

```
1 !pip install torch torchvision torchaudio --index-url https://download.pytorch.org/whl/cu118
2 !pip install opencv-python matplotlib numpy
```

Looking in indexes: <https://download.pytorch.org/whl/cu118>

Requirement already satisfied: torch in /usr/local/lib/python3.12/dist-packages (2.8.0+cu126)
Requirement already satisfied: torchvision in /usr/local/lib/python3.12/dist-packages (0.23.0+cu126)
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Requirement already satisfied: filelock in /usr/local/lib/python3.12/dist-packages (from torch) (3.19.1)
Requirement already satisfied: typing-extensions>=4.10.0 in /usr/local/lib/python3.12/dist-packages (from torch) (4.15.0)
Requirement already satisfied: setuptools in /usr/local/lib/python3.12/dist-packages (from torch) (75.2.0)
Requirement already satisfied: sympy>=1.13.3 in /usr/local/lib/python3.12/dist-packages (from torch) (1.13.3)
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Requirement already satisfied: pillow!=8.3.*,>=5.3.0 in /usr/local/lib/python3.12/dist-packages (from torchvision) (11.3.0)
Requirement already satisfied: mpmath<1.4,>=1.1.0 in /usr/local/lib/python3.12/dist-packages (from sympy>=1.13.3->torch) (1.3.0)
Requirement already satisfied: MarkupSafe>=2.0 in /usr/local/lib/python3.12/dist-packages (from jinja2->torch) (3.0.2)
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Requirement already satisfied: matplotlib in /usr/local/lib/python3.12/dist-packages (3.10.0)
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Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.12/dist-packages (from matplotlib) (25.0)
Requirement already satisfied: pillow>=8 in /usr/local/lib/python3.12/dist-packages (from matplotlib) (11.3.0)
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Requirement already satisfied: python-dateutil>=2.7 in /usr/local/lib/python3.12/dist-packages (from matplotlib) (2.9.0.post0)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.12/dist-packages (from python-dateutil>=2.7->matplotlib) (1.17.0)

```
1 !pip install ultralytics roboflow opencv-python-headless
```

Requirement already satisfied: six in /usr/local/lib/python3.12/dist-packages (from roboflow) (1.17.0)
Requirement already satisfied: urllib3>=1.26.6 in /usr/local/lib/python3.12/dist-packages (from roboflow) (2.5.0)
Requirement already satisfied: tqdm>=4.41.0 in /usr/local/lib/python3.12/dist-packages (from roboflow) (4.67.1)
Requirement already satisfied: requests-toolbelt in /usr/local/lib/python3.12/dist-packages (from roboflow) (1.0.0)
Collecting filetype (from roboflow)
 Downloading filetype-1.2.0-py2.py3-none-any.whl.metadata (6.5 kB)
Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.12/dist-packages (from matplotlib>=3.3.0->ultralytics) (1.3.3)
Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.12/dist-packages (from matplotlib>=3.3.0->ultralytics) (4.60.0)
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Requirement already satisfied: charset_normalizer<4,>=2 in /usr/local/lib/python3.12/dist-packages (from requests>=2.23.0->ultralytics) (3.4.3)
Requirement already satisfied: filelock in /usr/local/lib/python3.12/dist-packages (from torch>=1.8.0->ultralytics) (3.19.1)
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Requirement already satisfied: MarkupSafe>=2.0 in /usr/local/lib/python3.12/dist-packages (from jinja2->torch>=1.8.0->ultralytics) (3.0.2)
Downloading ultralytics-8.3.203-py3-none-any.whl (1.1 MB)
  1.1/1.1 MB 6.4 MB/s eta 0:00:00
Downloading roboflow-1.2.9-py3-none-any.whl (88 kB)
  88.7/88.7 kB 3.7 MB/s eta 0:00:00
Downloading opencv_python_headless-4.10.0.84-cp37-abi3-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (49.9 MB)
  49.9/49.9 MB 20.7 MB/s eta 0:00:00
Downloading idna-3.7-py3-none-any.whl (66 kB)
  66.8/66.8 kB 4.6 MB/s eta 0:00:00
Downloading pi_heif-1.1.0-cp312-cp312-manylinux_2_27_x86_64.manylinux_2_28_x86_64.whl (1.4 MB)
  1.4/1.4 MB 79.1 MB/s eta 0:00:00
Downloading pillow_avif_plugin-1.5.2-cp312-cp312-manylinux_2_28_x86_64.whl (4.2 MB)
  4.2/4.2 MB 126.9 MB/s eta 0:00:00
Downloading ultralytics_thop-2.0.17-py3-none-any.whl (28 kB)
Downloading filetype-1.2.0-py2.py3-none-any.whl (19 kB)
Installing collected packages: pillow-avif-plugin, filetype, pi-heif, opencv-python-headless, idna, ultralytics-thop, roboflow, ultralytics
  Attempting uninstall: opencv-python-headless
    Found existing installation: opencv-python-headless 4.12.0.88
    Uninstalling opencv-python-headless-4.12.0.88:
      Successfully uninstalled opencv-python-headless-4.12.0.88
  Attempting uninstall: idna
    Found existing installation: idna 3.10
    Uninstalling idna-3.10:
      Successfully uninstalled idna-3.10
Successfully installed filetype-1.2.0 idna-3.7 opencv-python-headless-4.10.0.84 pi-heif-1.1.0 pillow-avif-plugin-1.5.2 roboflow-1.2.9 ultralytics-8.3.203 ultralytics-thop-2.0.17
```

