System And Method For Rapid Automated Head Computed Tomography Analysis

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INVENTION NOVELTY

This invention is a novel, automated method to rapidly detect and locate neurological emergencies such as acute intracranial hemorrhage on head computed tomography (CT) images using deep learning technology.

VALUE PROPOSITION

Computed tomography (CT) head scanning is a noninvasive diagnostic tool used to examine the neurological symptoms of head trauma, intracranial pressure changes, and hemorrhagic or ischemic stroke. The diagnosis obtained from CT images determines the subsequent treatment strategies as well as the need for immediate hospitalization, surgical intervention, or administration of medicine. Currently, only trained radiologists are qualified to interpret CT images. This has become a growing issue since CT scanning technology, including the new generation of portable CT scanners, is now accessible in many locations where radiologists may not be readily available. Also, the number of CT scans performed each year and the volume of imaging data per scan have been rising, but the number of trained radiologists has not, potentially resulting in diagnostic delays. Therefore, there is a critical need for an automated method to detect neurological emergencies from CT data in order to expedite patient diagnosis and treatment. Since this technology could rapidly identify life-threatening abnormalities on head CT scans and flag them for immediate attention by radiologists and treating physicians, this would result in improved patient care.

This novel invention has the following advantages:

-Fast analysis of batch or single images

-Adaptable system that can be customized to fit user needs

-Available on multiple devices and operating systems

-Cloud-based platform can be remotely accessed or share data

-Quantification of volume, density, as well as localization of trauma

-High accuracy, sensitivity, and specificity

TECHNOLOGY DESCRIPTION

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OTHER INFORMATION

KEYWORDS

Computed tomography (CT), Medical Device, Diagnostics, Software, Deep learning, Noninvasive, Head Trauma, Ischemic stroke

CATEGORIZED AS

- **Medical**
  - Devices
  - Diagnostics
  - Software

RELATED CASES

2016-089-0

Neuroradiologists at the University of California, San Francisco developed novel software for rapid detection of head trauma from CT data. This software applies custom heuristic algorithms in combination with deep learning technology to raw or processed CT images in order to identify multiple aspects of head trauma, including acute intracranial hemorrhage, intracranial mass effect, and brain herniation. The software runs separate, yet concurrent analyses on different types of image features, so users can customize the system to only include relevant subsets. Additionally, this technology quantifies the size and density, and maps the location of, acute intracranial hemorrhage, which a human specialist could not provide alone, thus helping to influence therapeutic treatment strategies. Therefore, this system is a quick and automated platform to identify neurological emergencies using CT data, thus, delivering the critical analysis required for subsequent clinical decisions. Because this software is compatible with all standard devices and operating systems, it can rapidly be incorporated into clinical settings.

APPLICATION

- Rapid detection and localization of neurological emergencies on head CT for immediate attention by a radiologist
- Expedited diagnosis of neurological emergencies on head CT in situations when a radiologist may not be readily available
- Detection and localization of the following neurological emergencies from head CT images:
    - acute intracranial hemorrhage
    - intracranial mass effect
    - brain herniation
- Generation of quantitative data about hemorrhage size and density

PATENT STATUS

Country	Type	Number	Dated	Case
Germany	Issued Patent	3391284	04/17/2024	2016-089
Spain	Issued Patent	3391284	04/17/2024	2016-089
France	Issued Patent	3391284	04/17/2024	2016-089
United Kingdom	Issued Patent	3391284	04/17/2024	2016-089
United States Of America	Issued Patent	11,810,296	11/07/2023	2016-089
United States Of America	Issued Patent	11,200,664	12/14/2021	2016-089
China	Published Application	108369642	08/03/2018	2016-089
Japan	Published Application			2016-089

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