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Enhanced Planar Pattern Tracking for an Outdoor Augmented Reality System

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Abstract : In this paper, a scalable augmented reality framework for handheld devices is presented. The presented framework is enabled by using a server-client data communication structure, in which the search for tracking targets among a database of images is performed on the server-side while pixel-wise 3D tracking is performed on the client-side, which, in this case, is a handheld mobile device. Image search on the server-side adopts a residual-enhanced image descriptors representation that gives the framework a scalability property. The tracking algorithm on the client-side is based on a gravity-aligned feature descriptor which takes the advantage of a sensor-equipped mobile device and an optimized intensity-based image alignment approach that ensures the accuracy of 3D tracking. Automatic content streaming is achieved by using a key-frame selection algorithm, client working phase monitoring and standardized rules for content communication between the server and client. The recognition accuracy test performed on a standard dataset shows that the method adopted in the presented framework outperforms the Bag-of-Words (BoW) method that has been used in some of the previous systems. Experimental test conducted on a set of video sequences indicated the real-time performance of the tracking system with a frame rate at 15-30 frames per second. The presented framework is exposed to be functional in practical situations with a demonstration application on a campus walk-around.

Keywords : augmented reality framework, server-client model, vision-based tracking, image search
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