

Automatic Tissue Classification by Integrating Medical Expert Anatomic Knowledge

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Abstract: In MRI (Magnetic Resonance Imaging) based medical diagnosis, image segmentation techniques play a key role. Existing segmentation methods are generally based on classical features extracted from medical images such as grey level and texture. However, these methods can not identify physical significance of segmented objects on images because specialized medical knowledge is not considered in these classical features. In practice, specialized medical knowledge is very important when doctors observe medical images using their personal vision. To deal with this problem, many tissue classification systems were developed by incorporating specific medical knowledge. However, the development of these systems strongly depends on specific applications and then can not lead to a general structure for integrating medical knowledge in a large context. To treat medical image recognition in a systematic way, we propose in this paper a general intelligent tissue classification system which combines both FCM (Fuzzy C-Means) based clustering algorithm and qualitative medical knowledge on geometric properties of different tissues. In this system, a general geometric model is proposed for formalizing non structured and non normalized medical knowledge from various medical images. This system has been successfully applied to classification of human thigh, crus, arm, forearm, and brain from MRI images.

Keywords: Magnetic Resonance Imaging, Fuzzy C-Means, Medical Knowledge, Tissue Classification System.