

## A Course for the Summer School at CAS

- Course Title: Jump Regression Analysis and Image Processing

- Instructor:

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- Course Outline:

Nonparametric regression analysis provides a statistical tool for estimating regression curves or surfaces from noisy data. Conventional nonparametric regression methods, however, are only appropriate for estimating continuous regression functions. When a underlying regression function has jumps, functions estimated by the conventional methods are not statistically consistent at the jump positions. Recently, jump regression analysis (JRA) for estimating jump regression functions is under rapid development, because JRA has broad applications. One important application is image processing where a monochrome image can be regarded as a surface of the image intensity function which has jumps at the outlines of objects. The first half of the course will introduce some major methodologies, the current research status, and certain challenging research problems in JRA. The second half will describe its various applications in image processing, including edge detection, image segmentation, image denoising, image deblurring, image registration, magnetic resonance imaging (MRI), and functional MRI.