```

1 from roboflow import Roboflow
2
3 rf = Roboflow(api_key="WcStc0iZ7FKdql9cjEb7")
4 project = rf.workspace("pothole-hps1b").project("lane_detection-b7yyn")
5 version = project.version(1)
6 dataset = version.download("yolov11")

loading Roboflow workspace...
loading Roboflow project...
Downloading Dataset Version Zip in Lane_detection-1 to yolov11:: 100%|██████████| 5583/5583 [00:00<00:00, 15284.89it/s]

Extracting Dataset Version Zip to Lane_detection-1 in yolov11:: 100%|██████████| 140/140 [00:00<00:00, 6359.14it/s]

```

```

1 !yolo task=segment mode=train model=yolo11s-seg.pt data=/content/Lane_detection-1/data.yaml epochs=30 imgs=640 plots=True

Creating new Ultralytics Settings v0.0.6 file ✓
View Ultralytics Settings with 'yolo settings' or at '/root/.config/Ultralytics/settings.json'
Update Settings with 'yolo settings key=value', i.e. 'yolo settings runs_dir=path/to/dir'. For help see https://docs.ultralytics.com/quickstart/#ultralytics-settings.
Downloading https://github.com/ultralytics/assets/releases/download/v8.3.0/yolo11s-seg.pt to 'yolo11s-seg.pt': 100% ━━━━━━━━ 19.7MB 239.3MB/s 0.1s
Ultralytics 8.3.203 🚀 Python-3.12.11 torch-2.8.0+cu126 CUDA:0 (Tesla T4, 15095MiB)
engine/trainer: agnostic_nms=False, amp=True, augment=False, auto_augment=randaugment, batch=16, bgr=0.0, box=7.5, cache=False, cfg=None, classes=None, close_mosaic=10, cls=0.5, compil
Downloading https://ultralytics.com/assets/Arial.ttf to '/root/.config/Ultralytics/Arial.ttf': 100% ━━━━━━━━ 755.1KB 24.2MB/s 0.0s
Overriding model.yaml nc=80 with nc=1

```

	from	n	params	module	arguments
0		-1	1	928 ultralytics.nn.modules.conv.Conv	[3, 32, 3, 2]
1		-1	1	18560 ultralytics.nn.modules.conv.Conv	[32, 64, 3, 2]
2		-1	1	26080 ultralytics.nn.modules.block.C3k2	[64, 128, 1, False, 0.25]
3		-1	1	147712 ultralytics.nn.modules.conv.Conv	[128, 128, 3, 2]
4		-1	1	103360 ultralytics.nn.modules.block.C3k2	[128, 256, 1, False, 0.25]
5		-1	1	590336 ultralytics.nn.modules.conv.Conv	[256, 256, 3, 2]
6		-1	1	346112 ultralytics.nn.modules.block.C3k2	[256, 256, 1, True]
7		-1	1	1180672 ultralytics.nn.modules.conv.Conv	[256, 512, 3, 2]
8		-1	1	1380352 ultralytics.nn.modules.block.C3k2	[512, 512, 1, True]
9		-1	1	656896 ultralytics.nn.modules.block.SPPF	[512, 512, 5]
10		-1	1	990976 ultralytics.nn.modules.block.C2PSA	[512, 512, 1]
11		-1	1	0 torch.nn.modules.upsampling.Upsample	[None, 2, 'nearest']
12		[-1, 6]	1	0 ultralytics.nn.modules.conv.Concat	[1]
13		-1	1	443776 ultralytics.nn.modules.block.C3k2	[768, 256, 1, False]
14		-1	1	0 torch.nn.modules.upsampling.Upsample	[None, 2, 'nearest']
15		[-1, 4]	1	0 ultralytics.nn.modules.conv.Concat	[1]
16		-1	1	127680 ultralytics.nn.modules.block.C3k2	[512, 128, 1, False]
17		-1	1	147712 ultralytics.nn.modules.conv.Conv	[128, 128, 3, 2]
18		[-1, 13]	1	0 ultralytics.nn.modules.conv.Concat	[1]
19		-1	1	345472 ultralytics.nn.modules.block.C3k2	[384, 256, 1, False]
20		-1	1	590336 ultralytics.nn.modules.conv.Conv	[256, 256, 3, 2]
21		[-1, 10]	1	0 ultralytics.nn.modules.conv.Concat	[1]
22		-1	1	1511424 ultralytics.nn.modules.block.C3k2	[768, 512, 1, True]
23		[16, 19, 22]	1	1474291 ultralytics.nn.modules.head.Segment	[1, 32, 128, [128, 256, 512]]

YOL011s-seg summary: 203 layers, 10,082,675 parameters, 10,082,659 gradients, 33.1 GFLOPs

