1 Guided Gated Convolution Neural Network for Normal Inference

1.1 Light Net Evaluation

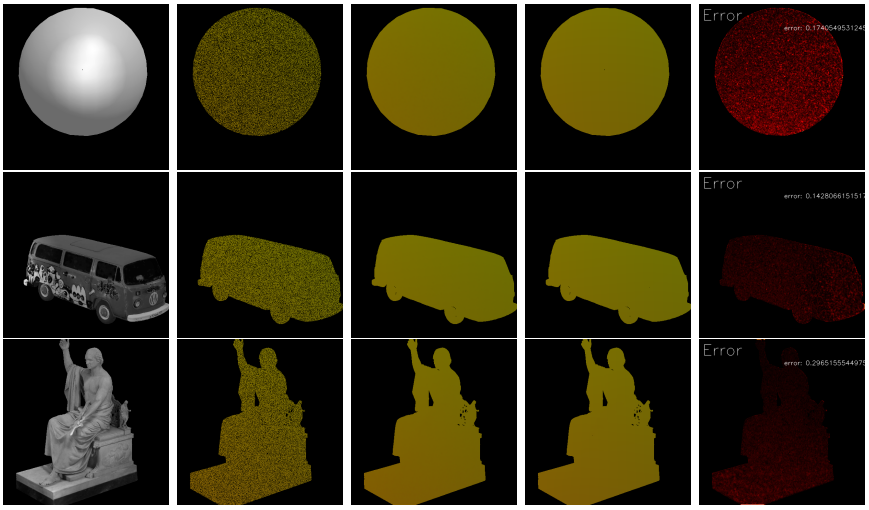

Figure 1: Qualitative evaluation of light net. From left to right, grayscale image, semi-dense light map(input), full-dense light map(output), full-dense light map(ground-truth), error map.

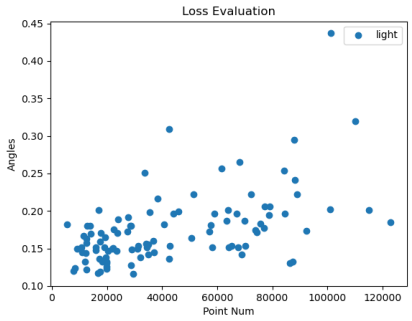

Figure 2: The evaluation on 100 test cases of Light Net.

1.2 comparison

From the Figure 3 we can observe the normal difference between ground-truth and GCNN predicted normals in another dimension. It separates the interval

Model	**Angle Error /degree**	**Time /ms**
LightNet	0.17	4.72
GCNN	9999	9999
Trignet	9999	9999
Trignet	9999	9999

Table 1: The error of models. The angle error is the average angle error of all valid pixels in the test case. The time unit is millisecond.

$[-1, 1]$, which is exactly the range of normal vector, to 256 sections. Then it counts the number of points locates in each section for 3 axes. The 3 axes are fitted quit well in most of interval but other than $[-0.25, 0.25]$ for x and y axes and interval close to -1 for z axis. Therefore a further constraint can be considered to the loss function related to the normal difference shown in this figure.

It is faulty that almost no normal has -1 z-component in GCNN predicted normal map. The reason?

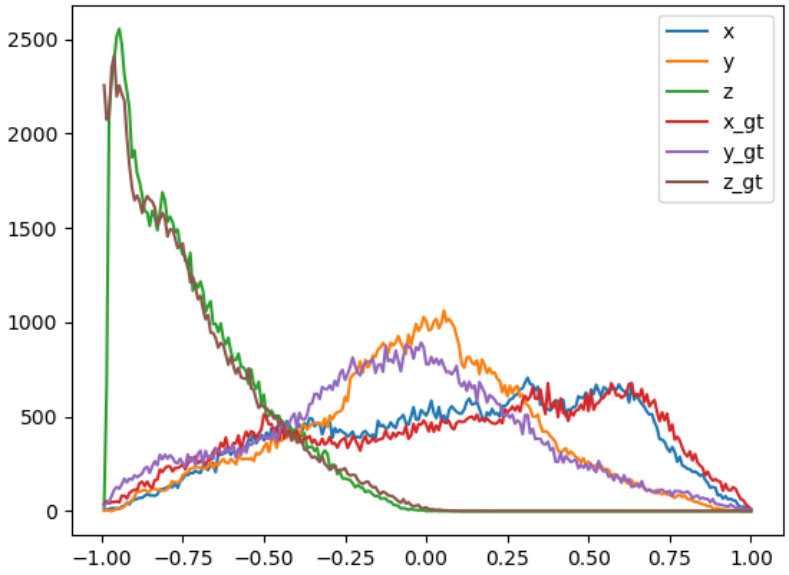

Figure 3: The normal difference of between GCNN and ground-truth in x, y, z-axis respectively. The y axis indicates the number of points, x axis indicates the value of normal in x/y/z axis. (The chart is based on the "dragon" scene showing above)