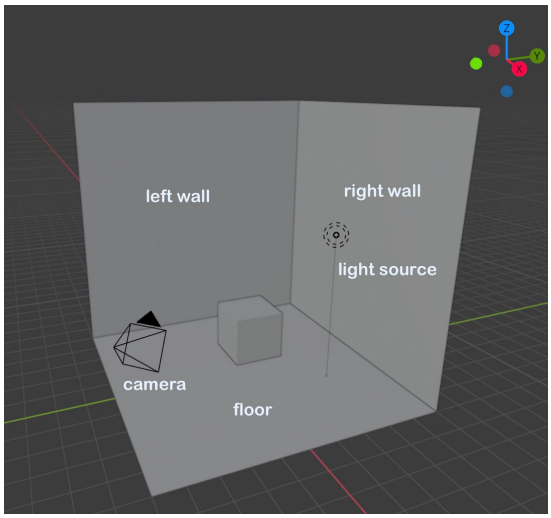
Description of RT-Dataset

1. General description

This is an image dataset generated by Blender with python scripting. Our environment is set to have a background (composed of a left wall, a right wall, and a floor), a camera(fixed position and angle), and a light source(fixed position and angle). In this environment, we put simple geometries varying in color, shape, position, and rotation angle and generate pairs of images with ray-tracing on/off.

Size: 200*200 pixel

Format: PNG



2. Folder hierarchy

-dataset

-folder1_color

-folder2_shape

-folder3_position

-folder4_rotation

-folder5_all

-000001-000200

-000201-000400

……

-009801-010000

3. Setting of each sub-folder

Comment on naming conventions:

ON_ABCD_X.png(ray-tracing on) OFF_ABCD_X.png(ray-tracing off)

X is an integer, specifying serial# starting from 0

A = 0 if position is fixed, 1 if position is varied

B = 0 if rotation is fixed, 1 if rotation is varied
C = 0 if color is fixed, 1 if color is varied
D = 0 if shape is fixed, 1 if shape is varied

[folder1_position]
Number of images: 200
Naming format: ON_1000_X.png / OFF_1000_X.png, where X is serial#
Position is the only parameter that varies.
Shape: cube potentially more sub-folders for more shapes
Color: RGBA [0.822032,1,0.36454,1]
Rotation: none

[folder2_rotation]
Number of images: 200
Naming format: ON_0100_X.png / OFF_0100_X.png, where X is serial#
Angle of rotation is the only parameter that varies.
Shape: cube
Position: (0,0,1)
Color: RGBA [0.822032,1,0.36454,1]

[folder3_color]
Number of images: 2k?
Naming format: ON_0010_X.png / OFF_0010_X.png, where X is serial#
Color is the only parameter that varies.
Shape: cube
Position: (0,0,1)
Rotation: none

[folder4_shape]
Number of images: 7
Naming format: ON_0001_X.png / OFF_0001_X.png, where X is serial#
Color: RGBA [0.822032,1,0.36454,1] may change later, pick any color that works the best, e.g. the color makes the ray-tracing effect the most obvious
Position: (0,0,1)
Rotation: none

[folder5_all]
Number of images: 10k?
Naming format: ON_1111_X.png / OFF_1111_X.png, where X is serial#
No parameter is fixed. All color, shape, position, and rotation of images would vary from one image to another.

4. Purposes of sub-folders

The 5th folder “folder5_all” is designed to be a training dataset, while the first 4 folders are recommended to be used as testing datasets. **Remember to randomly pick images from**

folder 5 as the first 5103 images are ordered by shape. When your DNN model does not work very well, by analyzing your ray-traced outputs of folder1_color, you can figure out whether your model can do well in extracting color features owing to this controlled experiment setting. Similarly, with folders 2-4, you can evaluate your model's capability of extracting features of shape, position, and angle of rotation.

5. csv reference sheet

In every folder, there's a corresponding csv file containing parameter values for each image, such as folder1_position.csv in dataset/folder1_position and folder5_all_5601-5800.csv in dataset/folder5_all/5601-5800.

folder5_all_5401-5600

image_name	serial#	shape	color-r	color-g	color-b	color-a	pos_x	pos_y	pos_z	rot_0	rot_1	rot_2
1111_005401	5401	cube	0.183331815778796	0.57749524426108	0.46086708282939700	1	0.5089456744288700	-0.1773718441016580	2.845677672502390	68.48241235966230	78.58925937933360	328.18370861289000
1111_005402	5402	monkey	0.07809220532432080	0.4277716606691390	0.9686345643707000	1	2.395011988255040	-0.510180039864805	2.2050781054117200	68.84384717531430	309.75796854174000	288.09686039724900
1111_005403	5403	torus	0.14221519803394300	0.6000718818515640	0.24197696821166700	1	2.0595421052323000	-1.0592109164259000	0.24248365593944	38.18926610031190	55.92061648266610	188.56886480507910
1111_005404	5404	cone	0.572490976716157	0.21108789295940500	0.216898606207947	1	1.4790276182691300	0.2541976425778930	2.575315647929420	294.55606844488700	114.79362627613700	205.84419763159000
1111_005405	5405	uv_sphere	0.5073325780774360	0.4818026447459280	0.36028963673578800	1	2.2433896352111000	-1.4506236118058800	1.1082990610347100	210.04746142412800	75.77271492149680	167.76266909018800
1111_005406	5406	cylinder	0.3601037253774100	0.28751387205531200	0.3086311090059440	1	-0.3894393995348170	-2.453705103394710	2.124262366747400	154.20910122275800	14.96393058429100	169.19847641829300
1111_005407	5407	sphere	0.34467431807963000	0.6655310507000640	0.26810831815152100	1	0.7749247764302370	-2.9526980115183000	0.6876215407825170	192.64904234931000	80.31759775053490	26.1808340897458
1111_005408	5408	cone	0.9492813509121950	0.9495730992586440	0.7700513739468800	1	0.3771259380251970 0	2.245304977272730 0	1.188173220224900	293.82191179240500	268.8396610206890	27.769544543288600
1111_005409	5409	torus	0.6345608436217310	0.017350639499130700	0.6396413845449580	1	-0.015991798692520700	-2.425977027132130 0	2.969707305865270 0	6.88572395539889	187.60614241467700	258.2569562289360

Demo

Comment: the unit for rot_0 rot_1 rot_2 is degree denoted by °.