Deep Resolve –
Faster than ever before

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Faster than ever before

Deep Resolve

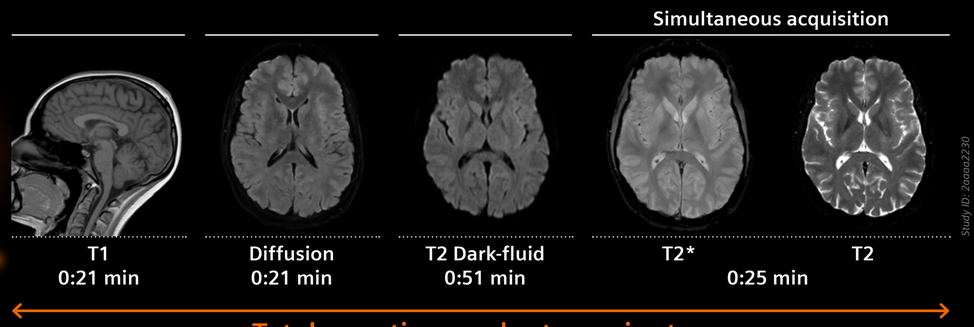
Deep Resolve is our progressive, AI-powered image reconstruction technology. It is shaping the future and setting new standards in MR image acquisition.

With a convolutional neural network at its core, it can radically shorten acquisition times without compromising image resolution. It helps generate actionable insights that can be diagnostically relevant by delivering sharper scans, faster than ever before.

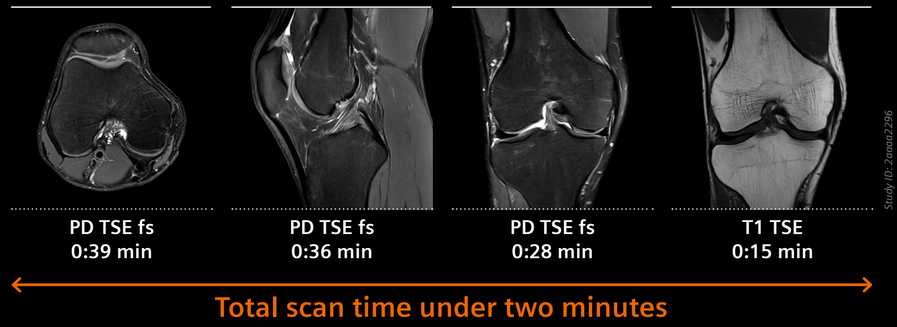
Deep Resolve technology is taking one more step towards building a healthier world.

Deep Resolve consists of four technologies that help you achieve faster images than ever before: **Deep Resolve Gain, Sharp, Boost and Swift Brain.**

Impressive speed in brain imaging



Impressive speed in knee imaging



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Targeted, localized denoising

Deep Resolve Gain

What is it?

Deep Resolve Gain is a targeted denoising method to increase the SNR of images. With this, either shorter scan times or higher image quality with higher resolution can be achieved.

What is cool about it?

Address local noise variations

This is the first time we target the local variation in noise.

Broad application

It's applicable for cartesian sequences.

With this, we bring the iterative principle of Compressed Sensing to a broader use.

What problem does it solve?

Coil array geometry and acceleration techniques cause noise in MR images.

The noise has local variations – and conventional standard noise filters don't address that.

This impairs SNR and decreases image quality.

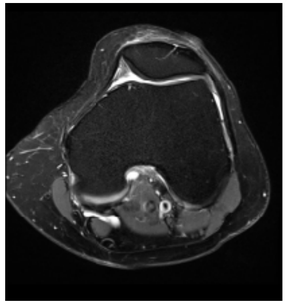
Why not do targeted, localized denoising?

How does it work?

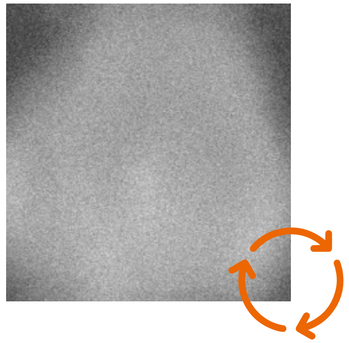
Deep Resolve Gain uses the acquired MRI data to generate a noise map which reflects spatial noise variations.

