

Automatic Diagnosis of Intracranial hematoma on brain CT using Knowledge Discovery Techniques: Is finer resolution better?

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Furen Xiao;Chun-Chih Liao;Jau-Min Wong;I-Jen Chiang

Abstract

Computed tomography (CT) of the brain is the study of choice for neurological emergencies. Physicians use CT to diagnose various types of intracranial hematomas, including epidural, subdural, and intracerebral hematomas according to their locations and shapes. We have proposed a novel method that can automatically diagnose intracranial hematomas by combining machine vision and knowledge discovery techniques. In this paper, we attempted segmentation of intracranial hematomas in multiple resolutions using image pyramids. The features of the segmented hematoma and the diagnoses made by physicians were used by C4.5 algorithm to construct a decision tree. The algorithm was evaluated on 48 pathological images treated in a single institute. The two discovered rules in all resolutions closely resembled those used by human experts, and were able to make correct diagnoses in all cases. Results of tenfold cross-validation were also satisfactory.