Pan-tilt-zoom SLAM for Sports Videos Supplementary Material

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1 More Results

1.1 Synthetic Data Experiments

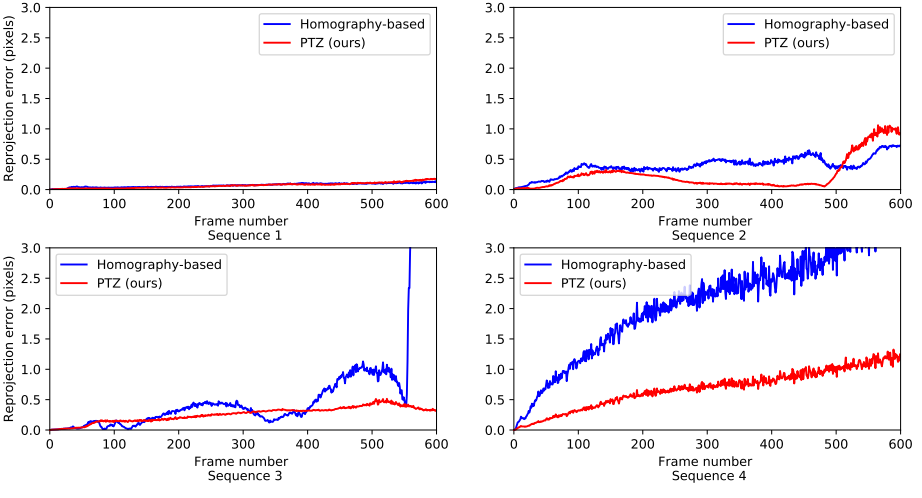

Figure 1: Reprojection errors on four synthetic sequences. Our method (red line) tracks well on all sequences. On the other hand, the tracking of the homography-based method (blue line) is lost on the sequences with large velocity (sequence 3).

Figure 1 shows the reprojection errors on the four synthetic sequences. Our method achieves much lower errors than the homography-based method in sequence 3 and sequence 4.

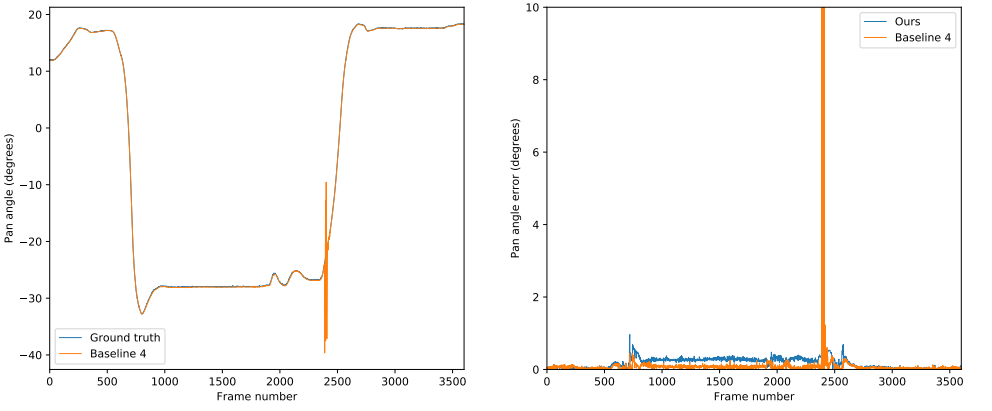

Figure 2: Detailed comparison with baseline 4 (basketball). Left: estimated pan angles of baseline 4. It has larger error around frame 2,500. Right: comparison of our method with baseline 4 on pan angle errors. Baseline 4 is slightly better than our method on mean errors (0.10° vs 0.17°) but it has a much higher maximum error (15.89° vs. 0.96°)).

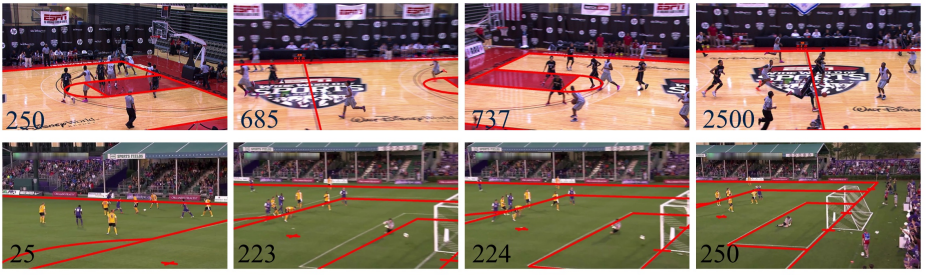

Figure 3: Qualitative results. The red lines are overlaid markings using estimated camera poses. The black numbers are frame numbers.

1.2 Real Data Experiments

Figure 2 shows the result of baseline 4 and our method on the basketball dataset. The left figure shows the estimated pan angles of baseline 4. Overall, baseline 4 has very small pan errors except for several frames (around 2,500). In these frames, the camera moves very fast and the images have severe motion blur. In that case, poor image feature matching and no temporal information fail baseline 4. The right figure compares the pan angle errors of our method with those of baseline 4. Our method has much smaller maximum errors.

Figure 3 shows the qualitative results of our system. For the basketball sequence, our method successfully tracks frames with fast camera motion (*e.g.* frame 685 and frame 2,500). For the soccer sequence, our method occasionally loses tracking (*e.g.* frame 223) because of texture-less background and dramatic camera rotation. However, our method recovers the camera at the next frame (frame 224), demonstrating the robustness of our method.