מכון ויצמן למדע

THE WEIZMANN INSTITUTE OF SCIENCE

FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

Vision and Robotics Seminar

Room 1 ,Ziskind Building
on Thursday, Jan 17, 2019
at 12:15

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Variational Plane-Sweeping for Multi-Image Alignment Under Extreme Noise and How is that Related to Underwater Robots?

Abstract:

We tackle the problem of multiple image alignment and 3D reconstruction under extreme noise.
Modern alignment schemes, based on similarity measures, feature matching and optical flow are often pairwise, or assume global alignment. Nevertheless, under extreme noise, the alignment success sharply deteriorates, since each image does not contain enough information. Yet, when multiple images are well aligned, the signal emerges from the stack.
As the problems of alignment and 3D reconstruction are coupled, we constrain the solution by taking into account only alignments that are geometrically feasible and solve for the entire stack simultaneously. The solution is formulated as a variational problem where only a single variable per pixel, the scene's distance, is solved for. Thus, the complexity of the algorithm is independent of the number of images. Our method outperforms state-of-the-art techniques, as indicated by our simulations and by experiments on real-world scenes.
And, finally- I will discuss how this algorithm is related to our current and planned work with underwater robots.