Dynamic sampling pointnet notes

xyz

Feb 2018

Contents

1 Quick notes for important events while using one file to test

1.1 batch size

1.1.1 bs=27 vs bs=81

batch size: 9,27,81
data: xyz-color_1norm
model: 1AG
sampling & grouping: stride_0d1_step_0d1_bmap_nh5_2048_0d5_1_fmn1-160_32-32_12-0d2_0d6-0d2_0d6

1.2 feed elements

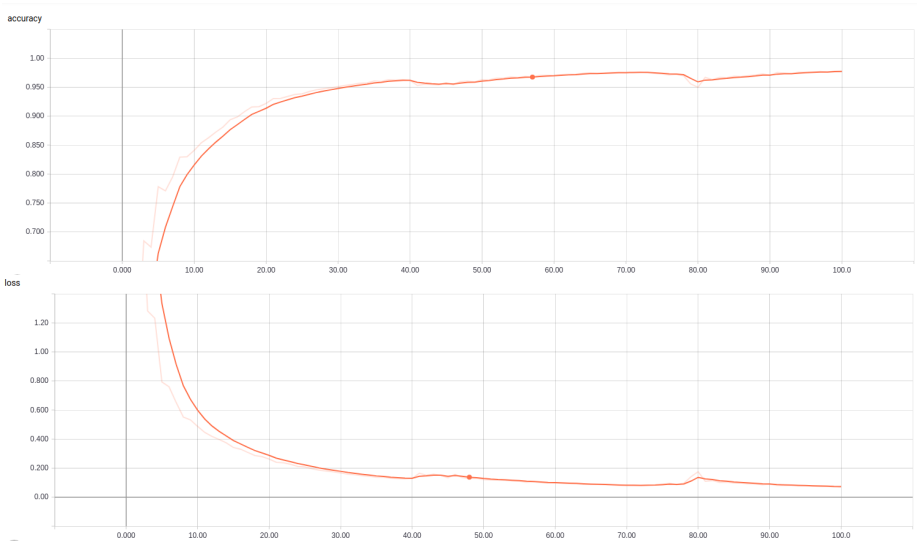
epoch num = 100
stride_0d1_step_0d1_bmap_nh5_2048_0d5_1_fmn1-160_32-32_12-0d2_0d6-0d2_0d6

Figure 1: bs=9

Figure 2: bs=27

model	batch size	data elements	acc	loss
1AG	9	xyz color	0.890	0.356
1AG	27	xyz color	0.920	0.240
3AG	27	xyz color	0.912	0.273
2A	27	xyz color	0.908	0.294
2AG	27	xyz color	0.902	0.293
1A	27	xyz color	0.883	0.351
1AG	81	xyz color	0.978	0.072
1AG	9	xyz	0.861	0.427
1AG	27	xyz	0.907	0.257
1AG	81	xyz	0.975	0.078
1A	27	xyzmid color	0.889	0.357
3AG	27	xyzmid color	0.933	0.193
2A	27	xyzmid color	0.939	0.177

Figure 3: bs=81



1. large batch size is better
2. $1AG(0.92) > 3AG(0.912) > 2A(0.908) > 2AG(0.902) > 1A(883)$
   1AG is much better than 1A
   1AG is a bit better than 3AG ???
3. xyz-color is only a bit better than xyz
4. xyzmid-color is much better than xyz-color
5. **xyzmid-color is normally much better than xyz-xyzmid-color ???**

1.3 model

batch size: 50
data: xyz_midnorm_block-color_1norm
epoch_num = 600
sampling & grouping: stride_0d1_step_0d1_bmap_nh5_12800_1d6_2_fmn3-600_64_24-60_16_12-0d2_0d6_1d2-0d2_0d6_1d2

model	acc	loss
3A	0.909	0.248
3AG	0.913	0.231
4AG	0.912	0.232

batch size: 32
data: xyz_midnorm_block-color_1norm
sampling & grouping: stride_0d1_step_0d1_bmap_nh5_12800_1d6_2_fmn6-2048_256_64-32_32_16-0d2_0d6_1d2-0d1_0d3_0d6

matterport3d
feed_data_elements:['xyz_midnorm_block', 'color_1norm']
feed_label_elements:['label_category', 'label_instance']
train data shape: [362 12800 6]
test data shape: [384 12800 6]
max epoch = 500

