

Blob-Based Super-Resolution Image Reconstruction

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School of Physical and Mathematical Sciences

A novel approach for super-resolution image reconstruction by incorporating blob-based basis functions to further improve the quality of the reconstruction has been proposed. Blob-based basis functions, which are more commonly known as blobs were derived using a generalization of Kaiser-Bessel basis functions by Lewitt. These spatially localized and rotationally symmetric basis functions have made them very attractive for iterative image reconstruction from projection datasets. In fact, they are equally attractive for super-resolution image reconstruction from multiple low-resolution image datasets. We incorporate the blob-based basis functions into iterative super-resolution image reconstruction and show how they can be used to stabilize the iterative reconstruction at higher numbers of iteration. We also show experimentally that the basis functions are effective in suppressing random image noise and without the need of using a separate prior to regularize the reconstruction. For excessively noisy low-resolution images, we preprocess the datasets before they are used for the super-resolution reconstruction. By incorporating blob-based basis functions into the super-resolution reconstruction framework, we thus guarantee that they can improve the quality of a reconstructed image and save computational time.

Speaker Biography

Edward Ho was born in Penang, Malaysia in 1975. He received his B.Eng (Hons) degree from Nanyang Technological University, Singapore in 2000. He then went to the University of Cambridge, United Kingdom to do a short study in Partical Physics and Astronomy. He also worked as a researcher for a few years in the UK before he started his PhD study. In 2008, he obtained his PhD degree in Medical Physics and Bioengineering from University College London. Dr Ho is currently a Research Fellow at Nanyang Technological University in Singapore. He has extensive research experiences in image reconstruction, image processing, computer vision, augmented reality, numerical analysis, engineering dynamics and geometric (Clifford) algebra.

Host: Mathematical Imaging and Vision Research Group, Division of Mathematical Sciences, School of Physical and Mathematical Sciences

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