

Exploiting Discontinuities in Optical Flow

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ABSTRACT

Most optical flow estimation techniques have substantial difficulties dealing with flow discontinuities. Methods which simultaneously detect flow boundaries and use the detected boundaries to aid in flow estimation can produce significantly improved results. Current approaches to implementing these methods still have important limitations, however. We demonstrate three such problems: errors due to the mixture of image properties across boundaries, an intrinsic ambiguity in boundary location when only short sequences are considered, and difficulties insuring that the motion of a boundary aids in flow estimation for the surface to which it is attached without corrupting the flow estimates for the occluded surface on the other side. The first problem can be fixed by basing flow estimation only on image changes at edges. The second requires an analysis of longer time intervals. The third can be aided by using a boundary detection mechanism which classify the sides of boundaries as occluding and occluded at the same time as the boundaries are detected.