

A Study on the Effectiveness of Images and Point Clouds in Estimating Drivable Areas

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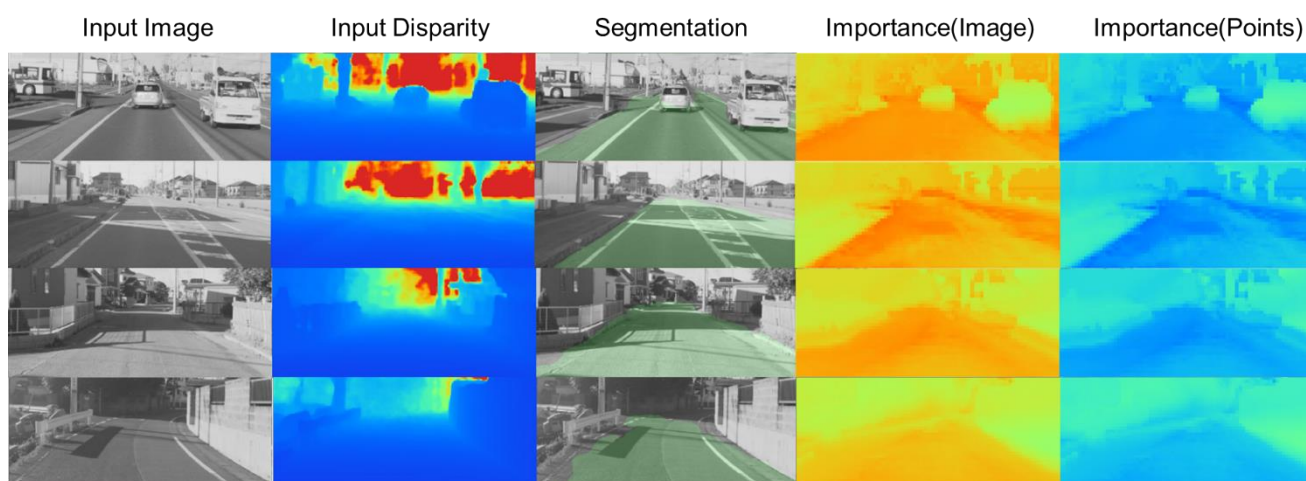


Fig. 1 Recognition Results

In this study, we examine the estimation of the drivable areas using images and point clouds. The drivable areas can be estimated by semantic segmentation using deep learning. Previous researches using images and point clouds cannot measure the effectiveness of images and point clouds on recognition results. This is due to the fact that the network structure does not take into account explanatory properties. This makes it difficult for algorithm designers to interpret what intention the images and point clouds are being used for.

Therefore, we proposed a network structure that explicitly calculates weights when fusing image and point cloud features in order to calculate the effectiveness between images and point clouds (Fig.2). The proposed method performs convolution operations on the features of point clouds and calculates the weight of the point cloud relative to the image (Fig.3). The calculated weights are visualized to determine the effectiveness of the image and point cloud.

We conduct experiments using point clouds estimated by GCNet. By applying the proposed method, the trend of the effectiveness of images and point clouds for recognition results can be determined (Fig.3). Images are used more actively than point clouds in estimating the drivable areas. Images are used for the surface area of the road, and point clouds are used to identify three-dimensional objects.

In general, model structures that take into account explanatory properties are known to perform poorly. Future work is ensuring model transparency and reducing the degradation of recognition performance. We will work on mitigating the trade-off between model explainability and recognition performance.

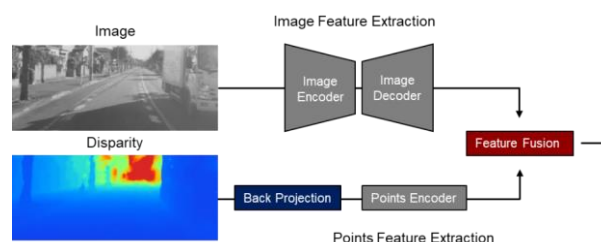


Fig. 2 Network Architecture

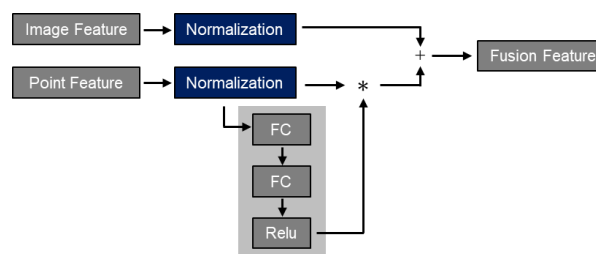


Fig. 3 Feature Fusion Module