Title:	Meidcal image processing: denoising dynamic perfusion MRI (DCE-MRI) data using AI
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Abstract:	Dynamic Contrast-Enhanced MRI (DCE-MRI) has been established as a non-invasive imaging technique which is extensively used to quantitatively evaluate tumour biology in many physiological and pathological cases. The dynamic scans are then used to quantify the permeability of the contrast agent to the Blood-Brain Barrier (BBB) by extracting the pharmacokinetic parameters. However, the DCE-MRI concentration curves (C(t)) are prone to Gaussian and Rician noise. In this study, an attempt is based to understand the variation of different Tracer Kinetic Parameters (TKP) at various noise levels. Further, state of the art deep learning-based denoising systems were trained to capture the different noise levels and characteristic shapes of the C(t) in an attempt to reduce the noise found in the real dataset. For training as clean signals (ground truth) are not available, the Generalized Tracer Kinetic Model (GTKM) with non-linear dynamics was used to generate pragmatic training data. The results of this study reveal the dependence of TKP on noise levels. It was also found that deep denoising systems were able to bring down the inherent noise in the C(t) curves from the Gray Matter and White Matter in the real dataset. This is validated by the improved Signal to Noise Ratio (SNR) and increase in the similarity index of the concentration curves of neighbouring voxels.
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