Baylor Scott & White RESEARCH INSTITUTE

SW13-023INV

Anatomical Assessment Software

Summary

Breakthrough software for the automatic identification and analysis of two or more preselected anatomical features to aid in medical assessments of possible injury, malalignment, or abnormality was developed through a collaborative effort between Baylor Scott & White Healthcare and Baylor University. Analyzing subcutaneous images, such as computerized tomography (CT) scans, the software provides identification with precise measurements between two features, compares the results against normative data, and provides final results to the user. One embodiment of this technology can measure an interval between two bones such as to identify ligamentous injuries in the occipitocervical complex (OCC).

Key Investigator

Christopher Chaput, MD

Field

Orthopedics

Technology

Method and system of measuring anatomical features in subcutaneous images to assess risk of injury

Key Features

- Precise and accurate results not attainable by the naked eye
- No competing product available on the market
- Proof of concept with OCC injury detection

Stage of Development

Preclinical, prototype

Status

Available for licensing

Patent Status

US Patent 9,078,621
Pending patents
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Market

In trauma situations, evaluating the extent of damage is time consuming to analyze by eye. With little support available from computer aided diagnosis, the radiology image interpretation can be subjective based on physician expertise. Exemplifying this issue, it has been reported that medical malpractice lawsuits for "failure to diagnose" account for about 40-54% of radiology-related medical malpractice cases.

The spinal cord is one anatomic area often evaluated for injury resulting from motor vehicle accidents, falls, and sports injuries. The OCC is the upper portion of the cervical spine between the region from the base of the skull to the second cervical interspace. Occipitocervical injuries (OCIs) usually result in full paralysis or death. The mean reported incidence of cervical spine injuries was nearly 50% in blunt trauma fatalities in one study, and it has been reported that up to 38% of patients suffered profound neurological deterioration before an OCI was recognized. Because OCIs often involve damage to soft tissue rather than bones, these injuries are difficult to detect, even with the use of advanced imaging such as CT scans.

In order to improve the survival and health of trauma patients, rapid injury diagnosis and management is essential to save critical time and reduce human error. Currently, no software exists to aid physicians in the inspection of the OCC in spine CTs.

Technology

The invention is a software module for medical analysis of anatomical scans. The software computes the appropriate measurements by locating and/or tracing along pre-selected anatomical features that includes processing digital images of the general region of the structures to locate the specific features, mathematically determines the distance between such features, compares these measurements with normal values, and provides a report of the results to the physician. In some cases, the software generates an alert or warning to further investigate for injury.

From a set of images, the system can search and automatically find appropriate bones, anatomical references, and anatomical features without intervention by the medical personnel to produce the results that may alert the medical personnel to a condition that otherwise might be unsuspected and unknown. The system can also be given direction to measure and analyze the point between two features manually.

In one example, the software has identified and computed the basion-dens interval (BDI). The BDI is the distance between the inferior tip of the basion and the superior tip of the dens – two anatomical structures in the OCC. Measurement of the BDI aids in the diagnosis of OCC injury. If the BDI exceeds a certain value, then the risk of undetected OCC injury is elevated.

Currently, the software prototype is being advanced to incorporate additional cases.