The MR image and the corresponding noise map are used as input for an iterative process.

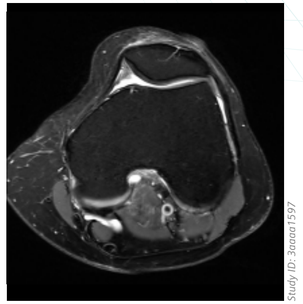
Targeted denoising



Noise map



The result



An MR image with higher SNR.

The benefits:

Speed up scan time & **Get higher image quality**

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Deep learning reconstruction

Deep Resolve Sharp

AI & deep learning

The neural network is able to anticipate where to expect a sharp edge in an image.

Well-trained

It was trained on large amounts of pairs of low-res and high-res images.

Hi-res from low-res

The neural network generates high-res output from low-res input.

Consistency ensured

Consistency with raw data is ensured.

What is cool about it?

What problem does it solve?

slow and high-res
OR
fast and lower-res

We can either have a longer scan that acquires a lot of data and gives us high resolution. Or: A quicker scan, less data – but lower resolution.

Why not have the best of both?

What is it?

A deep neural network is at the heart of Deep Resolve Sharp. It improves the MR image quality by increasing the sharpness.

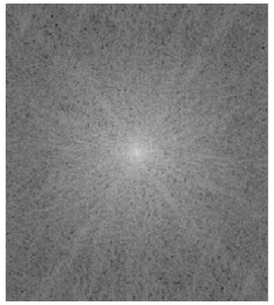
How does it work?

During image acquisition, phase encoding lines can be reduced, thus reducing the amount of data and speeding up scan time. From the raw data, a low-res image is reconstructed in a first step.

Deep neural network

Now AI comes into play:
The algorithm in Deep Resolve Sharp has been trained on a large amount of pairs of low-res and high-res MR data. It reconstructs a sharp image from low resolution data.

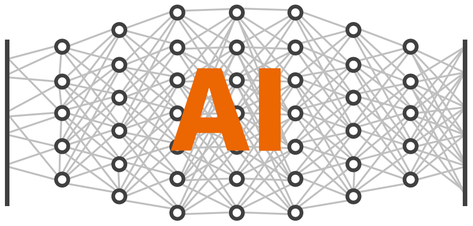
Raw data input



1

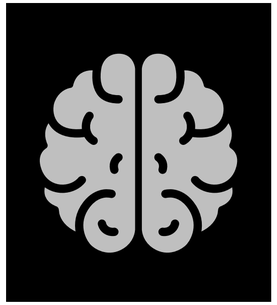
Low-res reconstruction

2



3

High-res reconstruction

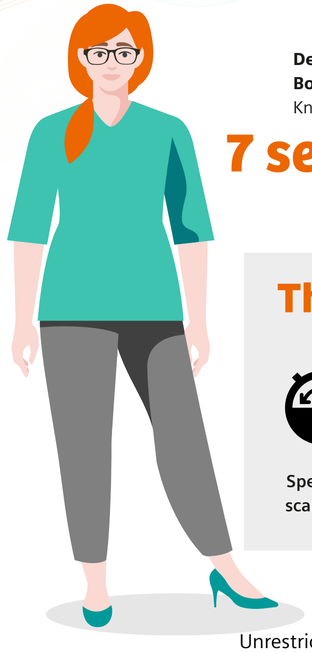


4

Robust results

The consistency with the acquired raw data is ensured until the final image reconstruction.

The result is an image with sharp edges and high resolution: Deep Resolve Sharp offers up to a factor of two in in-plane resolution.



Clever combination:

Deep Resolve, Boost, Sharp & SMS:
Knee imaging in

7 seconds

Study ID: 2aaaa2200

The benefits:

especially on the edges

Speed up scan time & **Get higher image sharpness**

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Strong denoising for fastest acquisitions

Deep Resolve Boost

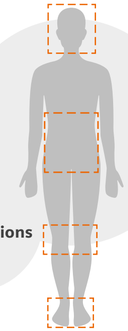
What is it?

