A unified framework for real-time visual tracking and servoing

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In order to build a complete vision-based control system we need the integration of several research areas as visual matching, visual tracking and visual servoing. System integration is becoming an important issue due to the high number of different methods for tracking and servoing. This paper is the first step towards the integration of several recent research works in computer vision and robotics that authors have proposed in complementary research areas. The integration is made in a unifying framework which allows the use of model-free vision-based control techniques. These techniques have been designed to control a robot with respect to objects of any shape (i.e. without knowing a CAD model). Most systems have been designed for positioning a robot by tracking specific visual features (e.g. interest points, straight lines, contours). If such features are not available, several parts of the system must be designed again. In this paper, we propose a more flexible approach which can be used even with textured objects with no evident structured features. The main contribution of this paper is to integrate into an unifying framework recent advances in real-time template-based visual tracking and model-free visual servoing techniques.

Figure 1: Real-time tracking of a car for car-platooning application.

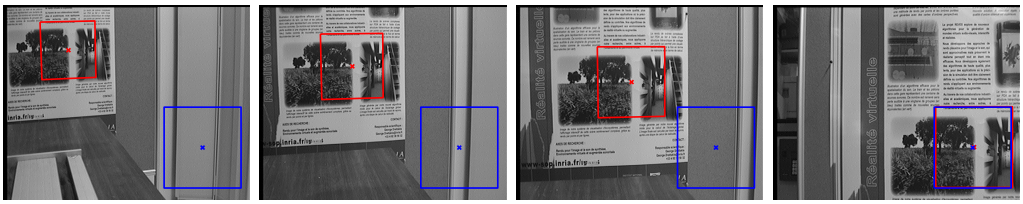

Figure 2: Real-time tracking and servoing with respect to a planar object.