Brain and Deep Tissue Visualization by Diffusion Tensor Imaging

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing software that enables the use of diffusion tensor magnetic resonance imaging to explore brain connectivity and support new diagnostic tools.

Overview

Elucidating the workings and development of the brain remains a fertile topic of investigation and one reliant on non-invasive visualization technology like magnetic resonance imaging (MRI).

As applied in MRI, diffusion tensor imaging (DTI) is a technique that probes the diffusion characteristics of the brain and other deep tissues. The method has been used in several studies to infer the microstructural features of the heart, muscle tissue, bone marrow, intervertebral discs and spinal cord. For brain white matter, especially, DTI can provide exquisitely detailed *in vivo* maps of fiber pathways. In this type of tissue, diffusion is restricted (anisotropic), and shows a different level of brightness in DTI images than anisotropic gray matter.

Making available a code that facilitates DTI for brain and other deep tissue research, assessment and diagnostics is highly desirable.

The Invention

UW–Madison researchers have developed a post-processing algorithm that accepts diffusion weighted images acquired with diffusion weighted gradients in any 3-D orientation and with any combination of eigenvalues as input.

The code calculates the diffusion tensors for each voxel and provides as output several types of maps, including trace, fractional anisotropy, volume ratio, absolute value color and vector maps. The algorithm also provides a description of the mean diffusion properties of the region of interest and details of the diffusion characteristics of selected voxels.

Applications

- New tools for diagnosing and assessing the effects of stroke, brain tumors, degenerative diseases and brain injury
- Research into white matter function and development in newborns
- Clinical visualization of other deep tissues like heart, muscle and the spinal cord

Key Benefits

- Images acquired with diffusion weighted gradients in any 3-D orientation
- Any combination of eigenvalues used as input
- Provides several map types and detailed diffusion descriptions

Additional Information

For More Information About the Inventors

- M. Elizabeth Meyerand

Tech Fields

- Information Technology : Computing methods, software & machine learning
- Medical Imaging : MRI

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