

PHOTONICS spectra

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Video Spectroscopy meets Artificial Intelligence

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Cubert's latest development ULTRIS 20: The hyperspectral video camera is based on light field technology. With a field of view of 120° and a depth of 200, the camera enables to take image cubes to create a wide range of applications, ranging from machine vision up to mobile imaging of biological and surface parameters (e.g. LIDAR). The sensor cubes show different shapes, textures and colors, seen with an ULTRIS from a stone in a height of 10m.

With the growing availability of powerful computers, even in the smallest devices, we see an ever-increasing use of imaging techniques in industry and everyday products. Artificial intelligence and machine learning increase the capabilities of our image sensors and our smart devices in every sector rapidly. Nowadays these algorithms rely on the data of BW sensors or RGB sensors at best. Thus, they are missing a profound part of the information the incident light would have to offer.

Spectral imaging adds another dimension to this two-dimensional geometric imaging. By definition, a spectral image is the result of capturing the same image in a variety of narrow-band spectral regions, usually in the visible light spectrum and the near-infrared region. This allows for identification of optical features of surfaces that are invisible to conventional cameras or the human eye. These features are directly attributable to the chemical properties of an object. Spectral procedures thus enable important applications such as substance classification, object segmentation, color characterization, quality control, concentration analysis, security verifications of products and many more.

Furthermore, the typical training of machine learning algorithms based only on RGB images needs hundred thousand of images for the training of typical image recognition algorithms. This training could be sped up dramatically with the addition of spectral imaging data reducing the training time to a single image in some applications.

Thus far, spectral image data with acceptable resolution have only been obtained by scanning methods (push broom sensors) or with bulky multi-sensor setups. These types of sensors are complex, expensive and difficult to incorporate into machine learning algorithms.

Video Spectroscopy Meets Artificial Intelligence

Hyperspectral imaging, the combination of spectral and spatial information, has enabled advances in fields as diverse as precision farming, machine vision, and biomedical imaging. Cubert's most recent development, the hyperspectral light field camera ULTRIS 20 offers the fastest hyperspectral camera technology worldwide with an ease-of-use of a common digital camera. The ULTRIS, a hyperspectral snapshot camera, provides full capability for real-time video applications. Applying powerful algorithms based on machine learning to the live data stream, allows the retrieval of relevant information within seconds.

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