

Depth Estimation Algorithms for Light Field Cameras

by

Professor Alessandro NERI

University of Rome 'TRE'

Rome, Italy

Abstract:

Plenoptic videocameras represent a disruptive video technology able to capture 4D Light field information, whose post processing can drastically change the entire video production, giving to art directors unexpected opportunities during the editing phase. However, replacement of conventional cameras with light field technologies will require the availability of effective digital signal processing tools supporting all phases, from image formation to information extraction. These tools should be able to efficiently handle the Big Data represented by the millions of rays captured from the sensors, or equivalently, the high number of images produced by the microlens array used to capture the light field.

This lecture addresses the design of efficient suboptimal algorithms able to face the computational burden associated to conventional stereo processing schemes extended to dense image arrays. In particular, the lecture is focused on the estimation of the depth map from the light field that represents the basic element for a wide range of tasks from image-post processing, to scene understanding and to coding. Performance and computational complexity of methods based on the extensions to multcameras of stereo matching solutions, and methods based on the analysis of the epipolar images will be compared on the basis of theoretical and experimental results.