(SD2021-402) Fully Automated Deep Learning-Based Background Phase Error Correction for Abdominopelvic 4D Flow MRI

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BACKGROUND

4D Flow MRI has become increasingly valuable for the qualitative and quantitative assessment of cardiovascular disease. Since all measurements can be obtained following image acquisition without the need for targeted ultrasonographic windows or placement of 2D phase contrast planes at the time of the exam, 4D Flow provides versatility that can be essential in the diagnostic process.

However, the correction of magnetic eddy current-related background phase error remains a critical bottleneck in abdominal applications.

TECHNOLOGY DESCRIPTION

Radiologists from UC San Diego have developed and trained a CNN algorithm to automatically recognize phase error for software image-based correction. This new technology obviates the need for a specially trained physician or technologist to identify static soft tissue that is necessary for image-based correction.

Any 4D Flow MRI that is performed to assess the vasculature in the abdomen or pelvis will require correction.

Using his invention now makes it possible for many more institutions to begin to use this technology to study blood flow in these areas, whether for research or for clinical care.

STATE OF DEVELOPMENT

Proof-of-concept study demonstrated the feasibility of fully automating phase-error correction, bypassing the segmentation tasks that are generally required for manual correction. In essence, the machine learning algorithm successfully performed a complex behavior, simultaneously capturing the phase-error in static soft tissue, while ignoring flowing blood in the arterial and venous systems. This highlights the untapped potential of CNNs to accomplish complex visual and computational tasks that may not be readily accomplished by ordinary humans, and may help to bring complex imaging technologies, such as 4D Flow, into routine clinical care.

INTELLECTUAL PROPERTY INFO

UC San Diego is seeking partners to commercially develop this technology.

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OTHER INFORMATION

KEYWORDS
4D Flow, vascular, abdominal, pelvic, phase-contrast, MRI, eddy-current

CATEGORIZED AS
- Imaging
  - Medical
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