AI-powered image construction technology

Deep learning technologies are increasingly being used in medical technology to accelerate processes and improve patient outcomes. AI is also becoming increasingly important in the field of radiology in the context of computed tomography and magnetic resonance imaging. A new Deep Learning technology is expected to assist in the reconstruction of clinical images in the future and promises faster and better-resolved MRI scans. Until now, image qualities have been determined by the interplay of scan duration, image noise, and resolution. Until now, improving any one component resulted in the compromise of another.

Innovative deep-learning technology now promises to have solved this problem: In the future, physicians should be able to select a much faster scan time that maintains identical resolution while reducing noise. Alternatively, the image quality can be further increased while keeping the scan time unchanged.

The technology used for this purpose works with the raw data of the scanner, which makes it possible to apply the AI algorithms already from the start of the image reconstruction. Using the raw data at such an early stage offers great potential, as the Deep Resolve algorithms are able to accelerate the scan time by up to 70 percent while doubling the resolution. Overall, Deep Resolve technology contributes to increased workflow efficiency and comfort in the examination process for patients. Based on thousands of curative data pairs resulting from accelerated and unaccelerated scans as well as higher and lower resolution image pairs, the algorithm has been trained and optimized. In addition, the system uses individual noise maps for each scan, which help the algorithm identify areas in the final image that may be more affected by noise in order to precisely remove them and thus produce an image with greatly reduced noise.

INNOVATIVE TECHNOLOGICAL APPROACH

◊ **Company:**
Siemens Healthineers AG

◊ **Technology:**
Deep Resolve

◊ **Technological basis:**
Deep-Learning-Algorithms

◊ **Field of applications:**
MR-Scans
– all body regions

◊ **Advantages:**
Faster scan time

Higher resolution

Improved image quality

High precision

◊ **Website:**
www.siemens-he-althineers.com

The technology works with a total of 3 modules that focus on optimizing each component. (1) The Deep Resolve Gain is able to improve the signal-to-noise ratio with unchanged measurement time. This involves identifying local noise differences in the acquired MRI data and removing them using an iterative process. (2) Deep Resolve Boost technology reconstructs images from raw data, enabling accelerated image acquisition through high signal-to-noise ratio scans. (3) Deep Resolve Sharp uses a deep learning reconstruction algorithm to improve image quality by increasing sharpness. Training is performed on high-resolution MR data, allowing the neural network to produce sharp images from low-resolution data.

In addition, another advantage of the technology is that it can be applied to all regions of the body and thus can be used in almost any diagnostic procedure using MRI. To ensure diagnostic value and image quality, the system automatically initiates mandatory data consistency analysis throughout the image reconstruction process.

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