3D Image Registration for Two CT Sequence Images

李致瑋、張世旭

E-mail: 9806832@mail.dyu.edu.tw

ABSTRACT

Diagnoses of lung cancer are it is not easy to discriminate the size and location of the cancer region when making diagnosis. The purpose of this project is to create a Computer-Aided Diagnosis（CAD） System to process the Computed Tomography scan（CT ） images and to assist in making diagnosis. The physician is hard to calculate the size of lung cancer. The CAD can offer more accuracy by using image registration technique.

In the proposed system were implemented for several image processing techniques processing CT images. These techniques include （1） Bone Extraction, （2） Find Baseline Searching, （3） Coarse Registration, （4） Labeling, and （5） Fine Registration. CT images are DICOM（Digital Imaging and Communication in Medicine） format. Each study contains 60-90 sequential images with the voxel of each image is 5mm.

The experimental results show that the proposed system can effectively support 3D image registration of two sequences of CT images.

Keywords : CT、Image registration、Computer-Aided Diagnosis、Labeling、DICOM

Table of Contents

REFERENCES

[1]行政院衛生署，九十六年十大死因， http://www.doh.gov.tw/cht2006/index_populace.aspx.

[2]A. Jemal, A. Thomas, T. Murray, and M. Thun,“ Cancer statistics, 2002, ” CA: A Cancer Journal for Clinicians, Vol. 52, No. 1, pp. 23-47, 2002.

[3]A. M. R. Schilham, B. van Ginneken, and M. Loog,“ Multi-scale nodule detection in chest radiographs, ” Lecture Notes in Computer Science, Vol. 2878, pp. 602-609, 2003.

[4]M. Giger, K. Doi, and H. MacMahon,“ Image feature analysis and computer-aided diagnosis in digital radiography. 3. Automated detection of nodules in peripheral lung fields, ” Medical Physics, Vol. 15, pp. 158-166, 1988.

[5]“ 3D IMAGE REGISTRATION, ” http://www.3d-doctor.com/regist.html[6]L. Shang, J. C. Lv, and Z. Yi,“ Rigid medical image registration using PCA neural network, ” Neurocomputing, Vol. 69, pp. 1717-1722, 2006.

[7]L. Gong, S. Pathak, A. Alessio, and P. Kinahan,“ Automatic arm removal in PET and CT images for deformable registration, ” Computerized Medical Imaging and Graphics, Vol. 30, pp. 469-477, 2006.

[8]L. G. Brown, “ A survey of image registration techniques, ” ACM Computing Surveys （CSUR）, Vol. 24, No. 4, pp. 325-376, 1992.
[9]B. Zitova and J. Flusser, “ Image registration methods: a survey, ” Image and Vision Computing, Vol. 21, No. 11, pp. 977-1000, 2003.
[10]L. Wang, M. Greenspan, and R. Ellis, “ Validation of bone segmentation and improved 3-D registration using contour coherency in CT data, ” IEEE Transactions on Medical Imaging, Vol. 25, No. 3, pp. 324-334, 2006.
[11]A. Sarkar, R. Santiago, R. Smith, and A. Kassaee., “ Comparison of manual vs. automated multimodality （CT-MRI） image registration for brain tumors, ” Medical Dosimetry, Vol. 30, No. 1, pp. 20-24, 2005.
[12]T. Sebastian, H. Tek, J. Crisco, and BB. Kimia, “ Segmentation of carpal bones from CT images using skeletally coupled deformable models, ” Medical Image Analysis, Vol. 7, No. 1, pp. 21-45, 2003.
[13]B. Brendel, S. Winter, A. Rick, M. Stockholm, and H. Ermert, “ Bone registration with 3D CT and ultrasound data sets, ” International Congress Series, Vol. 1256, pp. 426-432, 2003.
[14]E. Firle, S. Wesarg, and C. Dold, “ Fast CT/PET registration based on partial volume matching, ” International Congress Series, Vol. 1268, pp. 31-36, 2004.
[15]H. Wang, J. Bai, and Y. Zhang, “ A normalized thoracic coordinate system for atlas mapping in 3D CT images, ” Progress in Natural Science, Vol. 18, No. 1, pp. 111-117, 2008.
[16] “ Wikipedia.Rib, ” http://en.wikipedia.org/wiki/Rib.
[17]I. Pitas, “ Digital Image Processing Algorithms and Applications, ” John Wiley and Sons, pp. 300-303, 2000.