model	acc	loss
1AG	0.944/0.431	0.161/4.633
4AG	0.835/0.401	0.520/3.644

1.4 integration: matterport3d

stride_0d1_step_0d1_bmap_nh5_12800_1d6_2_fmn3-512_64_24-48_16_12-0d2_0d6_1d2-0d2_0d6_1d2 17D_1LX_1pX_29h_2az				
model	batch size batch num shuffle	lr ds	data elements	epoch-acc mean-std train/eval
1aG	30/60	0.005	'xyz_midnorm_block', 'color_1norm', 'nxnynz'	250-0.981
1DSaG	30/60	0.001-40	'xyz_midnorm_block', 'color_1norm', 'nxnynz'	300-0.914-0.775
1DSaG	30/60	0.001-40	'xyz_midnorm_block', 'color_1norm', 'nxnynz'	300-0.914-0.775
1DSaG kp0.5	30/60	0.001-80 300-3e-4	'xyz_midnorm_block', 'color_1norm', 'nxnynz'	300-0.942-0.842
1DSaG kp0.2	30/60	0.001-80 300-3e-4	'xyz_midnorm_block', 'color_1norm', 'nxnynz'	300-0.928-0.797
1DSaG kp0.5	30/60	0.005-80 300-1.7e-3	'xyz_midnorm_block', 'color_1norm', 'nxnynz'	300-0.970-0.916
1DSaG kp0.2	30/60	0.005-80 300-1.7e-3	'xyz_midnorm_block', 'color_1norm', 'nxnynz'	300-0.966-0.924
1DSaG kp0.8	30/60	0.005-80 300-1.7e-3	'xyz_midnorm_block', 'color_1norm', 'nxnynz'	300-0.976-0.933 500-0.984-0.954
1aG	30/1083	0.003	'xyz_midnorm_block', 'color_1norm', 'nxnynz'	200-0.947
1aG	30/1083	0.01	'xyz_midnorm_block', 'color_1norm'	200-0.783 500-0.791
1aG	30/1083	0.003/30 300-0.00012	'xyz_midnorm_block', 'color_1norm'	200-0.903 300-0.921

1bG	25/1083	0.001-30 100-3e-4 300-4e-5	'xyz_midnorm_block'	100-0.854 200-0.918 300-0.936
1bG	25/1083	0.001-30 100-3e-4 300-4e-5	'xyz_midnorm_block', 'color_1norm', 'nxnynz'	100-0.914 200-0.957 300-0.966
1bG	25/1083	0.02	'xyz_midnorm_block', 'color_1norm'	200-0.655 300-0.718
1bG	25/1083	0.02	'xyz_midnorm_block', 'color_1norm', 'nxnynz'	200-0.772 300-0.823
1bG	25/1083	0.001	'xyz'	200-0.772 90-0.553-0.210
4bG	25/1083	0.001-30 100-3e-4 200-1e-4 300-4e-5	'xyz_midnorm_block', 'color_1norm', 'nxnynz'	100-0.752 200-0.816 300-0.832
2 1DSaG	30/1083	0.002-80	'xyz_midnorm_block', 'color_1norm', 'nxnynz'	200-0.930-0.830/0.450 460-0.952-0.881/0.471
1aG	30/19755	0.001-30 50-7e-4 100-3e-4	'xyz_midnorm_block', 'color_1norm','nxnynz'	50-0.752/0.580 100-0.843/0.574 (NoShuf) 102-0.806/0.570 (Shufle)
1bG	25/19755	0.001-30	'xyz_midnorm_block', 'color_1norm','nxnynz'	38-0.719/0.587 80-0.823/0.583 (NoShuf) 81-0.782/0.587 (Shufle)
1aG	30/19755	0.02	'xyz_midnorm_block', 'color_1norm'	56-0.562
1aG	30/19755	0.02 127-0.00483	'xyz_midnorm_block', 'color_1norm', 'nxnynz'	87-0.616 127-0.686
1bG	25/18737	0.001 N	'xyz_midnorm_block', 'color_1norm', 'nxnynz'	24-0.682/0.509 70-0.858/0.509
1bG	25/18737	0.001 Y	'xyz_midnorm_block', 'color_1norm', 'nxnynz'	24-0.738/0.573 70-0.876/0.563 90-0.897 /0.561
4bG	25/18737	0.001 Y	'xyz_midnorm_block', 'nxnynz'	24-0.576/0.545
4bG	25/18737	0.001 Y	'xyz_midnorm_block', 'color_1norm', 'nxnynz'	24-0.594/0.569

1DSaG	30/18737	0.002-80 Y	'xyz_midnorm_block', 'color_1norm', 'nxnynz'	20-0.688-0.394/0.428-0.224 36-0.742/0.395
1DSaG	30/18737	0.007-80 Y	'xyz_midnorm_block', 'color_1norm', 'nxnynz'	20-0.725-0.453/0.435-0.206 38-0.783/0.396
Conclusion: 1: nxnynz helps a lot 2: 1bG is much deeper than 1aG, why worse than 1aG 3: learning rate is important, cannot be too large				

