Prof. Dr. Leif Kobbelt
Gregor Kobsik, Tim Elsner

Visual Computing Institute | RWTH AACHEN UNIVERSITY

Theoretical Exercise 6

Date Published: May 24th 2023

Exercise 1 NeRF Volume Ray Casting

Perform volume ray casting for the following ray samples evaluated by the NeRF network. The sample segments are given ordered by their distance to the camera position, meaning 1 is the sample closest to the camera. Assume a length of the sample segements of 0.1. Compute for:
$\sigma_3 = 0.0, RGB_1 = (0.0, 0.0, 0.0)$
$\sigma_1 = 10, RGB_1 = (1.0, 0.0, 0.0)$
$\sigma_2 = 3, RGB_1 = (1.0, 1.0, 0.0)$
$\sigma_4 = 1000, RGB_1 = (1.0, 0.0, 1.0)$
$\sigma_5 = 1000, RGB_1 = (1.0, 1.0, 1.0)$

Exercise 2 NeRF Architecture

Argue for or against the following architecture choices for a NeRF:
a) Convolutions
b) Introducing direction in the first layer of the NeRF already
c) Training a (MIP) NeRF on multiple resolutions of the same image
d) Training KiloNeRF directly, not through distillation
e) Using leaky ReLus everywhere in the NeRF