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Multi-image query content-based image retrieval

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Multi-Image Query Content-Based Image Retrieval

A thesis submitted in fulfillment of the
requirements for the award of the degree

Master of Computer Science

from

UNIVERSITY OF WOLLONGONG

by

Feng Hui REN

School of Information Technology and Computer Science

October 2006

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by

Feng Hui REN

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*Dedicated to
my parents and my Bo*

Declaration

This is to certify that the work reported in this thesis was done by the author, unless specified otherwise, and that no part of it has been submitted in a thesis to any other university or similar institution.

Feng Hui REN
October 3, 2006

Abstract

Content-based retrieval is based on the premise that the similarity measures in the feature space accord well with visual perceptual similarity. Furthermore, the query-by-example paradigm assumes that the query concept is well specified by the user via the example image supplied. The inadequacy of these assumptions has led to the development of several similarity measures and visual features that capture and describe colour, texture and edge information in images. The simultaneous use of multiple features, relevance feedback and more recently and the use of multiple example images in specifying the query are attempts to improve the accuracy at which the query concept can be captured. Results obtained so far are still far from the ideal because of inadequate knowledge of the human perceptual processes and this leads to the so called "Semantic Gap".

This thesis proposes a multi-image query-by-example content-based image retrieval scheme in which the significance of the components of feature vectors (intra-level) and the significance of the selected features (inter-level) are estimated through weight computation. These weights are used in calculating the feature distances and visual similarity between the query images and the database images. The hypothesis is that by incorporating the significance of features at both levels, the weighted visual similarity measure will yield improved retrieval performance (precision and recall rates). The model of the weight estimation and assignment is developed and experiments are conducted to validate the hypothesis. On average the proposed method improved the precision and recall rates in retrieval tasks on a database of natural images.

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