Location Sensitive Monitoring of Surveillance Camera Videos

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Abstract: We propose a new in situ visualization to monitor videos of surveillance camera on a mobile display. The surveillance video is placed virtually as if there were a mirror between the mobile display and the camera. As the mobile display moves around, the surveillance video follows by keeping its relative location.

Advanced tool for in situ monitoring video taken by a surveillance camera could be useful for better understanding of what happened in a scene. On understanding the geometric information of the scene recorded in the video, it is important to let viewers intuitively perceive the spatial relationship of objects in the scene. This could be a strong request when the viewer is at the scene. The viewer should know the position and the orientation of the surveillance camera, the area that the camera covers, and the objects in the video. Ordinary video replay on a portable device may result in losing the spatial recognition of the objects in the video because the viewer should reconstruct the sense of orientation between what he watches in the video display on the device and what he really sees in the real scene.

We propose to use a virtual mirror to visualize the surveillance video in the portable display[1]. The mirror is always set as if it were placed in the middle of the path between the portable display and the surveillance camera. The location of the surveillance camera is given in advance. A camera attached to the display is registered by a computer vision based approach[2].

When the viewer faces the surveillance camera, he can see the scene in the past by looking into the virtual mirror. The figure below shows the geometric set up of our approach. As for explanation, we impose the current video of the surveillance camera in the virtual mirror. The viewer can see himself inside the virtual mirror, which is rendered in the portable display (which is shown as white small tablet in the figure). Since the virtual mirror is placed exactly half the distance from the portable display to the surveillance camera, he can easily perceive the spatial sense of the scene. This is because this virtual camera is geometrically equal to the real mirror set at the same position.

We have implemented the preliminary system with a USB camera and a Windows PC.

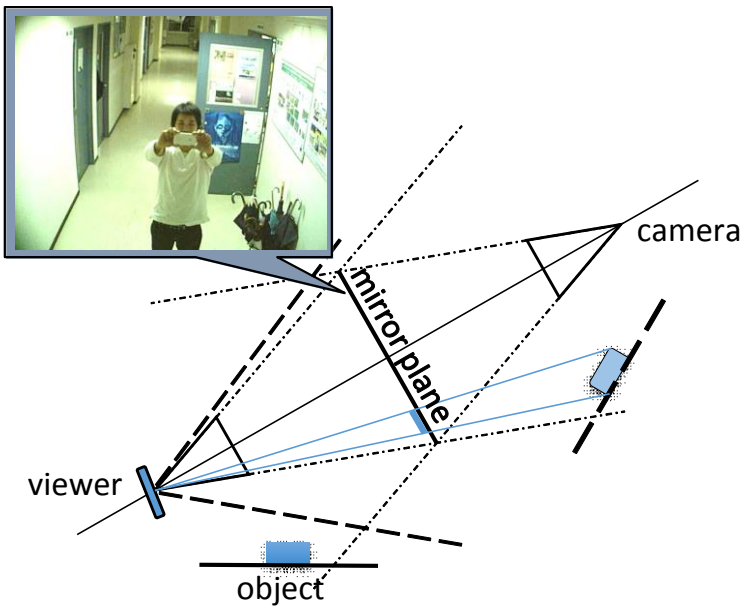

Figure 1. Virtual mirror of surveillance camera video

Acknowledgment

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Reference

[1] Sumiya, Kameda, and Ohta, “Visualization of Surveillance Camera Information Based on Mixed Reality,” Tech. Report of IEICE, PRMU, vol. 109, no.470, pp.287-292, 2010.

[2] Klein and Murray, “Parallel Tracking and Mapping for Small AR Workspaces,” ISMAR, pp.235-234, 2007.