

An improved method for automated anatomical labeling of bronchial branches extracted from 3-D CT images

S. Ema^{*}, K. Mori, T. Kitasaka, Y. Mekada, H. Murase, J. Hasegawa,
J. Toriwaki, M. Mori, H. Takabatake, H. Natori

*Department of Media Science, Graduate School of Information Science, Nagoya University,
Furo-cho, Chikusa, 464-8603, Nagoya, Aichi, Japan*

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1. Introduction

In the diagnosis of the chest, a medical doctor uses the information of normal anatomical structures, such as the bronchus, for detecting abnormal regions. The location of a lesion is identified by anatomical names such as bronchial branch names. Thus, it is important to develop a method for assigning anatomical names to the bronchial branches extracted from 3-D CT images. In the previous method, it was difficult to treat variations of branching patterns among individuals. Also labeling accuracy is deteriorated by large differences between the models and the actual tree structures in the peripheral parts. We improve anatomical labeling accuracy by introducing two key techniques: (a) handling of multiple branching models and (b) model deformation.

2. Methods

The whole procedure consists of four major steps: (1) construction of branching models, (2) extraction of tree structure information, (3) labeling for main bronchus, and (4) labeling of peripheral branches with the selection and deformation of a model. We construct multiple branching models for each part of the bronchus to deal with the branching variation problem. The model is deformed so as to fit it to the tree structure currently being processed.

3. Results

We have applied the proposed method to fifteen cases of 3-D CT images. The total number of branches was 355. The experimental results showed that the proposed method could assign anatomical names correctly for 316 branches (89%), while it was 296 branches (83%) by the previous method [1].

Reference

- [1] K. Mori, et al., Automated anatomical labeling of the bronchial branch and its application to the virtual bronchoscopy system, *IEEE Transactions on Medical Imaging* 19 (2000) 103–114.

^{*} Corresponding author. Tel.: +81-527893310; fax: +81-527893807.
E-mail address: sema@murase.nuic.nagoya-u.ac.jp (S. Ema).