

A 3D Interaction Technique for Augmented Reality on Smart Glasses

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We propose a low-latency, 3-dimensional (3D) interaction technique for augmented reality (AR), which is implemented on a smart glasses that is equipped with a binocular depth camera. Instead of tracking user's hands [1-3], our technique detects the motion vectors surrounding the virtual 3D objects and then recognizes the gestures. With this technique, the latency can be substantially improved.

Virtual 3D objects are first rendered by Unity 3D, and then projected by the smart glasses to be overlaid with the real world scene. The depth camera detects the certain region surrounding the virtual objects. Once anything, say user's hand, appears and moves within the region of interest, the motion vector map will be calculated using blob matching algorithm. Key features such as position and direction of the moving blobs will be extracted. To categorize the various motions into three manipulations, i.e. translational move, rotation and zoom, as shown in Fig. 1, support vector machine (SVM) is adopted.

Our experiments are carried out with Epson's MOVERIO Pro BT-2000. Its key specifications include TI's OMAP4460 (ARM Cortex A9 dual-core 1.2 GHz), 9-GB internal memory, double 5-million-pixel cameras, and Android 4.0.4. The resolution of the depth images is 640×480 and the depth sensing distance is from 30 to 100 cm. Using our technique, the latency for calculating each frame is 58.52 ms, which is much faster compared to the latency reported in [1] as 135.53 ms. If a GPU could be added, a better latency would be expected.

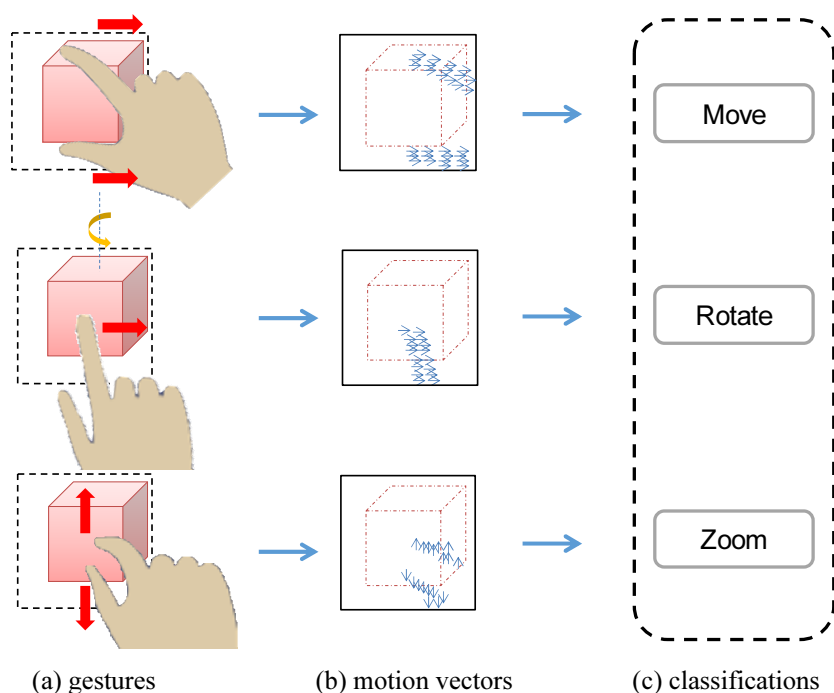


Fig. 1. Interactions with virtual 3D object

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