Research

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My Dissertation (2006-2010)

*A New Methodology for Semantic Image Similarity Based on Tree*

Abstract

This research proposes a new methodology for designing hierarchical semantic image similarity based on tree. The method has three main parts, i.e., semantic feature extraction, image representation, and image similarity measurement. Semantic feature extraction identifies informative image features hierarchically using online learning. Image representation represents the images using image tree. Finally, semantic image similarity measurement measures image similarity using tree matching based on the feature and structure of image tree. The methodology has been tested on several benchmark image databases containing 2,268 images. The interpolated precision metric and ROC analysis are used as performance metrics with statistical paired t-test. The achieved average precision and hit rate are 65% and 95% respectively, outperforming previously suggested methods. In all experiments conducted, the proposed method achieves the nest result with significant improvement. In addition, the results are very close to human visual similar perception. The correlation coefficient is 0.77. The experiment results demonstrate the usefulness and effectiveness of the proposed similarity measure for image retrieval that is promising for use in real-world application.

Keywords: image similarity; hierarchical semantic image; semantic gap; tree

*Face Line Distance Method for 3D Face Recognition*

**Abstract**

A new face feature lines selection using face geometrical features for 3D face recognition is proposed. We propose a face feature lines distance algorithm for face recognition under varying pose. The motivation of face feature lines distance algorithm is its inherent simplicity with the feature-based approach, owing to the fact that it does not use detail biometric knowledge of the human face. We experimentally selected ten landmark points and generated 0, 45, 90 and 135 degrees face feature lines and intersect those points. The dimension of the data was reduced by using Probability Principal Component Analysis (PPCA) through maximizing the likelihood function using Expectation Maximization (EM) algorithm and finally, the recognition was perform with backpropagation neural network. Result showed that selected face feature lines produces good recognition rates, handles face rotation both in and out of imaging plane and also has superior accuracy compared with grey level method.

Keywords : Face Recognition; Probability Principal Component Analysis; EM algorithm; Face Geometry; Face-Line Distance.

**Students Research Topics**

**Undergraduate student topics**

- Implementasi Self Organizing Map untuk Relevance Feedback pada Citra
- Pembentukan Ontologi Citra menggunakan Hierarchical Clustering
- Pengukuran Kemiripan Citra menggunakan Bayesian Network
- Optimisasi Kueri Citra dengan Algoritme Genetika
- Self Organizing Map untuk Klasifikasi Citra pada Sistem Temu Kembali Citra
- Klasifikasi citra dengan Radial Basis Function Network pada Sistem Temu Kembali Citra
- Pemanfaatan Sistem Pakar Fuzzy Dalam Menentukan Perilaku Api pada Kebakaran Hutan
- Analisis Kinerja Algoritme Expectation Miaximization untuk Segmentasi dan Sistem Temu Kembali Citra
- Metode Support Vector Machine Untuk Klasifikasi Sistem Temu Kembali Citra
- Pemampatan Citra dengan Metode Singlar Value Decomposition (SVD)
- Sistem Pakar Diagnosa Penyakit Udang Windu (Penaeus Monodon)
- Metode Pengindeksan Geometric Hashing untuk Content Based Image Retrieval
- Metode Hough Transform untuk Ekstraksi Ciri Bentuk pada Citra Bunga
- Metode Fuzzy Color Histogram untuk Temu Kembali Citra Bunga
- Evaluasi Penambahan Dokumen Dalam Sistem Temu Kembali Informasi
- Uji Simplifikasi Quadric pada Obyek Pertanian

**Graduate Students Topics**

- Pengembangan Sistem Manajemen berbasis Pengetahuan untuk Pemerintah Gorontalo
- Representasi Ontology Citra untuk Sistem Temu Kembali Citra
- Fuzzy Rule-Based Sistem Temu Kembali Citra
- Rekayasa Sistem Diagnosa Tingkat Kesehatan dan Kinerja Perusahaan Agrobisnis/Agroindustri Berbasis Jaringan Saraf Tiruan dan Logika Fuzzy