2006

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
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.
Acknowledgements

This work would not have been carried out so smoothly without the help, assistance and support of a number of people. I would like to thank the following people:

• My supervisor, Dr. Lei Ye, for always having a moment to spare, as well as inspiring and motivating me throughout my period of study.

• My co-supervisor, Prof. Philip Ogunbona, for sharing his knowledge without reservation, and for his patient guidance.

• Masters student, Jianqiang Wang, for his great help and support with my image database collection. He collected many digital images that I used in my experiments.

• Masters student, Ling Meng, for discussing various issues and for sharing ideas. He made this period of hard work interesting and relaxing. Special thanks go to Ling for his inspiration.

• My parents, for their endless love and support in my life.

• All the people who supported my image database building work, for their kindness, images and dedication of time.

• Last but not least, I wish to thank my Bo for her boundless love, support and care throughout my degree. I will never forget those days where she took care of me when I was sick and lying in bed.
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