

Week 8 Report

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1 Week 8 Goals

The goals of this weeks are to build our own architecture based on Just Go with The Flow[1] as well as PointPWCNet[2] and maybe start training on the preprocessed semanticKitti dataset.

2 Upsampling

A simple upsampling method was implemented that makes use of a KDTree structure and selects the nearest neighbor of the same class. If a class got removed in beforehand (will not be used), the flow will result in a zero vector. Thus only leaving flow values for the classes we are interested in (currently dynamic/moving classes)

3 Cycle Loss

We implemented the cycle loss from the JGWTF network, and translated it to pytorch, while also make use of the already given util functions from the pointPWC network to have a more clean/consistent codebase.

4 Architectures

We focus on mostly PointPWC and FlowNet3D[3] as of now. As a first step, we have been working on modifying the PointPWC architecture. Instead of RGB values, we can use the original PointPWC architecture with coordinates. Also, we are implementing KP convolutional layers[4] in place of point convolutional layers. Additionally, we are trying to decrease the number of parameters. Later on, we are thinking of trying FlowNet3D architecture, with its set convolution layers replaced by KP convolution layers.

5 Training and Next Steps

We are very close to start training. After we start training a model that passes the debugging steps, such as overfitting to a single sample, and shows a decent loss curve, we are going to start implementing the single-scan inference step of a pretrained panoptic segmentation model. Eventually, we will be running the pretrained panoptic segmentation model on the outputs of our sceneflow pipeline and report the metrics.

References

- [1] H. Mittal, B. Okorn, and D. Held, “Just go with the flow: Self-supervised scene flow estimation,” in *Proceedings of the IEEE/CVF conference on computer vision and pattern recognition*, 2020, pp. 11 177–11 185.
- [2] W. Wu, Z. Wang, Z. Li, W. Liu, and L. Fuxin, “Pointpwc-net: A coarse-to-fine network for supervised and self-supervised scene flow estimation on 3d point clouds,” *arXiv preprint arXiv:1911.12408*, 2019.
- [3] X. Liu, C. R. Qi, and L. J. Guibas, “Flownet3d: Learning scene flow in 3d point clouds,” 2018. [Online]. Available: <https://arxiv.org/abs/1806.01411>
- [4] H. Thomas, C. R. Qi, J.-E. Deschaud, B. Marcotegui, F. Goulette, and L. J. Guibas, “Kpconv: Flexible and deformable convolution for point clouds,” 2019. [Online]. Available: <https://arxiv.org/abs/1904.08889>