

# 中央研究院數學研究所

Institute of Mathematics, Academia Sinica

## Taipei Postdoc Seminar

**Speaker** : 何友達 Dr. Edward Ho  
(National Center for Theoretical Sciences)

**Title** : *Blob-Based Super-Resolution Image Reconstruction*

**Abstract** : A novel generic framework by incorporating blob-based basis functions into super-resolution image reconstruction is proposed. Blob-based basis functions or blobs are a set of basis functions with smooth transition from one to zero derived from a family of modified Kaiser-Bessel window functions. These spatially localized and rotationally symmetric basis functions have made them very attractive for tomographic image reconstruction from a projection dataset. In fact, they are equally attractive for super-resolution image reconstruction from multiple low-resolution 2-D images, as well as reconstructing a super-resolution sinogram from multiple sets of projected sinogram before the super-resolved sinogram is backprojected to become an image – our second novel approach in this talk.

We show further image quality improvement of an iteratively reconstructed image from multiple low-resolution 2-D images taken from a same scene using the proposed blob-based super-resolution image reconstruction framework as our first set of experiments. We also run second set of experiments to show further quality improvement of a reconstructed image from a super-resolved sinogram from multiple sets of projected sinogram, compared with the current gold standard, i.e. filtered backprojection with regularization of a single sinogram.

By incorporating blob-based basis functions into iterative (super-resolution) image reconstruction, we show how blobs can be used to stabilize iterative reconstructions at higher number of iterations. We also show experimentally that blobs are effective in suppressing random noise and without the need of using a separate prior to regularize iterative (super-resolution) image reconstruction.

**Time** : 11:00 – 12:30, Wednesday, October 19, 2016

**Venue** : Room 638, Astro-Math. Building (NTU Campus)

**Organizer** : Yu-Yen Chien (NCTS), Jyun-Ao Lin (Academia Sinica)

**Refreshment** : 10:30

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