Title: Invariance of color constancy models to complex lighting conditions

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Abstract:

Color constancy is the ability of human vision to recognize a stable color in objects under varying lighting conditions. When it comes to computer vision, color constancy is not as accurate as in human vision. Computer vision aims at "seeing" and "understanding" visual data (content of images and videos) in order to provide decision-support for many applications. It is a multi-disciplinary approach which seeks to get closer to human visual perception and understanding in order to automate tasks that the human visual system can do. In this quest, color constancy is a prevalent issue in every discipline associated with computer vision. The results of computer vision models deeply depend on the point of view and lighting conditions. The task of computational color constancy is to estimate the scene illumination and then perform the chromatic adaptation in order to remove the influence of the illumination and the camera sensor on the colors of the objects in the scene. Removing the influence of the illuminants, of the camera sensor, and of the optical effects is of primordial importance in computer vision to make sense of digital videos and images. This is how, for example, most digital cameras use color constancy methods in their camera Image Signal Processing (ISP) Pipeline. In this presentation we will survey the most recent models/methods dealing with color constancy and will discuss the following research questions: - How might we make computer vision more robust against complex illumination/viewing conditions? - How to make materials and colors appearance, optical and photonics models consistent with human perception when using new image sensors (eg. multispectral sensors) and display devices (eg. AR/XR)? - How might we improve the deployment of smartphones and low-cost sensors in professional uses? We will also discuss some areas of improvements using machine learning methods.

Biography:

Alain Trémeau is Professor at University Jean Monnet (UJM), France and member of the laboratory Hubert Curien (CNRS - UMR 5516). He is also affiliated as Affiliate Researcher at Chulalongkorn university, Thailand. His research activity covers various fields, such as Human Perception of visually impair people, Color Appearance of materials, Color Constancy in computer vision, 3D human body pose estimation in performing arts, etc. He wrote numerous scientific papers and book chapters, in the domain of Color Imaging and Computer Vision in the highest ranked journal and conferences in the domain. He is member of the COSI consortium, at UJM his teaching activities cover Color and Multispectral Image Processing, and Computer Vision. Homepage: http://perso.univ-st-etienne.fr/tremeaua/.