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Machine Learning for Medical Image Reconstruction

5th International Workshop, MLMIR 2022
Held in Conjunction with MICCAI 2022
Singapore, September 22, 2022, Proceedings

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Preface

We are proud to present the proceedings for the Fifth Workshop on Machine Learning for Medical Image Reconstruction (MLMIR 2022) which was held on September 22, 2022, at the Resorts World Convention Centre in Singapore, as part of the 25th Medical Image Computing and Computer Assisted Intervention (MICCAI 2022) conference.

Image reconstruction commonly refers to solving an inverse problem, recovering a latent image of some physical parameter from a set of noisy measurements assuming a physical model of the generating process between the image and the measurements. In medical imaging two particular widespread applications are computed tomography (CT) and magnetic resonance imaging (MRI). Using those two modalities as examples, conditions have been established under which the associated reconstruction problems can be solved uniquely. However, in many cases there is a need to recover solutions from fewer measurements to reduce the dose applied to patients or to reduce the measurement time. The theory of compressed sensing showed how to pursue this while still enabling accurate reconstruction by using prior knowledge about the imaged objects. A critical question is the construction of suitable models of prior knowledge about images. Research has departed from constructing explicit priors for images and moved towards learning suitable priors from large datasets using machine learning (ML).

After four previous successful workshops, we found that ML approaches have found their way into multiple products for different modalities. Its cross-modality approach brings together researchers from various modalities ranging from CT and MRI to microscopy and X-ray fluoroscopy. We believe joint discussion fosters the translation of algorithms between modalities.

We were fortunate that Shanshan Wang (Paul C. Lauterbur Research Center, Chinese Academy of Sciences, China) and Jong Chul Ye (Kim Jaechul Graduate School of AI, KAIST, South Korea) accepted our invitation as keynote speakers and presented fascinating keynote lectures about the state of the art in this field. For this first in-person iteration of the workshop after the start of the COVID-19 pandemic, we received 19 submissions and accepted 15 papers for inclusion in the workshop. The topics of the accepted papers are still dominated by MRI reconstruction but cover a broad range of applications over CT, PET, ultrasound, fluoroscopy, and magnetic particle imaging.

August 2022

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