Medical Imaging

Image Reconstruction Method for Functional Magnetic Resonance Imaging

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WARF: P06143US

Inventors: Charles Mistretta, Walter Block

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a new method for acquiring and reconstructing functional magnetic resonance (MR) images.

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. Functional MRI (fMRI) is used to image changes in cerebral blood volume, flow and oxygenation induced by the brain performing certain tasks.

To see the changes in brain activity that are induced by performing certain tasks, a series of fMRI images need to be obtained at a high rate. To add to this challenge, since neuronal activity can occur at widely dispersed locations, a relatively large 3D volume needs to be scanned in the fMRI image series. If insufficient views are acquired, the fMRI images may contain unwanted streaks, or "artifacts," that distort the image.

The Invention

UW-Madison researchers have developed a new method for acquiring and reconstructing functional magnetic resonance (MR) images. A series of views are combined into a composite image that is employed in a highly constrained backprojection method to reconstruct fMRI image with an increased signal-to-noise ratio (SNR) and fewer artifacts.

The composite image allows the method to produce good quality images with far less data, reducing scan time. The highly constrained backprojection reconstruction method weights image pixels to increase the image quality at areas where the composite image pixels intersect structures in the subject, instead of simply assuming the pixels should be weighted evenly. Increasing the quality of the composite image by taking a series of undersampled images and interleaving them increases the reconstructed image quality.

Applications

- Highly constrained image reconstruction for fMRI applications, including measuring neural activity in the brain and spinal cord

Key Benefits

- Increases image resolution
- Decreases scan time
- Increases signal to noise ratio
- Decreases the appearance of image artifacts

Additional Information

For More Information About the Inventors

- Charles Mistretta
- Walter Block

Related Technologies

- For information about diffusion tensor magnetic resonance imaging (DT-MRI), see WARF reference number P06144US.

Tech Fields

- Medical Imaging : MRI

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