



# Preface to the Special Issue on Pattern Recognition (DAGM GCPR 2021)

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This issue of the International Journal of Computer Vision is devoted to efficient approaches for pattern recognition. The papers address various aspects of efficiency, namely memory efficiency, data efficiency, and runtime efficiency, and cover various applications including optical flow estimation, image classification, semantic segmentation of LiDAR data, video instance segmentation, and illumination estimation. This issue consists of 5 papers that are briefly discussed as follows:

In “A Cutting-Plane Method for Sublabel-Accurate Relaxation of Problems with Product Label Spaces”, Ye et al. combine product-space relaxation and sublabel-accurate discretization to reduce the memory requirements of convex relaxation methods. The approach is validated for image denoising and optical flow estimation. Fan et al. propose in “Revisiting Consistency Regularization for Semi-Supervised Learning” a simple yet effective consistency regularization for semi-supervised image classification. The method is very data-efficient and performs very well in low data regimes and for imbalanced datasets. Lack of training data is also addressed

in “A Realism Metric for Generated LiDAR Point Clouds” by Triess et al. In this work, a new metric is proposed that measures the quality of LiDAR point clouds that are generated, e.g., by a generative network. The metric can be used as an early indicator which assesses whether the generated training data will improve a down-stream task like semantic point cloud segmentation. Brissman et al. propose in “Recurrent Graph Neural Networks for Video Instance Segmentation” a very efficient approach for video instance segmentation. The approach tracks and segments multiple objects on-line and in real-time. Temporal information is also used in “Spatio-Temporal Outdoor Lighting Aggregation on Image Sequences using Transformer Networks” by Lee et al. to estimate outdoor illumination more consistently and without the need of an additional post-processing step.

The special issue was preceded by the DAGM German Conference on Pattern Recognition (DAGM GCPR 2021), held virtually from September 28 to October 1, 2021. The articles have undergone rigorous peer-review according to the journal’s high standards. Collectively, these 5 papers illustrate the diverse range of efficiency issues in pattern recognition.

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