1.5 multi scale in 60

configuration	epoch-train point acc-class acc
model_1aG-gsbb_3B1-bs25-xyz_midnorm_block-color_1norm-nxnynz-12800-mat60	50-0.904 100-0.955 200-0.967 257-0.977
model_4bG-Elw-gsbb_3B1-bs20-lr2-ds_80-Sf_Y-xyz_midnorm_block-color_1norm-nxnynz-12800-mat_60	200-0.860-0.824 300-0.870-0.839

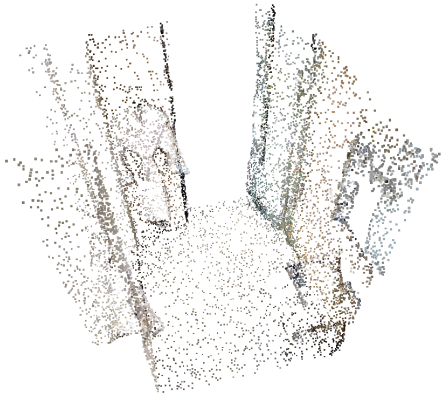
1.6 integration: scannet

stride_0d1_step_0d1_bmap_nh5_12800_1d6_2_fmn3-256_48_16-56_8_8-0d2_0d6_1d2-0d2_0d6_1d2 scannet train					
model	loss: E,N,C input drop (No)	batch size batch num shuffle	lr ds	data elements	epoch-point ac-class ac train/eval
1bG	E	25/12887 test Y	0.001 40	xyzmid	23-0.732-0.326/0.664-0.260 25-0.746-0.340/0.669-0.273
1bG	N	25/12887 Y	0.001 40	xyzmid	25-0.733-0.390/0.666-0.252
1bG	C	25/12887 Y	0.001 40	xyzmid	25-0.703-0.356/0.655-0.252
1bG	CN	25/12887 Y	0.001 40	xyzmid	25-0.681-0.366/0.611-0.237
1DSaG	E idp9	30/12887 Y	0.003 80	xyzmid	40-0.738-0.376/0.513-0.228 90-0.832/0.496
1bG	E	25/13091 train_300 Y	0.002 80	xyzmid	60-0.765-0.389/0.700-0.252
1bG	E	25/13091 Y	0.003 80	xyzmid	10-0.646/0.689 60-0.753-0.349/0.691-0.234 100-0.833-0.480/0.672-0.261
1bG	CN	25/13091 Y	0.002 80	xyzmid	60-0.738-0.409/0.670-0.237
1bG	E idp9	25/13091 Y	0.003 80	xyzmid	10-0.641/0.585 16-0.646/0.633
1DSaG	E	30/13091 Y	0.003 80	xyzmid	40-0.794-0.456/0.420-0.154 100-0.872-0.602/0.417-0.153
Conclusion:					
4bG	CN	25/2998-3521 Y	0.001 40	xyzmid	142-0.726-0.445/0.625-0.242
4bG	E	25/2998-3521 Y	0.001 40	xyzmid	145-0.792-0.506/0.656-0.257

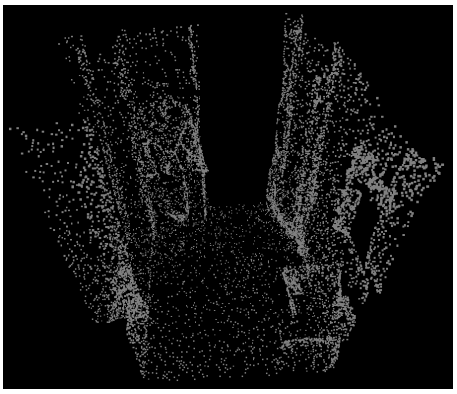
1.7 Semantic segmentation expamples

1.7.1 good: 1083, train, 0.946

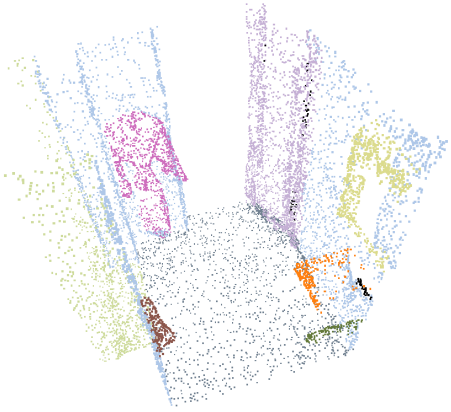
log: log-model_1bG-gsbb_3B1-bs25-lr1-ds_30-xyz_midnorm_block-color_1norm-nxnynz-12800-mat_1083
model: 1bG
sampling & grouping:
stride_0d1_step_0d1_bmap_nh5_12800_1d6_2_fmn3-512_64_24-48_16_12-0d2_0d6_1d2-0d2_0d6_1d2
batch size: 25
learning rate: 0.001000
decay_epoch_step: 30
matterport3d
feed_data_elements:['xyz_midnorm_block', 'color_1norm', 'nxnynz']
feed_label_elements:['label_category', 'label_instance']
train data shape: [1083 12800 9]



