



Tracking the Untrackable: How to Track When Your Object Is Featureless

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MOTIVATION

Conventional tracking

uses features (blobs, corners,...) that are distinguishable (satisfy Moravec/Harris/Förstner condition) and provide point-to-point correspondence (at least).



But what if there's not enough of these? Or if the majority lie on the object contour \Rightarrow influenced by the background.



However, virtual straight lines - tangents - are present, but they have the Aperture Problem!

- Chamfer distance, fit of points to edges in the second image)

Correspondence of a_2^{\star} **Edgestring Tangents** R - tracking k₁, the tangent of X₁ at a₁, k_1 by perpendicular search from a_1 - edge point a₂ found by 1D search, ()tangent k_2 of X_2 at a_2 assumed to correspond to k_1 – note that k_1 corresponds to k_2 even if a_2 is not the point corresponding to a_1 – tangents at a_{γ}^* and a_{γ} are the same

 C_2

 \Rightarrow correspondence of intersection points gives the correct transformation – 1D perpendicular search; similarity of gradient angle, position, appearance



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FeatureLess Object tracking



novel idea of using correspondences of tangent lines

- the method learns tangent point reliability to decrease drift and
- remembers multiple models to correct tracker pose on failure
- results competitive on standard sequences
- results superior to *state-of-the-art* trackers on low-textured objects



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