CLAIMS

WHAT IS CLAIMED IS:

1. A computer-implemented method for improving image quality with reduced dose of contrast agent, the method comprising:

(a) acquiring, using a medical imaging apparatus, a medical image of a subject with a reduced dose of contrast agent;

(b) reformatting the medical image of the subject in multiple orientations to generate a plurality of reformat medical images; and

(c) applying a deep network model to the plurality of reformat medical images to generate a predicted medical image with improved quality.

2. The computer-implemented method of claim 1, wherein the medical imaging apparatus is a transforming magnetic resonance (MR) device.

3. The computer-implemented method of claim 1, wherein the medical image is a 2.5D volumetric image.

4. The computer-implemented method of claim 1, wherein the multiple orientations include at least one orientation that is not in the direction of the scanning plane.

5. The computer-implemented method of claim 1, further comprising rotating each of the plurality of reformat medical images into various angles to generate a plurality of rotated reformat medical images.

6. The computer-implemented method of claim 5, further comprising applying the deep network model to the plurality of rotated reformat medical images to output a plurality of predicted images.

7. The computer-implemented method of claim 6, wherein the plurality of predicted images are rotated to be aligned to a scanning plane.

8. The computer-implemented method of claim 7, further comprising averaging the plurality of predicted images after rotated to be aligned to the scanning plane to generate the predicted medical image with improved quality.

9. The computer-implemented method of claim 1, wherein the predicted medical image with improved quality is obtained by averaging a plurality of predicted medical images corresponding to the plurality of the reformat medical images.

10. The computer-implemented method of claim 1, wherein parameters of the deep learning model are tuned based at least in part on a perceptual loss or adversarial loss.

11. A non-transitory computer-readable storage medium including instructions that, when executed by one or more processors, cause the one or more processors to perform operations comprising:

(a) acquiring, using a medical imaging apparatus, a medical image of a subject with a reduced dose of contrast agent;

(b) reformatting the medical image of the subject in multiple orientations to generate a plurality of reformat medical images; and

(c) applying a deep network model to the plurality of reformat medical images to generate a predicted medical image with improved quality.

12. The non-transitory computer-readable storage medium of claim 11, wherein the medical imaging apparatus is a transforming magnetic resonance (MR) device.

13. The non-transitory computer-readable storage medium of claim 11, wherein the medical image is a 2.5D volumetric image.

14. The non-transitory computer-readable storage medium of claim 11, wherein the multiple orientations include at least one orientation that is not in the direction of the scanning plane.

15. The non-transitory computer-readable storage medium of claim 11, wherein the operations further comprise rotating each of the plurality of reformat medical images into various angles to generate a plurality of rotated reformat medical images.

16. The non-transitory computer-readable storage medium of claim 15, wherein the operations further comprise applying the deep network model to the plurality of rotated reformat medical images to output a plurality of predicted images.

17. The non-transitory computer-readable storage medium of claim 16, wherein the plurality of predicted images are rotated to be aligned to a scanning plane.

18. The non-transitory computer-readable storage medium of claim 17, wherein the operations further comprise averaging the plurality of predicted images after rotated to be aligned to the scanning plane to generate the predicted medical image with improved quality.

19. The non-transitory computer-readable storage medium of claim 11, wherein the predicted medical image with improved quality is obtained by averaging a plurality of predicted medical images corresponding to the plurality of the reformat medical images.

20. The non-transitory computer-readable storage medium of claim 11, wherein parameters of the deep learning model are tuned based at least in part on a perceptual loss or adversarial loss.