Self-correcting and Self-tracking Algorithm for Detection of Articulate Objects and Human Hand Gestures in Video Signals

Advantages

• Can detect subtle hand gestures
• System is self-initializing and self-correcting in order to prevent abrupt failure in diverse environments
• Algorithm is not dependent on skin color and requires no predetermination of the such
• Well suited for uncontrolled environments in which illumination and shadows can vary from one frame to the next
• Algorithm works even while no movement is present

Invention

A self-initializing, self-correcting system and algorithm for tracking articulate objects (particularly human hands) in a video system.

Background

The ability to detect and track articulate objects such as hands is important in human computer interactions (HCI) and also surveillance. Thus, research in tracking these objects is a well covered area in computer vision, giving rise to numerous tracking systems and algorithms. Common shortcomings of the existing algorithms is that they return a high number of false positives and are unable to recover if the tracking should fail in even one frame. In addition, current systems are only able to track hands in controlled environments, and are limited by the number and type of gestures that they are able to detect. There also exists a group of algorithms which are dependent on predetermined information such as skin color. Thus, if the skin color in some scene is not in the device's repertoire, or if color is altered by lighting conditions, then the tracking system will not work.

UCF scientists have developed a novel hand tracking algorithm and system which eliminates the false positives of past video tracking systems. It is also self-recovering and thus able to recuperate from failed tracking. This is possible since the algorithm is able to use information from frames in which the track was successful, to recover or reconstruct lost frames. In this algorithm, tracking is based on finger primitives and not on skin color. Thus, success or failure is not limited by skin color. Such an algorithm could be incorporated into current computer vision systems to accurately track various objects and hand gestures without suffering from the pitfalls of currently utilized systems.

Application

This technology can be utilized for a wide range of hand tracking and surveillance applications. Computer vision hardware and software developers could utilize this highly accurate algorithm in their current and future products for integration into innovative user interface systems, video gaming systems and automated surveillance technologies. The present invention is not limited to hands, but may also be utilized to identify and detect articulate objects within one or many video signals.

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Selected References