Computer-Aided Detection of Implantable Man-Made Devices in Medical Images

Tech ID: 23204 / UC Case 2007-218-0

SUMMARY

UCLA investigators have invented a computer-aided detection (CAD) system to automatically detect and assess implantable, man-made devices (IMD) in medical images. This invention is the first computer vision system to detect and assist interpretation of implanted man-made devices in patients.

BACKGROUND

Computer-aided detection system has become a promising subject in medical imaging and diagnostic radiology. However, there have been relatively few applications of these systems with the exception of two that have been commercialized for detecting organs and diseases in mammograms and CT images. Man-made devices are used more and more frequently as medical implants to replace, support, or enhance biological structures in patients, such as pacemakers. The failure to monitor these implants accurately could threaten the life of patients depending on the critical nature and position of the implantable devices. Unfortunately, there have been no techniques developed for detecting and classifying implanted man-made devices (IMDs) for medical imaging except for modeling surgical dental implants for simulation and planning purposes. Detection and surveillance of IMDs is required on a large number of images for within the same imaging modality and within different modalities. Currently the presence and location of IMDs are assessed visually by a radiologist solely. It is a time-consuming and sometimes challenging task for physicians, and is therefore expensive for healthcare.

INNOVATION

Researchers at UCLA have developed a computer-aided detection system (CAD) to detect and assess an IMD for medical imaging. The system is implemented as a computer software package. Following detection and classification of an IMD, the system can automatically generate a detailed report about the images. In detail, a report will include information for automatically determining: (a) location, (b) number, (c) category, manufacturer, and characteristics; (d) comparison to manufacturer's specifications; (e) movement between serial images; (f) safety verification and recall.

APPLICATIONS

- Detect a variety of IMDs such as pacemakers, pumps, stents, plates, coils, tubes, catheters, clips, nails, screws, and microchips.
- Applicable to medical imaging modalities such as X-ray, MR, ultrasound, nuclear, and optical.
- Detect critical device failures that put patient safety at risk.
- Assess changes in position of an IMD in a given patient from different measurements.

ADVANTAGES

- Reduce time and costs for detecting IMDs
- Increase accuracy, consistency and level of detailed interpretation.
- Applicable to a wide range of radiologic tasks.
- Can be run on an individual medical imaging workstation, a centralized server or cluster of servers in medical centers, or be accessed remotely via the internet.

STATE OF DEVELOPMENT

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OTHER INFORMATION

KEYWORDS

CAD, IMD, Medical, implant, imaging, detection, diagnostic, computer, software, device, radiology

CATEGORIZED AS

- **Computer**
  - Software
- **Imaging**
  - Medical
  - Software
- **Medical**
  - Imaging
  - Software

RELATED CASES

2007-218-0

Preliminary investigations have shown the viability of the approach for detecting catheters in chest x-ray images. It has been shown that catheters are visible and can be classified with additional feature detection. The result suggests that with additional features a classifier can be trained to automatically detect the catheters.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,471,973	10/18/2016	2007-218

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Wireless Remote Sensing of Changes in Fluid Filled Containers
- Probability Map of Biopsy Site
- 3D Population Maps for Noninvasively Identifying Phenotypes and Pathologies in Individual Patients
- A New Human-Monitor Interface For Interpreting Clinical Images

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