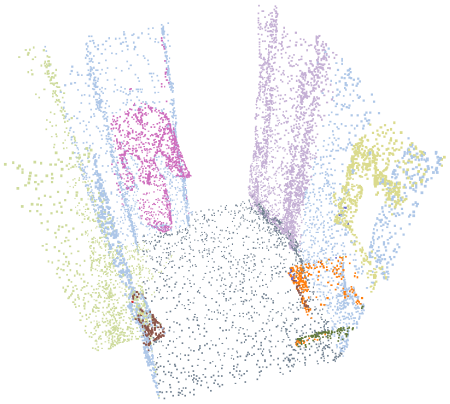
(a) colorized point cloud



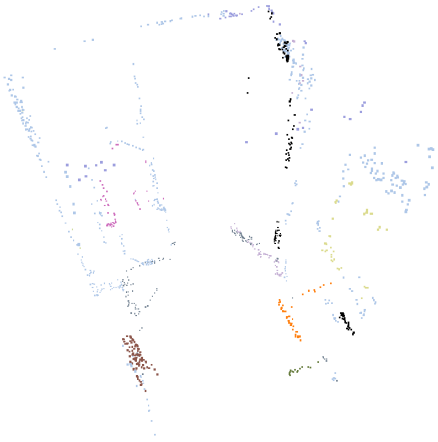
(b) raw point cloud



(c) gt

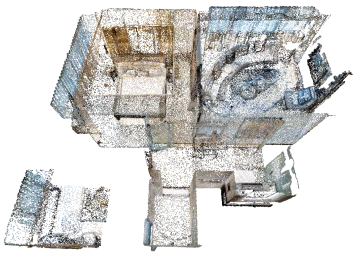


(d) pred

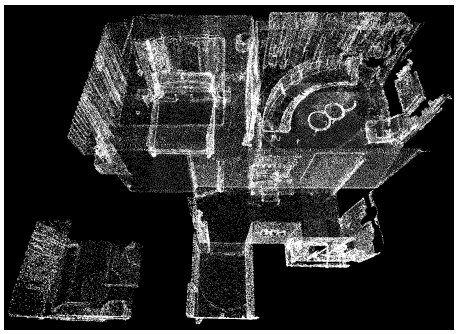


(e) err

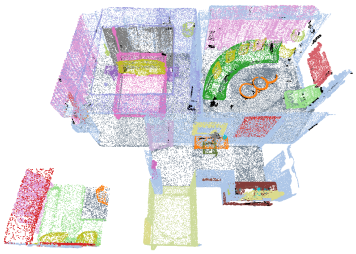
Figure 4: 17DRP5sb8fy_1_2_a946



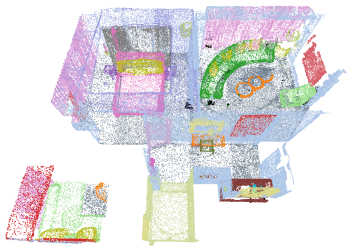
(a) colorized point cloud



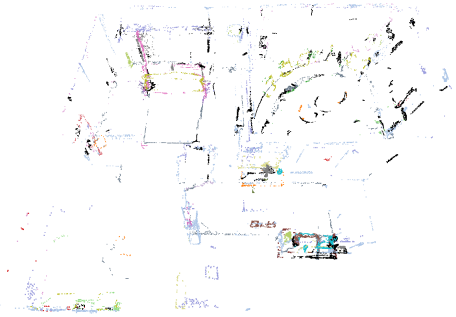
(b) raw point cloud



(c) gt



(d) pred



(e) err

Figure 5: 17DRP5sb8fy_0_25_a946

1.7.2 bad: 18737,eval 0.071

model: 1bG
sampling & grouping: stride_0d1_step_0d1_bmap_nh5_12800_1d6_2_fmn3-512_64_24-48_16_12-0d2_0d6_1d2-0d2_0d6_1d2
batch size: 25
learning rate: 0.001000
decay_epoch_step: 50
epoch 0 train IsShuffleIdx: True

epoch 0 train IsShuffleIdx: True
matterport3d
feed_data_elements:['xyz_midnorm_block', 'color_1norm', 'nxnynz']
feed_label_elements:['label_category', 'label_instance']
train data shape: [18737 12800 9]
test data shape: [4172 12800 9]

Figure 6: qoi_r1Q_r47_rPc_rqf_2_3_a0d071 (raw,gt,pred,err,crt)

1.8 point++

1.8.1 scannet seg

each room as a block, total 40 block			
batch size batch num	lr ds	data elements	epoch-point ac-class ac train/eval/eval whole scene
30/40	0.001	xyzmid	200-0.675/0.757-0.54/0.799-0.52
25	0.001	xyzmid	200-0.689/0.787-0.556/0.815-0.517i