利用小波分解及梯度變異為基礎之影像查詢系統

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摘 要

在以內容為基礎的影像檢索系統（CBIR），材質（Texture）特 徵是其中一個非常有效的特徵。在本篇論文，將提出兩個影像檢索 方法。首先，第一個提出方法是利用小波轉換（Wavelet Transform） 與梯度運算（Gradient Operation）作為特徵，並透過主成分分析 （PCA）計算每個特徵的權重，進而提昇檢索系統的準確度。第二 個所提出的方法則利用梯度運算與統計方式對材質影像進行特徵 擷取。在實驗部分使用Brodatz Album 材質影像作為檢索的測試影 像，此套材質影像總共有112 張512×512 解析度的影像。進行實驗 之前，首先將每一張材質影像切割為16 張非重疊之128×128 子影 像作為材質影像資料庫，因此材質影像資料庫總共包含1792 張影 像。一般在影像檢索系統中，影像特徵的數量將直接影響到檢索的 效能與效率，Huang and Dai（2003）所提出的方法中所使用的特徵 數量為144 個，在本論文所提出的第一個方法中，每張材質影像總 共為126 個特徵，而第二個方法僅使用54 個特徵。實驗結果顯示， 本論文所提出的兩種方法與Huang and Dai 方法比較，可分別獲得 3.51%與9.41%的效能提昇。

關鍵詞 : 以內容為基礎的影像查詢 ; 離散小波轉換 ; 材質紋理 ; 梯度運算 ; 熵 ; 主成分分析

目錄

參考文獻

[1] M. Stricker and M. Orengo,“ Similarity of color images ”, SPIE: Storage Retrieval Image and Video Database III, vol. 2420, pp. 381 – 392, 1995.

[2] J. M. Fuertes, M. Lucena, N. Peres de la Blanca, and J. Chamorro-Martinez,“ A Scheme of Color Image Retrieval From Databases ”, Pattern Recognition, vol. 22, No. 3, pp. 323-337, 2001.

[3] Y. K. Chan and C. Y. Chen,“ Image retrieval system based on color-complexity and color-spatial features ”, The Journal of Systems and Software, vol. 71, pp. 65-70, 2004.

[4] C. C. Chang and Y. K. Chan,“ A Fast Filter for Image Retrieval Based on Color Features ”, SEMS2000, pp. 47-51, 2000.

[5] Y. C. Ko, and H. Byun,“ FRIP: A Region-Based Image Retrieval Tool Using Automatic Image Segmentation and Stepwise Boolean AND Matching ”, IEEE Transactions on multimedia, vol. 7, pp. 105-113, 2005.

[6] B. M. Mehtre, M. Kankanhalli, and W. F. Lee,“ Shape measures for content-based image retrieval: A comparison Info ”, Processing & Management, vol. 33, pp. 319 – 337, 1997.

[7] S. Arivazhagan and L. Ganesan:“ Texture classification using wavelet transform ”, Pattern Recognition Letters, vol. 36, pp. 1513 – 1521, 2003.

[8] S. Arivazhagan and L. Ganesan:“ Texture segmentatio using wavelet transform ”, Pattern Recognition Letters, vol. 2, pp. 3197 – 3203, 2003.

[9] P. W. Huang and S. K. Dai,“ Image Retrieval by Texture Similarity ”, Pattern Recognition, vol. 36, pp. 665-679, 2003.

[10]S. Liapis and G. Tziritas“ Color and Texture Image Retrieval Using Chroma-ticity Histograms and Wavelet Frames ”, IEEE Transactions on multimedia, vol. 6 pp. 676-686, 2004.

[11]N. Jhanwara, S. Chaudhurib, G. Seetharamanc and B. Zavidovique, " Content based image retrieval using motif co-occurrence matrix ", Image and Vision Computing, vol. 22 pp. 1211 – 1220, 2004.
[12]B. Verma and S. Kulkarni " A fuzzy-neural approach for interpretation and fusion of colour and texture features for CBIR systems ", Applied Soft Computing, vol.5 pp.119-130, 2003.
[13]R. M. Haralick, K. Shanmugam, and I. Dinstein, " Texture features for image classification ", IEEE Trans., vol. SMC-8, pp. 610 – 621, Nov. 1973.
[14]H. C. Lin, C. C. Chang, J. C. Wu, L. L. Wang, and S. N. Yang, " Content-based image retrieval by color, texture, and shape ", Journal of Computers, vol. 13, No. 4, 2001.
[15]R. Brnuelli and O. Mich, " Histograms Analysis for Image Retrieval ", Pattern Recognition, vol. 34, pp. 1625-1637, 2001.
[16]R.M. Haralick, L.G. Shapiro, Computer and Robot Vision, vol. I, Addison-Wesley, Reading, MA, 1992.
[17]H. Tamura, S. Mori, and T. Yamawaki, " Texture features corresponding to visual perception ", IEEE Trans., vol. 8, PP. 460 – 473, June 1978.
[18]R.C. Gonzalez, R.E. Woods, Digital Image Processing, Commun. Pure Appl. Math. 41 (1988) 386 – 394.
[19]D. Ballard, C. Brown, Computer Vision, Prentice-Hall, Englewood Cliffs, NJ, 1982.
[20]R. C. Gonzalez, R. E. Woods, Digital Image Processing , Prentice-Hall, NJ, 2002 386 – 394 [21]D. F. Morrison, Multivariate statistical methods, New York: McGraw-Hill.
[22]Y. D. Chun, S. Y. Seo, and N. C. Kim, " Image Retrieval Using BDIP and BVLC Moments ", IEEE Transactions on Circuits and for Video Technology, vol. 13, no. 9, September 2003 [23]Brodatz Album Texture Database.
[Online]. Available: http://www.ux.hwas.no/~tranden/brodatz.html [24] M. Kokare, P. K. Biswas, and B. N. Chatterji, " Texture Image Retrieval Using New Rotated Complex Wavelet Filters " , IEEE Trans. on Systems, MAN, and Cybernetics, vol 35, no.6, December 2005.
[25] M. Kokare, P. K. Biswas, and B. N. Chatterji, " Rotation-Invariant Texture Image Retrieval Using Rotated Complex Wavelet Filters " , IEEE Trans. on Systems, MAN, and Cybernetics, vol. 36, no. 6, December 2006.