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WHAT FOR?

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APPROACH

The video sequence is geo-registered using visual similarity based on ORB features and custom RANSAC guided transformation estimation.

Detection candidates are generated using knowledge of road surface, moving object detection based upon GMM model of the scene and already tracked vehicles. Candidates are resolved by coupled weak and strong MB-LBP cascade classifiers trained on vast hand annotated training dataset.

Positional offset error caused by perspective parallax is removed using homography decomposition and projective geometry.

Multi-object tracking is carried out in RGB + ScharrEdge colour space by a set of specialised Bayesian Bootstrap Filters, which incorporate "noisy" initialisation phase for fast moving objects and are aided by attractors generated by the weak classifier.

Invalid trajectories are rejected by application of standard drive model and overlap detection and reasoning.

The generated trajectories are postprocessed by application of local approximating B-spline curve in spatial domain and combination of global interpolating spline curve with Monotone Piecewise Cubic Interpolation in tempo-spatial domain.

RESULTS

The system was evaluated using a dataset consisting of total 73.5 km (3h 21min) of vehicle trajectory data from video sequences captured in the Czech Republic and the UK. The precision (ratio of correctly estimated trajectories in generated output) was 92.3%. The recall (ratio of correctly estimated trajectories from all true trajectories) was 83.9%.

The work is continued as PhD research at FIT, BUT and is successfully implemented as a part of pioneering DataFromSky traffic analysis service used worldwide.

PUBLICATIONS


Babinec, A.: “Automatic Vehicle Trajectory Extraction from Aerial Video Data”. In EXCEL@FIT 2015. Brno: BUT. (Awarded first prize in category Marketing Potential and second prize in category Public Contribution.)

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