Multi-Camera Tracking and Data Association

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Abstract

We describe a novel approach for vehicle tracking and data association across multiple air and ground based sensors. Using information about the metadata of the cameras (pose, intrinsic parameter) we can map the image derived tracks into a global reference coordinate system where association between air and ground sensors can be performed. We employ road networks and learnt traffic patterns to provide kinematic constraints between vehicles as they move within the area under surveillance. We derive fingerprint features from image regions containing targets and train offline classifiers which can discriminate between same and different targets. The image fingerprints are used jointly with kinematics constraints in a Multi Hypothesis Tracking (MHT) which performs the global data association. We illustrate our algorithm on real data acquired from multiple air and ground sensor. The global tracking framework proposed can be extended for other applications such as tracking vessels in waterways, and fusion of data from other sensor modalities such as IR or hyper-spectral imagery.