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Abstract

This paper presents a novel approach for autonomous live sports broadcasting using visual 3D model-based tracking and a vertical take-off and landing (VTOL) unmanned aerial vehicle (UAV) such as a quadcopter or hexacopter in GPS-impaired environments. To achieve this level of autonomy, position estimation is essential and is a highly challenging problem using a monocular camera due to the scale ambiguity. In this paper, we track a tennis court, that is standard in dimension, using a moving edge-based tracker, and recover the scale with the prior knowledge of the fixed playing field. Experimental results are demonstrated in 3 different environments including static scenes, real broadcast video, and indoor flying. We also evaluate the proposed approach with the ground truth provided by a motion capture system and achieve a position estimation with less than 0:02m standard deviation in the error.

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Index Terms

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Keywords

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