Tracking of Crowded Similar-Appearance Targets from Low-Continuity Image Sequences

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Problem

Track a large number of similar-appearance targets through a **low-continuity** image sequence.
Fiber Tracking as An Example

Track about 500 fibers with similar appearance

Low continuity: Large inter-slice distance for fast imaging and micro-structure characterization

High continuity \[ \rightarrow 1 \mu m \]

Low continuity \[ \rightarrow 20 \mu m \]
Approach – Kalman Filter Framework

Recursive steps: Prediction and Correction
Main Challenge: Association

Black boxes: predictions

Red circles: detections
Our Association Method

Group-wise modeling of the association

- Key idea: mapping with homeomorphism

Homeomorphism is modeled by Thin-Plate Splines (TPS) bending energy
Experimental Results

MOTA: Multiple Object Tracking Accuracy

![Graphs showing MOTA (%) vs. inter-slice distance (µm) for different methods including Kalman-NN, Kalman-Hung, Kalman-Global, and Our method compared to DPNMS, SMOT, CEM, KTH, and Our method.](image)
Crowded Human Tracking
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Dataset and code: http://cvl.cse.sc.edu/project/cvpr2016.html

Thank you