Deep Resolve Boost delivers especially strong denoising for fast acquisitions from head to toe – enabled by Siemens Healthineers' first raw data to image deep learning reconstruction.

What is cool about it?

Choose out of three denoising strengths

Adapt to body regions



What problem does it solve?

With conventional reconstruction methods, a highly accelerated image acquisition will lead to a strong noise contamination.

The reconstruction with Deep Resolve Boost enables the generation of images with insanely high SNR and a superfast image acquisition simultaneously.

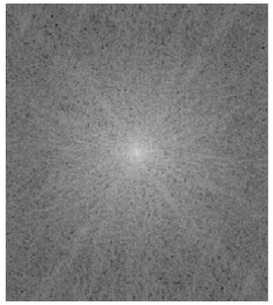
High SNR
+
High speed

How does it work?

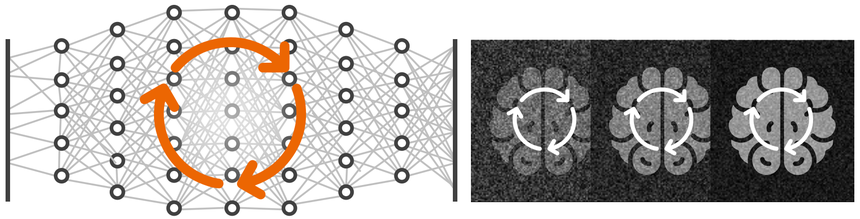
Deep Resolve Boost uses raw data from a reduced, and thus faster scan as input.

In an iterative process, a deep neural network is applied multiple times to generate the final output – with significantly reduced noise. The integration of the raw data along the entire reconstruction process leads to an unmatched performance.

Raw data input from accelerated acquisition



Iterative deep learning reconstruction

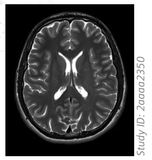


Final image output

Clever combination:

Deep Resolve, Boost, Sharp & SMS:
Knee imaging in

88%
shorter scan time: 18 seconds



Study ID: Zaaaa2350

The benefits:

Fast acquisition

&

Powerful denoising

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Deep learning recon for all relevant neuro contrasts in only 2 minutes

Deep Resolve Swift Brain

What is it?

Deep Resolve Swift Brain provides an ultrafast neuro exam.

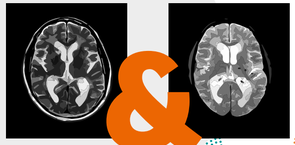
It combines smart acquisition and a deep learning reconstruction method – which delivers all relevant neuro contrasts and orientations in only 2 minutes.

How does it work?

A multi-shot EPI approach enables fastest data acquisition, generating all necessary contrasts in one go.

T2 und T2* are measured simultaneously – which saves additional time. To reduce distortion, a static field correction is applied.

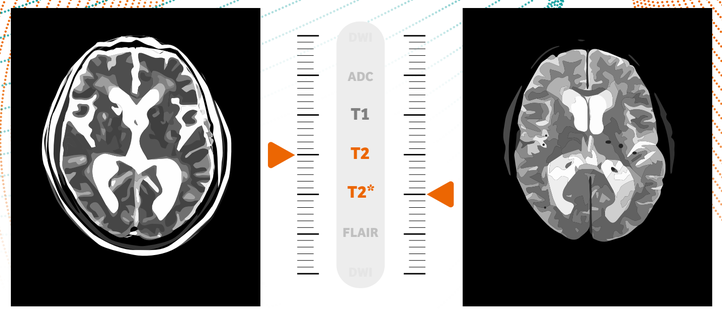
Simultaneous acquisition of T2 and T2*



Deep learning recon

What is cool about it?

One go



What problem does it solve?

Usually for a brain scan, various contrasts need to be set up – which can take some time and is prone to error.

Deep Resolve Swift Brain tackles all of these challenges, delivering all relevant neuro contrasts in one go.

The benefits:

Superfast brain scan

All in one examination

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