

Andrew Reader

Short Biography:

Andrew Reader is a Professor of Imaging Sciences at King's College London, United Kingdom. He received his Ph.D. in medical physics from the University of London in 1999 on the subject of PET image reconstruction. Prior to joining the School of Biomedical Engineering and Imaging Sciences at King's College London in 2014, he was a Canada Research Chair at McGill University and the Montreal Neurological Institute for 6 years. He is an Associate Editor of IEEE TRPMS and has co-authored over 200 scientific outputs. His main research interests include PET-MR, multi-modal image reconstruction and medical image analysis, all now with a primary emphasis on exploiting deep learning.

Abstract:

Artificial intelligence (AI) methodology is now at the leading edge of research for image reconstruction in positron emission tomography (PET). While AI can learn the entire PET imaging physics as well as the noise in the acquired data (when given sufficient training examples), one of the most common uses of AI arises from exploiting databases of high-quality reference examples, to provide enhanced noise compensation and resolution recovery. There are three main AI reconstruction approaches: i) direct data-driven AI methods which rely on supervised learning from reference data, ii) iterative (unrolled) methods which combine our physics and statistical models with AI learning from data, and iii) methods which exploit AI alongside our known models when only using the acquired dataset in hand, not needing any external training data. This presentation reviews these AI methods for reconstruction, considering the opportunities and challenges of AI for PET image reconstruction.