國立成功大學統計學系暨數據科學研究所
專題演講

時　間:　2020 年 09 月 10 日 (星期四) 16:30 - 17:30

地　點:　統計學系三樓視聽教室 (62331)

演講者:　Prof. Chia-Hsiang Lin (林家祥　助理教授)
國立成功大學電腦與通信工程研究所

茶　會:　16:00 - 16:25 (統計學系二樓教師休息室)

題　目:　Mathematical Principles Behind Fast Unsupervised Image Super-resolution

摘　要

Sentinel-2 satellite, launched by the European Space Agency, plays a critical role in various Earth observation missions. However, the spatial resolutions of Sentinel-2 images are different across its 12 spectral bands, meaning that there is no pixel in such imagery. To facilitate the analysis of such multi-resolution images, super-resolving (SR) of the low-resolution bands to a higher resolution is desired. Without relying on big data, we computationally achieve this SR task from a single dataset. As in many image restoration inverse problems, we exploit image self-similarity, a commonly observed property in natural images. However, the design of self-similarity regularization in non-diagonal inverse problems is challenging; often, a self-similarity based denoiser is plugged into the algorithmic iterations, without a guarantee of convergence in general. For the first time, we explicitly define the concept of self-similarity as a convex function, built explicitly on a self-similarity graph that can be directly learned from the Sentinel-2 images. Remarkably, unlike widely used sparsity or total-variation regularization schemes, the proposed convex function is scene-adapted. We then develop a fast algorithm, termed Sentinel-2 super-resolution via scene-adapted self-similarity (SSSS), which efficiently and exactly solves three involved different types of very large-scale matrix inversions. We experimentally show the superiority of SSSS over four commonly observed scenes, indicating the potential usage of our newly introduced convex self-similarity regularization in other ill-posed imaging inverse problems.

敬請公佈 歡迎蒞臨 國立成功大學統計學系暨數據科學研究所 敬邀

統計學系: http://www.stat.ncku.edu.tw

校園地圖: http://news.secr.ncku.edu.tw/p/412-1037-1389.php

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