Faster, Higher Quality Medical Imaging

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WARF: P150024US01

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a model-based reconstruction technique for MRI and CT that provides accelerated, time-resolved imaging.

Overview

Magnetic resonance imaging (MRI) and computed tomography (CT) have become invaluable tools for learning about a patient's health. However, systems are limited by acquisition speed, which often leads to unsatisfactory tradeoffs between spatial resolution and temporal resolution (or radiation dose, in the case of CT).

There is significant interest in new acquisition/image reconstruction methods to accelerate the process. While techniques like parallel imaging and compressed sensing have had some success, the need for greater acceleration and image quality remains vital in many applications.

The Invention

UW–Madison researchers have developed a reconstruction technique that uses a non-patient-specific signal model (e.g., a physical or physiological model) to improve image quality without compromising accuracy.

While other methods make use of such analytical models in the post-processing stage, the new technique utilizes the model earlier in the process, yielding clinically useful images from highly undersampled data. The reconstruction process is designed to accommodate deviations from the model when appropriate.

Applications

- Medical imaging software for MRI and CT
- Uses include time-resolved contrast-enhanced angiography and perfusion imaging
- May be used along with existing techniques (e.g., parallel imaging) for combined benefits

Key Benefits

- Provides higher acceleration capabilities
- Improves image quality, sharpness
- Boosts spatial/temporal resolution
- Cuts noise levels and undersampling artifacts
- May lead to dose reduction in CT
- Robust, even in the presence of patient motion
- Deviates from signal model when appropriate

Stage of Development

The researchers have demonstrated their technique using patient data. Compared to standard view sharing techniques used in dynamic contrast-enhanced imaging to improve image quality, the new method preserves temporal fidelity of the reconstructed time series.

In applications such as contrast-enhanced, MR angiography (CE MRA), this allows for accurate separation of arterial and venous phases of contrast dynamics and estimation of blood volume/flow/mean transmit times in perfusion imaging.

Compared to other techniques based on compressed sensing estimation theory, the new technique has been shown to improve image sharpness and spatial/temporal resolution.

Additional Information

Related Technologies
- WARF reference number P120280US01 describes a method for reconstructing medical images from limited data samples in which the process is constrained to be consistent with a signal model.
- WARF reference number P05348US describes a method for reducing the processing time and enhancing image quality of parallel MRI using radial acquisition trajectory.

Related Intellectual Property
- View Divisional Patent in PDF format.

Tech Fields
- Medical Imaging : CT
- Medical Imaging : MRI

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846