



Image Reconstruction Method for Computed Tomography and Magnetic Resonance Cardiac Imaging

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WARF: P06479US

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a new method for reconstructing highly undersampled images at specific cardiac phases for both X-ray computed tomography (CT) and magnetic resonance imaging (MRI).

Overview

Magnetic resonance imaging (MRI) is a medical imaging technique that takes measurements, or “views,” of a subject’s nuclear magnetic resonance (NMR) to form images of internal structures. Computed tomography (CT) is another medical imaging technique that measures the attenuation of an X-ray beam’s signal to form images. Images are reconstructed from the projection views by backprojecting the processed data to the signal receivers to reconstruct the image. High quality images require a long scan time, while a short scan time results in low quality images.

When imaging a beating heart, electrocardiography (ECG) is used to detect when the heart is at a certain point in the cardiac cycle. This allows a still image to be created at that cardiac cycle point. Twenty years ago a method for creating good quality images of moving tissue with far less data was proposed, but never developed because a scanner system was not yet commercially available. By combining image data from the stationary tissue surrounding the heart and image data from the moving heart tissue, distortions in the final image due to the stationary tissue could be removed completely.

The Invention

A UW–Madison researcher has developed a new method for reconstructing highly undersampled images at specific cardiac phases for both X-ray computed tomography (CT) and magnetic resonance imaging (MRI). The method uses a highly constrained backprojection method and requires a composite image that is enhanced using the previously proposed method.

The highly constrained backprojection reconstruction method weights image pixels to increase the image quality at areas in which the composite image pixels intersect structures in the subject, instead of simply assuming the pixels should be weighted evenly like previous techniques. Increasing the quality of this composite image directly increases the reconstructed image quality. The composite image can be enhanced further by subtracting the stationary tissue that surrounds the heart.

Applications

- MRI and X-ray CT images of a beating heart

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- Increases image resolution

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- Decreases scan time
- Increases signal-to-noise ratio
- Removes distortions due to stationary tissue image

Additional Information

For More Information About the Inventors

- [Charles Mistretta](#)
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Tech Fields

- [Medical Imaging : CT](#)
- [Medical Imaging : MRI](#)

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

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