GSAIM Seminar

(The four minute a Day Seminar Series)

"Shape from Focus Using LULU Operators and Discrete Pulse Transform in the Presence of Noise"

by

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Abstract

A study of three dimension (3D) shape recovery is an interesting and challenging area of research. Recovering the depth information of an object from normal two dimensional (2D) images has been studied for a long time with different techniques. One technique for 3D shape recovery is known as Shape from Focus (SFF). SFF is a method that depends on different focused values in reconstructing the shape, surface, and depth of an object. The different focus values are captured by taking different images for the same object by varying the focus length or varying the distance between object and camera. This single view imaging makes the data gathering simpler in SFF compared to other shape recovery techniques. Calculating the shape of the object using different images with different focused values can be done by applying sharpness detection methods to maximize and detect the focused values. However, noise destroys many information in an image and the result of noise corruption can change the focus values in the images. This work presents a new 3D shape recovery technique based on focus values in the presence of noise. The proposed technique is based on LULU operators and Discrete Pulse Transform (DPT). LULU operators are nonlinear rank selector operators that hold consistent separation, total variation and shape preservation properties. The proposed techniques show better and more accurate performance in comparison with the existing SFF techniques in noisy environments.