Hessisches Kompetenzzentrum
für Hochleistungsrechnen

Pedestrian Detection Using Shearlets



Introduction

One main application area of pedestrian detection is located in the automotive domain. The usage of collusion warning and intervention systems as well as in future systems of autonomous driving require fast and reliable algorithms.

Methods

Efficient detection systems are usually based on edge detection algorithms. Very often, gradient methods are employed. In contrast to this, in this project we use detection algorithms based on shearlet frames. Shearlets [1, 2] are recently developed affine systems that are very well suited for the detection of directional information. In this project, specific shearlet methods are combined with deep learning algorithms. This combination requires a training of the convolutional neural networks based on a huge amount of data. These kinds of training have been successfully performed on MaRC.

Discussion

The shearlet approach seems to be very promising. Indeed, it has turned out that shearlet algorithms outperform any hand-crafted algorithm for pedestrian detection [3, 4]. In the near future, in particular much more sophisticated deep learning strategies will be investigated and trained on MaRC.

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Project Term
2019 - 2019

Project Areas
Mathematics

Clusters
MaRC2 Cluster Marburg

Additional Software
C++

Institute
Department of Mathematics and Computer Science, Marburg

University
University of Marburg

Partners
ITK Engineering

Publications

Reference

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[3] Pfeifer, L.: Shearlet features for pedestrian detection. Journal of Mathematical Imaging and Vision, 1-18 (2018). https://doi.org/10.1007/s10851-018-0834-9

[4] Pfeifer, L.: Pedestrian Detection Algorithms using Shearlets. Logos Verlag Berlin GmbH (2019).

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