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Topic of Research: Multiple Object Localization and Tracking

Findings

Multiple object tracking is an important problem in the computer vision community due to its applications, including but not limited to, visual surveillance, crowd behavior analysis and robotics. The difficulties of this problem lie in several challenges such as frequent occlusion, interaction, high-degree articulation, etc. I investigate in this thesis tracking multiple objects through depth modelling of binocular vision for 3D visualization and localization relative to their nearby objects. More specifically, the problem of multiple object tracking is generalized to tracking targets in any scenario. Namely, objects to be tracked are no longer constrained to have a linear motion or in range of occlusion or any illumination variation. This approach for handling Multiple Object Tracking being gives following findings:

- In the first approach, multiple object being tracked relative to background information. The concept of multiple object tracking through background learning is based upon the theory of relativity, that involves a frame of reference in spatial domain to localize and/or track any object. The field of multiple object tracking has seen a lot of research, but researchers have considered the background as redundant. However, in object tracking, the background plays a vital role and leads to definite improvement in the overall process of tracking. In the present work an algorithm is proposed for the multiple object tracking through background learning. The learning framework is based on graph embedding approach for localizing multiple objects. The graph utilizes the inherent capabilities of depth modelling that assist in prior to track occlusion avoidance among multiple objects. The proposed algorithm has been

compared with the recent work available in literature on numerous performance evaluation measures. It is observed that our proposed algorithm gives better performance.

- In the second approach, the classification and tracking of vehicles is addressed, as they being a crucial component of modern transportation infrastructure. Transport authorities make significant investments in it since it is one of the most critical transportation facilities for collecting and analyzing traffic data to optimize route utilization, increase transportation safety, and build future transportation plans. Numerous novel traffic evaluation and monitoring systems have been developed as a result of recent improvements in fast computing technologies. However, still the camera-based systems lag in accuracy as mostly the systems are constructed using limited traffic datasets that do not adequately account for weather conditions, camera viewpoints, and highway layouts, forcing the system to make trade-offs in terms of the number of actual detections. This research offers a categorical vehicle classification and tracking system based on deep neural networks to overcome these difficulties. The capabilities of generative adversarial networks framework to compensate for weather variability, gaussian models to look for roadway configurations, single shot multibox detector for categorical vehicle detections with high precision and boosted efficient binary local image descriptor for tracking multiple vehicle objects are all incorporated into the research. The study also includes the publication of a high-quality traffic dataset with four different perspectives in various environments. The proposed approach has been applied on the published dataset and the performance has been evaluated. The results verify that using the proposed flow of approach one can attain higher detection and tracking accuracy.