Connecting the Complementary-view Videos: Joint Camera Identification and Subject Association

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1. Limitation and Discussion

We discuss the limitation of the proposed method on the special cases of human distribution with perfect rotation symmetry. For the perfect regular N-polygon distribution as shown in above Figure 1a, our method does get confused in this rare case, just like other geometry-based methods. However, with a very moderate location change as shown in Figure 1b, our method can well address the ambiguity. In practice, we can further take the frame-to-frame continuity to help address such ambiguity unless such perfect symmetry occurs at all the frames, which is even more rare.

![Figure 1. Illustration of the special cases of human distribution with perfect rotation symmetry.](image1)

We further provide more analysis of the cases where some assumptions in the proposed method are not held. For example, we assume that the subjects are located on a planar ground and the side-view camera is not with the significant in-plane rotation. Specifically, for the given scene in the virtual environment, we 1) adjust the persons to be not located in a plane by gradually increasing the variance of their ground clearances with the step of 0.02, and 2) gradually enlarge the in-plane rotation of the first-person view with the step of 1°. Figure 2 shows the statistical average results of the view direction estimation errors in each range (a) and several case illustrations (b-c). We can see that our method can handle the non-planer cases, because the x-axis distributions, i.e., the human center coordinate in Eq. (5) and y-axis distributions, i.e., the human height in Eq. (6), are not influenced by the altitudes of the subjects. For the in-plane rotation, our method may fail when the yaw angle is very large, e.g., 60° in (c), which is not common in real world.

As discussed above, we clarify that these assumptions in our method are not too strict for real cases.

![Figure 2. Illustration of some special cases not satisfied the assumptions in the proposed method.](image2)