

Towards Semantic User Query: A Review

Hui-Hui Wang, Yin-Chai Wang and Soo-See Chai

Department of Computing and Software Engineering, Faculty of Computer Science and Information Technology,
Universiti Malaysia Sarawak, Kota Samarahan, Sarawak, Malaysia

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Corresponding Author:

Hui-Hui Wang

Department of Computing and
Software Engineering, Faculty
of Computer Science and
Information Technology,
Universiti Malaysia Sarawak,
Kota Samarahan, Sarawak,
Malaysia

Email: hhwang@unimas.my

Abstract: This paper attempts to discuss the image query mechanisms and user needs for image retrieval. The explosive growth of image data leads to the need of research and development of Image retrieval. Image retrieval researches are moving from keyword, to low level features and to semantic features. Drive towards semantic features is due to the problem of the keywords which can be very subjective and time consuming while low level features cannot always describe high level concepts in the users' mind. This paper also highlights both the already addressed and outstanding issues.

Keywords: Image Retrieval, Semantic Gap, Semantic Based Image Retrieval

Introduction

An image can be interpreted and understood differently by different users (Yoon, 2011). It is important to understand the context of the users in an image seeking process for designing an image retrieval system (Choi, 2010). In some situations, users can imagine what they desired. However, they are unable to express their desire in precise wording (Datta *et al.*, 2008; Zha *et al.*, 2010). In such situations, the difficulties of the user are the query formulation problem, whereby they could not formulate and communicate the needed information effectively (Urban and Jose, 2006). Thus, understandings of the way the users express their search needs, which may lead to the provision of appropriate access points to visual materials for retrieval, remain important (Choi and Tasmussen, 2003).

Query mechanisms play an important role in bridging the semantic gap between users and image retrieval (Gudivada and Raghavan, 1995). The user query is used to express the user's intention and need to retrieve images from the collection of database that conform to human perception. The image search results and their accuracy are directly affected by the submitted queries (Zha *et al.*, 2010). Researches have been focusing on reducing the semantic gap in image retrieval, however in order to define a semantic meaning and representation of the input query that can precisely describe the intent of the user queries as well as the domain coverage are the major challenges (Hu *et al.*, 2009; Hua *et al.*, 2013).

An image retrieval system should have an effective user interface that allows users to precisely express their need and intent for searching the images that are conformed to human perception (Hu *et al.*, 1999). To help users find the desired images, image search has been intensively studied (Niblack *et al.*, 1993; Flickner *et al.*, 1995; Lew *et al.*, 2006; Hua *et al.*, 2013).

Evolution of User Query

Researchers have proposed a variety of ways to search images based on their intent from large image databases. Mostly, it can be classified into three levels (Eakins *et al.*, 1996; Eakins, 2000). Each level represents different level of abstraction as illustrated in Fig. 1.

Level 1 comprises of retrieval process by primitive features, such as colour, texture, shape or the spatial location of image elements. For example, find pictures of an orange circle. At this level, image is retrieve directly derivable from the images themselves, without the need to refer to any external knowledge base.

Level 2 comprises of retrieval process by derived features, involving some degree of logical inference about the identity of the objects depicted in the image. For example, finding pictures of an object ('bus'). At this level, reference to some external knowledge base is normally required.

Level 3 comprises of retrieval process using abstract attributes and involving a significant amount of high-level reasoning about the meaning and purpose of the objects or scenes depicted. For Example, find pictures of a 'happy and cheerful girl'.