

This short article provides a personal view on the Second Challenge of Image Retrieval Conference, based on a final summary presented by the author at the conference. It is by necessity partial due to space and time constraints, and you are referred to additional sources of information at the end of this article.

The conference got off to a flying start with a session on "Content-based Image Retrieval technology: can we make it deliver?" presented by John Eakins and Margaret Graham of the Institute of Image Data Research, University of Northumbria. They presented the initial findings of a JISC[1] funded study on the state-of-the-art of Content-based Image Retrieval (CBIR) technology, and this was followed by discussion based on short position statements by representatives drawn from the user communities. Three main messages emerged from this session. First, there is a considerable gulf between what CBIR can deliver, which is mainly low-level feature based retrieval, and what users "really, really want", which is retrieval based on semantic features. Second, that there is considerable scope for progress in hybrid and cross-media IR, and that the (structured) text and image hybrid system is of continuing interest and importance to the end users, e.g. stock photograph archives. Third, that the short-term impact of CBIR is likely to be in specialist application areas such as fingerprint, trademark and face image retrieval.

Michael Swain of Cambridge Research Laboratory, Compaq (Cambridge, Mass.) presented an excellent keynote on the research and practical challenges of searching for (still) image and video on the Web. He described the challenges in developing Alta Vista's Photo Finder, and an earlier image search engine, WebSeer. Interestingly, much of the image retrieval functionality in Photo Finder is based on text retrieval techniques. Less surprisingly, perhaps, is that scaleability and performance are major issues, and that possible CBIR solutions may be rejected on this basis. The speaker stressed the end user/customer focus of his research, and highlighted the research benefits of this applied research approach, namely that interesting and relevant research problems emerge. One example was the identification of "near duplicate" images for assisting users in identifying copyright violations, an application incidentally that makes extensive use of CBIR techniques.

Three sessions of the conference were devoted to the presentation of research papers, where the themes of these sessions were "CBIR applications", "CBIR techniques" and "New approaches to Image Data Management". You are referred to the

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[1] Joint Information Systems Committee, organisation responsible for provision of a national network infrastructure and exploitation of information systems for the UK Higher Education and research council communities.

Electronic Proceedings (see below) for the abstracts and papers. A number of clear trends emerged from the presentations, and from discussions throughout the conference, these being:

- The challenge of bridging the gap between low-level feature indexing and matching techniques, and the actual user need for high-level semantic retrieval (a long standing problem for text in the IR community too!), and the role for various techniques in meeting this challenge, namely:
- the role of "text" (automatic indexing, keyword and thesaurus approaches) in hybrid text/image systems, which was referred to by one speaker as "the complementarity of CBIR and text (metadata)";
- the role of browsing and visualisation as alternatives to querying, where browsing by users "supplies" the semantic interpretation; and
- the role of "whole image" approaches to image indexing and retrieval, e.g. the use of power spectra and machine learning for classification of images.

The (continuing) need for customer and end user orientation and focus in order to inform and make relevant the research we do, and this through:
- establishing end user and customer requirements and needs through ethnographic studies, requirements analysis, etc.;
- identifying "real world" problems, which require fundamental research, e.g. the "near duplicate" problem, scaleability, support for hybrid indexing approaches, etc;
- emphasis on good user interface design, possibly in tandem with HCI experts; and

- developing and employing sound and appropriate techniques for evaluating CBIR-based tools and systems, where evaluation is built organically into the projects we undertake.
- A developing interest in video indexing and retrieval, based on the need to manage and access large, video archives and repositories, where much of this demand stems from consumer products, e.g. video-on-demand, broadband TV, and so on. Naturally, the research trends identified above hold as much, if not more, for video IR applications, in which the needs of users are even less well understood.

The final session of the conference concerned emerging standards for image retrieval.

Alan Lock of the Technical Advisory Service for Images (TASI) presented a thought-provoking talk on the "Importance of Standards", a message which I am sure would not be lost on figures in public life. He highlighted both the benefits of standards, which include underpinning for developing product markets, but at the same time indicated some of the pitfalls, namely premature choices of technological solutions. Michael Day of the UK Office for Library and Information Networking presented a talk on "Metadata for Images", in which he mainly concentrated on the metadata formats developed under the Dublin Core initiative and the Consortium for the Interchange of Museum Information (CIMI) standard. This work highlights, again, the importance of text (in this case structured metadata) in multimedia retrieval, and indeed indicates the appropriateness of the expression "a picture is worth a 1000 words". Indeed, image libraries are prepared to provide this metadata, using skilled, human indexers.

Finally, Edward Hartley of the University of Lancaster, gave an excellent overview of the

work on the new MPEG-7 standard, and the likely impact of this standard. The standard is intended to "provide a framework within which to progress the evolution of media objects from undifferentiated BLOBs to *fully searchable, retrievable and indexed* content items with the same flexible access capability that we *expect from text*" (my emphasis). Potentially, this is a far-reaching standard, and the speaker encouraged the CBIR community to get involved in this standards work. These presentations were followed by wide-ranging question-and-answer and discussion session, ably chaired by Peter Enser, in which Edward Hartley fielded some challenging questions on MPEG-7. So, the conference came full circle, and ended with a challenge!

In addition to the formal plenary sessions, there was also an opportunity to view systems demonstrations, both research prototypes and products, and to view posters. Typically, much of the conference activity centred on informal discussions at dinner and afterwards, and from a social perspective, the conference was also undoubtedly a success. The Challenge of Image Retrieval Conference was organised by the Institute for Image Data Research, University of Northumbria at Newcastle, on behalf of its sponsors[2], and the Institute staff should be congratulated on the excellence of the local arrangements.

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Additional Sources of Information

"Challenge of Image Retrieval" Conference website at
http://www.unn.ac.uk/iidr/conference.html
has details of CIR98 and CIR99, including for each conference, the call for papers, programme, and abstracts of the keynote, invited speaker and posters.

Electronic proceedings of CIR98 (and CIR99 when approved by eWiC Editor) at the
BCS "*electronic* Workshops in Computing" website (projected launch date: 19th March 1999) at http://www.ewic.org.uk/

Details on obtaining copies of the JISC-funded study on the state-of-the-art of CBIR by Eakins and Graham, will be posted on http://www.unn.ac.uk/iidr/

Further information and documents on MPEG-7 at http://drogo.cselt.stet.it/mpeg/

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[2] The Conference was co-sponsored by: the Institute for Image Data Research, University of Northumbria at Newcastle; The British Computer Society Information Retrieval Specialist Group; The British Library Research and Innovation Centre; The Institute of Information Scientists; and The Robert Gordon University, Aberdeen. The event was also supported by the British Machine Vision Association and The Institution of Electrical Engineers.