

Automatic Detection of Intracranial Hematoma on Routine Brain CT

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Abstract

In recent years, non-volumetric computed tomography (CT) without administration of intravenous contrast agent has become an important screening tool for almost all patients presenting with acute neurological disorders, which is well known to have great potential of rapid worsening. Intracranial hematoma appears as a hyperdense (white) area on brain CT and is usually not difficult to identify. However, it is not easy to have the correct diagnosis by general physicians due to the complex and usually unfamiliar anatomy. Furthermore, timely opinions from specialist are not usually available, increasing the risk of misdiagnosis and improper treatment. To overcome this problem, we developed a system that can automatically identify and classify different types of intracranial hematoma within single slices of brain CT images in less than one minute, bases on rules derived from human specialists. Fifty-six CT slices bearing the largest hyperdense area of the series were picked up by manually from 76 consecutive patients admitted to the intensive care unit of a single hospital and the results were reviewed. For images with spontaneous deep intracerebral hematoma or large traumatic intracranial hematoma, the system was able to recognize 95% of them (40/42). Worse performance was noted for images containing smaller traumatic hematoma or intraventricular hematoma adjacent to intracerebral hematoma. We conclude that automatic hematoma localization and classification is feasible on single slices of routine non-contrast brain CT for most patients without significant false-positive results. With further refinement, our system may gain wider application and may be integrated into image workstations to form an online decision support system.