Docket #: S17-392

Improved MRI reconstruction using deep learning, generative adversarial network and acquisition signal model

Stanford researchers have developed novel methods to achieve more efficient, accurate and generalizable reconstruction from under-sampled MRI. Specifically, a deep learning method using generative adversarial network structures is used and acquisition signal model is incorporated in the method such that the model can be generalizable to different acquisition. The methods is have been developed and the models are trained on MRI datasets. The results demonstrate the proposed method has superiority in both efficiency and accuracy in reconstruction performance compared with conventional iterative reconstruction method and other deep learning based methods. 4. Applications: Efficient and accurate reconstruction for under-sampled MRI. Reconstruction for under-sampled measurements for other medical imaging 5. Advantages: Achieve more accurate reconstruction quantified by metrics such as RMSE, PSNR and SSIM More efficient reconstruction, about 100x faster than conventional Compressed Sensing iterative reconstruction methods. Generate reconstructions that are more visually pleasing and realistic than model based reconstruction with may over-smooth or under-suppress artifacts. Generalizable for different acquisition model and avoid retraining for different acquisition signal model. Able to incorporate signal characteristics, noise distribution or measurement uncertainties into the method

Applications

- Efficient and accurate reconstruction for under-sampled MRI.
- Reconstruction for under-sampled measurements for other medical imaging.

Advantages

- Achieve more accurate reconstruction: about 100x faster than conventional compressed sensing iterative reconstruction methods.
- Generate reconstructions that are more visually pleasing and realistic than model-based reconstruction.
- Generalizable for different acquisition modesl.
- Ability to incorporate signal characteristics, noise distribution or measurement uncertainties into the method.

Publications

- MARDANI ET AL. Deep Generative Adversarial Networks for Compressed Sensing Automates MRI arXiv.org: 1706.00051. Published online May 31, 2017.

Patents

- Issued: 10859657 (USA)

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