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Mathematisch-Naturwissenschaftliche Fakultät
Fachbereich Informatik
Kognitive Systeme (Prof. A. Zell)

Bachelorarbeit

Light Deep Stereo Matching Network

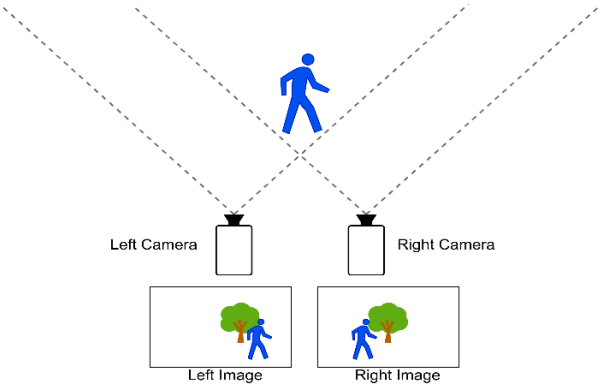
Stereo vision is a technique to infer the third dimension of a scene using two 2D images. In particular, by computing the disparity of a matching point in the left and right images, the distance of the point from the camera viewpoint can be estimated. Stereo vision can be applied in a wide range of applications, including autonomous driving, robot navigation and bin picking.

Recently, deep learning has played a key role in boosting the performance of the stereo vision techniques. Namely, the estimated disparity maps demonstrate higher accuracy. However, in terms of the hardware resources, these deep networks demand at least a moderate GPU to operate. That is, transferring deep stereo networks into the limited hardware platforms still remains a challenge. It is noteworthy that stereo matching networks need further treatments to be applicable on resource-constrained devices, since they process two images in parallel and usually the data is processed with 3D convolutional layers.

As such, in this work, the goal is to investigate on light deep stereo networks, which can provide a comparable accuracy to the dense networks. As the baseline for this research LEAStereoNet, a network that is obtained by Neural Architecture Search (NAS) is considered. After reimplemening the method and replicating the original results on SceneFlow and KITTI, the goal is to create a lighter, more efficient version of the network. Therefore, different state-of-the-art training and fine-tuning pipelines shall be employed making use of weight pruning and quantization as well as regularization strategies. The improved model shall then be compared against other off-the-shelf deep stereo networks in terms of accuracy and computational cost.

Requirements:

- Python programming
- Knowledge of deep learning
- Familiar with PyTorch



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