1、 Introduction to the Lane Mark Detection Challenge

The lane mark detection challenge of ApolloScape aims to assign a semantic label to every image pixel to accurately localize the lane marks in traffic scenes. Its ultimate goal is to provide a comprehensive understanding of the semantics and functionalities of the lane marks in the context of autonomous driving. As understanding the traffic lane marks is crucial for building a robust autonomous driving system, we hope this new challenge can help push the research & practice along this direction forward.

2、 Overview

Images in ApolloScape dataset are all at 2710×3384 resolution. We will release 200 thousand image scenes during the year of 2018, all with pixel-level lane mark annotations. The first release has been made on June 31, 2018, containing 165949 image scenes (132189 and 33760 for training and testing, respecitively).

An official training/testing split will be provided along with each release. Note that only the annotations of training images will be made available for our participants. It means that these annotations can be used for training/validation freely, but one has to submit the results on the testing split to our server for official evaluations.

3、 Label Definition

ApolloScape includes 35 common lane mark classes in everyday traffic scenes. Each class is uniquely defined by its *type*, *color* and *use* attributes jointly. For the ease of presentation, a short name is assigned to each class. Each class has two integer IDs. The class ID is unique, identifying a particular class in all the challenges of ApolloScape. The train ID is used for the ease of training and testing, and can be modified for your own purpose. However, we officially suggest a list of train IDs in the table below, where ID 255 is used to ignore labels during both training and evaluation. Note that when submitting the results, one has to make sure to predict the class IDs, NOT train IDs, to be consistent with the settings of our evaluation server.

Our challenge also supports category-level evaluation of lane mark detection. In this setting, multiple classes may be assigned to the same category, according to their basic functions in traffic control. The evaluation server reports both class-level and category-level results.

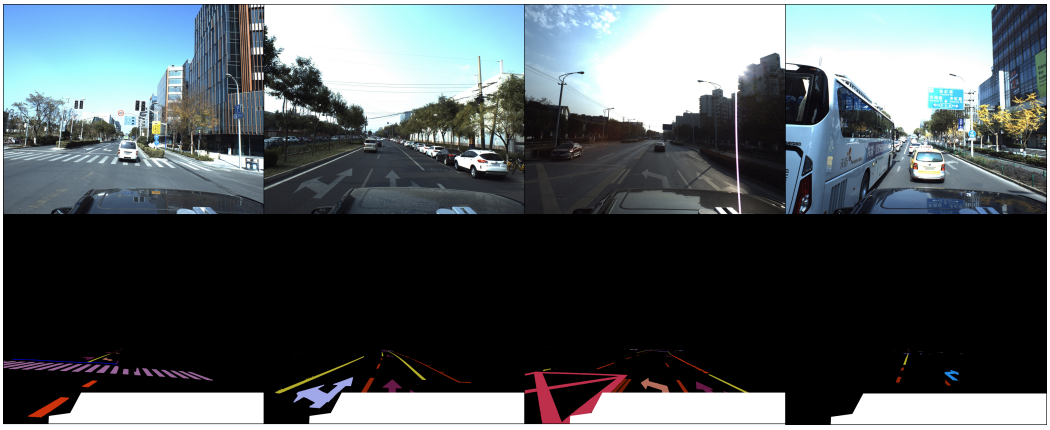
Our participants can access to these definitions quickly via the helper functions in the released evaluation scripts.

type	color	use	name	id	trainId	category	catId
n/a	n/a	n/a	void	0	0	void	0
solid	w	dividing	s_w_d	200	1	dividing	1
solid	y	dividing	s_y_d	204	2		
double solid	w	dividing, no pass	ds_w_dn	213	3		
double solid	y	dividing, no pass	ds_y_dn	209	4		
solid & broken	w	dividing, one-way pass	sb_w_do	206	5		
solid & broken	y	dividing, one-way pass	sb_y_do	207	6		

broken	w	guiding	b_w_g	201	7	guiding	2
broken	y	guiding	b_y_g	203	8		
double broken	w	guiding	db_w_g	211	9		
double broken	y	guiding	db_y_g	208	10		
double broken	w	stopping	db_w_s	216	11	stopping	3
solid	w	stopping	s_w_s	217	12		
double solid	w	stopping	ds_w_s	215	13		
solid	w	chevron	s_w_c	218	14	chevron	4
solid	y	chevron	s_y_c	219	15		
solid	w	parking	s_w_p	210	16	parking	5
solid	n/a	parking	s_n_p	232	17		
crosswalk	w/y	zebra	c_wy_z	214	18	zebra	6
arrow	w	u-turn	a_w_u	202	19	thru/turn	7
arrow	w	thru	a_w_t	220	20		
arrow	w	thru & left turn	a_w_tl	221	21		
arrow	w	thru & right turn	a_w_tr	222	22		
arrow	w	thru & left & right turn	a_w_tlr	231	23		
arrow	w	left turn	a_w_l	224	24		
arrow	w	right turn	a_w_r	225	25		
arrow	w	left & right turn	a_w_lr	226	26		
arrow	n/a	left & u-turn	a_n_lu	230	27		
arrow	w	thru & u-turn	a_w_tu	228	28		
arrow	w	merge	a_w_m	229	29		
arrow	y	thru	a_y_t	233	30		
bump	n/a	speed reduction	b_n_sr	205	31	reduction	8
diamond	w/y	zebra attention	d_wy_za	212	32	attention	9
rectangle	w/y	no parking	r_wy_np	227	33	no parking	10
visible old marking	w/y	n/a	vom_wy_n	223	34	others	11
other markings	n/a	n/a	om_n_n	250	35		
noise	n/a	n/a	noise	249	255	ignored	255
ignored	n/a	n/a	ignored	255	255		

4、 Label Annotations and Distributions

The lane mark detection challenge of ApolloScape spans various traffic conditions, with different levels of lightings, scene clutters, and object occlusions. Below we illustrate several typical annotated images present in our challenge.



