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Structure from motion using the extended kalman filter

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Abstrak

This book describes one of the first systems for sparse point-based 3D reconstruction and egomotion estimation from an image sequence; able to run in real-time at video frame rate and assuming quite weak prior knowledge about camera calibration, motion or scene. Its chapters unify the current perspectives of the robotics and computer vision communities on the 3D vision topic : as usual in robotics sensing, the explicit estimation and propagation of the uncertainty hold a central role in the sequential video processing and is shown to boost the efficiency and performance of the 3D estimation. On the other hand, some of the most relevant topics discussed in SfM by the computer vision scientists are addressed under this probabilistic filtering scheme, namely projective models, spurious rejection, model selection and self-calibration.