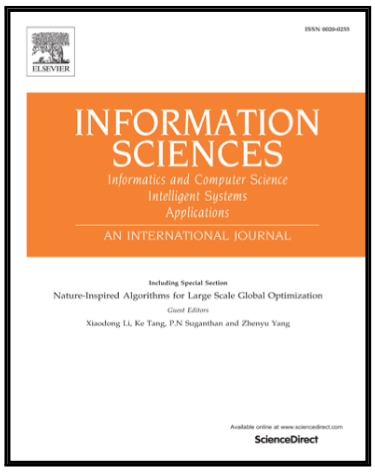

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Multi-task learning for dangerous object detection in autonomous driving

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Abstract

Recently, autonomous driving has been extensively studied and has shown considerable promise. Vision-based dangerous object detection is a crucial technology of autonomous driving. In previous work, dangerous object detection is generally formulated as a typical object detection problem and a distance-based danger assessment problem, separately. These two problems are usually dealt with using two independent models. In fact, vision-based object detection and distance prediction present prominent visual relationship. The objects with different distance to the camera have different attributes (pose, size and definition), which are very worthy to be exploited for dangerous object detection. However, these characteristics are usually ignored in previous work. In this paper, we propose a novel multi-task learning (MTL) method to jointly model object detection and distance prediction with a Cartesian product-based multi-task combination strategy. Furthermore, we mathematically prove that the proposed Cartesian product-based combination strategy is more optimal than the linear multi-task combination strategy that is usually used in MTL models, when the multi-task itself is not independent. Systematic experiments show that the proposed approach consistently achieves better object detection and distance prediction performances compared to both the single-task and

☆Fully documented templates are available in the elsarticle package on CTAN.

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