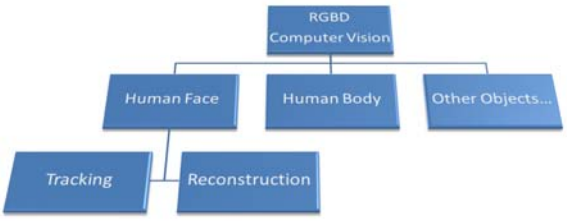
RGBD Computer Vision Makes Our Devices to Understand The World Better

RGBD camera will become ubiquitous in the near future



RGBD computer vision research in Image and Video Processing Laboratory

RGBD camera is also referred to as depth camera or range camera. Besides the traditional RGB color images, it can provide depth information for each pixel at a frame rate of 30 frames per second. The underlying sensing mechanisms include time of flight, structured stereo light, and so on.

Such cameras have existed for many years, but they cost around USD 10000 each. In contrast, the consumer RGBD camera now costs less than USD 200 and the price is dropping fast. In the meantime, the size of the RGBD camera is becoming smaller which makes it more portable and feasible for usages on devices like tablets or mobile phones. According to Mooly Eden, the General Manager of Intel's Perceptual Computing Group, RGBD camera will become ubiquitous, similar to how conventional webcams have become a standard feature of even the cheapest PCs. In CES2014, Intel showed seven different laptops and tablets from Dell, Lenovo, and Asus with integrated RGBD cameras.

At the Image and Video Processing (IVP) Lab of EE in CUHK, Prof. King Ngi Ngan's research group is trying to take advantage of the additional depth information provided by the RGBD camera to develop effective, efficient and robust computer vision algorithms. The general objective of the computer vision is to duplicate the abilities of human vision by electronically perceiving and understanding an image or a video. Using the depth information, we can better simulate how the human visual system sees this 3D world, and develop smarter computer vision algorithms that can understand and interact with the real life objects intelligently.

The most common object in everyday image is perhaps the human face, which makes the human face analysis an essential part for many practical applications, such as

surveillance, human computer interaction and augmented reality. Prof. Ngan's research group currently focuses on the human face analysis. Using the RGBD camera, his group is developing 3D face reconstruction and tracking algorithms. With the RGBD data as input, they can reconstruct an accurate 3D face mesh model for arbitrary person within several seconds. They can robustly track the fast head movement and accurately provide the 3D head location and rotation information, which has been successfully used in their free-viewpoint displaying system and mouse-free cursor's movement control system.

In the next step, Prof. Ngan plans to extend his research direction from the human face to the human body analysis, which is a more challenging problem that finds a wide range of applications. In fact, as the RGBD camera becomes more ubiquitous, RGBD data will become the next "Big Data". Given the abundant RGBD data of the real world, it will be relatively easy to extend the works on human face and body analyses to other common objects, such as cars, buildings, plants, etc. That will be the future directions for Prof. Ngan and his research group in the IVP Lab of EE in CUHK.