The distributions of images and pixels over the lane mark classes are listed below. Note that several classes are absent in the current release of the training or testing data. These classes will be ignored during evaluation.

name	id	# images			# pixels (millions)		
		train	test	all	train	test	all
void	0	132189	33790	165979	1062978.68	271606.79	1334585.47
s_w_d	200	130933	32839	163772	3483.83	923.27	4407.10
s_y_d	204	59974	22063	82037	840.27	246.05	1086.32
ds_w_dn	213	8304	0	8304	85.51	0.00	85.51
ds_y_dn	209	21196	12446	33642	344.04	494.32	838.37
sb_w_do	206	4135	1716	5851	5.87	0.45	6.31
sb_y_do	207	3029	0	3029	3.06	0.00	3.06
b_w_g	201	126784	29106	155890	1285.90	209.47	1495.37
b_y_g	203	22020	10537	32557	133.75	66.67	200.42
db_w_g	211	0	0	0	0.00	0.00	0.00
db_y_g	208	2458	0	2458	7.61	0.00	7.61
db_w_s	216	0	0	0	0.00	0.00	0.00
s_w_s	217	113843	30899	144742	435.46	135.34	570.80
ds_w_s	215	0	0	0	0.00	0.00	0.00
s_w_c	218	11500	0	11500	34.30	0.00	34.30
s_y_c	219	16918	2055	18973	68.87	6.22	75.09
s_w_p	210	51476	7560	59036	391.25	18.50	409.75
s_n_p	232	0	0	0	0.00	0.00	0.00
c_wy_z	214	122879	31478	154357	4208.28	1008.25	5216.52
a_w_u	202	8445	0	8445	29.85	0.00	29.85
a_w_t	220	82485	13338	95823	372.90	43.08	415.98
a_w_tl	221	38563	12017	50580	121.26	53.60	174.87
a_w_tr	222	88837	25307	114144	393.47	112.12	505.58
a_w_tlr	231	0	0	0	0.00	0.00	0.00
a_w_l	224	92257	22971	115228	620.42	110.32	730.74
a_w_r	225	46956	4755	51711	96.47	11.34	107.81
a_w_lr	226	4114	598	4712	1.81	0.21	2.01
a_n_lu	230	1326	0	1326	1.21	0.00	1.21
a_w_tu	228	0	0	0	0.00	0.00	0.00

a_w_m	229	0	0	0	0.00	0.00	0.00
a_y_t	233	0	0	0	0.00	0.00	0.00
b_n_sr	205	21631	10349	31980	15.14	4.66	19.80
d_wy_za	212	2026	18755	20781	3.88	50.04	53.92
r_wy_np	227	17811	8276	26087	366.84	150.15	516.99
vom_wy_n	223	33659	0	33659	587.71	0.00	587.71
om_n_n	250	39909	16433	56342	282.21	101.72	383.93
noise	249	0	0	0	0.00	0.00	0.00
ignored	255	132189	33790	165979	135057.90	34523.34	169581.24

5、 Task Definition

Since the ApolloScape dataset supports various kinds of annotations, e.g. 2D/3D semantic labels, depth and camera poses, there are plenty of potential tasks that can be defined. In this version of lane mark detection challenge, we mainly focus on a classical yet important task, i.e. semantic segmentation of lane marks. More tasks will be added into the future versions.

For evaluating semantic segmentation, we adopt the conventional Intersection-over-Union scores, also known as the Jaccard Index. Please find more details of its definition in our paper.

Our evaluation server accepts submitted results in the form of a tarball file containing all the image results. Each image is expected to have 2-channels, with 2710×3384 resolution and the predicted class IDs at each pixel point. Also, we require our participants to upload a text file specifying the relative paths of each predicted image within the compressed file. This file should be like test_image.csv, following the same image order. Note that our server will uncompress the uploaded tarball with the bash command *tar –xzf*.

6、 The Structure of the Dataset

The folder structure of our datasets is as follows:

{root } /{type} / {road id} / {record id} / {camera id} / {timestamp} _ {camera id} {ext}

root: The root path of the dataset specified by user.

type: Including “ColorImage” and “Label”.

road id: a name specifying the road, e.g. road02.

record id: a name specifying a subset of images, e.g. Record001.

camera id: for each record, the images are captured by two front cameras, “Camera 5” and “Camera 6”.

{timestamp}_{camera_id}: images are uniquely named in each record by a timestamp field and a camera id field.

ext: the extension name of image file, “.jpg” for RGB images and “.png” for label images.

7、 Download

road02_lane_seg.tar.gz

road03_lane_seg.tar.gz

road04_lane_seg.tar.gz

NOTE: the data released is used for educational and research purpose only. Commercial use or other forms that may violate the copyright is not permitted.

We also provide three list files to help our participants to access to our data: train_image.csv, train_label.csv, and test_image.csv. In each file, a line specifies the relative path of an image. The image order is consistent in train_image.csv and train_label.csv. Likewise, one has to ensure that the submitted text file has the save image order with that of test_image.csv for correct evaluations.