

MASTER'S THESIS

Advances in Query Intention Construction and Learning in Image Retrieval

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With the rapid advancement of technology, a huge number of images need to be captured, uploaded, and shared on various platforms. Efficient retrieving of expected images from a large database has been becoming crucial, which naturally raise two challenging problems below:

The first problem is that the existing image retrieval (IR) methods generally require at least one complete image as a query sample. From a practical point of view, a user may not have an image sample in hand for a query. Instead, partial information from multiple image samples would be available. To this end, we present a novel framework that allows users to make an image query that is composed of several partial information extracted from multiple image samples via Boolean operations (i.e., AND, OR, and NOT). Based on the request from the query, a Descriptor Cluster Label Table (DCLT) is designed to efficiently retrieve the result of Boolean operations based on partial information. Numerical experiments demonstrate the promising results of the proposed framework on commodity query and criminal investigation, although it is essentially applicable to different scenarios by changing the descriptors.

The second problem to be addressed is that the existing relevant feedback IR methods only focus on a single user's behavior, and only improve the retrieval performance in the current query session. Users, who make similar queries, would have similar behaviors because they have similar expectations during queries. Accordingly, we present a Similar Behavior Learning (SBL) model to learn the behaviors of multiple users. Subsequently, an IR framework is proposed, which consists of two stages. In the first stage, given a query image, the framework retrieves some images based on the similarity of the low-level features of this image and the learned information from the SBL model as a preliminary query result. In the second stage, a user selects the preferred images from the preliminary query result, which is considered as user behavior. The SBL model instantly determines the similarity between the current user's behavior and those recorded in the SBL model database, thereby achieving a better final query result. The experimental results demonstrate the efficiency of the proposed approach.