```

Transferred 555/561 items from pretrained weights
Freezing layer 'model.23.dfl.conv.weight'
AMP: running Automatic Mixed Precision (AMP) checks...
Downloading https://github.com/ultralytics/assets/releases/download/v8.3.0/yolo11n.pt to 'yolo11n.pt': 100% ━━━━━━━━ 5.4MB 100.6MB/s 0.1s
AMP: checks passed ✓
train: Fast image access ✓ (ping: 0.0±0.0 ms, read: 1993.1±499.7 MB/s, size: 109.6 KB)
train: Scanning /content/Lane_detection-1/train/labels... 51 images, 0 backgrounds, 0 corrupt: 100% ━━━━━━━━ 51/51 2.1Kit/s 0.0s

```

train: New cache created: /content/Lane_detection-1/train/labels.cache
albumentations: Blur($p=0.01$, blur_limit=(3, 7)), MedianBlur($p=0.01$, blur_limit=(3, 7)), ToGray($p=0.01$, method='weighted_average', num_output_channels=3), CLAHE($p=0.01$, clip_limit=(1.0, 1.0))
val: Fast image access ✓ (ping: 0.0 ± 0.0 ms, read: 778.8 ± 510.0 MB/s, size: 58.9 KB)
val: Scanning /content/Lane_detection-1/valid/labels... 8 images, 0 backgrounds, 0 corrupt: 100% ————— 8/8 1.0Kit/s 0.0s
val: New cache created: /content/Lane_detection-1/valid/labels.cache
Plotting labels to /content/runs/segment/train/labels.jpg...
optimizer: 'optimizer=auto' found, ignoring 'lr0=0.01' and 'momentum=0.937' and determining best 'optimizer', 'lr0' and 'momentum' automatically...
optimizer: AdamW(lr=0.002, momentum=0.9) with parameter groups 90 weight(decay=0.0), 101 weight(decay=0.0005), 100 bias(decay=0.0)
Image sizes 640 train, 640 val
Using 2 dataloader workers
Logging results to /content/runs/segment/train
Starting training for 30 epochs...

Epoch	GPU_mem	box_loss	seg_loss	cls_loss	dfl_loss	Instances	Size
1/30	4.78G	1.784	6.007	4.721	2.01	15	640: 100% ————— 4/4 0.2it/s 21.5s

```

1 !yolo task=segment mode=train \
2 model=/content/runs/segment/train/weights/best.pt \
3 data=/content/Lane_detection-1/data.yaml \
4 epochs=10 \
5 imgsz=768 \
6 augment=True \
7 lr0=0.001 \
8 plots=True \
9 batch=8 \
10 project=/content/runs/segment/fine_tune \
11 name=lane_finetune

```

	all	8	15	0.656	0.8	0.698	0.404	0.497	0.6	0.454	0.259
Epoch	GPU_mem	box_loss	seg_loss	cls_loss	dfl_loss	Instances	Size				
2/10	3.79G	0.9324	1.514	1.173	1.532	6	768: 100% ————— 7/7 3.4it/s 2.0s				
	Class all	Images	Instances	Box(P)	R	mAP50	mAP50-95)	Mask(P)	R	mAP50	mAP50-95): 100% ————— 1/1 6.9it/s 0.1s
		8	15	0.515	0.667	0.543	0.303	0.423	0.533	0.29	0.178
Epoch	GPU_mem	box_loss	seg_loss	cls_loss	dfl_loss	Instances	Size				
3/10	3.79G	0.9011	1.724	1.19	1.588	4	768: 100% ————— 7/7 4.1it/s 1.7s				
	Class all	Images	Instances	Box(P)	R	mAP50	mAP50-95)	Mask(P)	R	mAP50	mAP50-95): 100% ————— 1/1 6.8it/s 0.1s
		8	15	0.629	0.8	0.682	0.388	0.513	0.4	0.273	0.123
Epoch	GPU_mem	box_loss	seg_loss	cls_loss	dfl_loss	Instances	Size				
4/10	3.79G	0.9374	1.786	1.202	1.599	3	768: 100% ————— 7/7 3.9it/s 1.8s				
	Class all	Images	Instances	Box(P)	R	mAP50	mAP50-95)	Mask(P)	R	mAP50	mAP50-95): 100% ————— 1/1 6.6it/s 0.2s
		8	15	0.449	0.762	0.574	0.406	0.784	0.4	0.472	0.222
Epoch	GPU_mem	box_loss	seg_loss	cls_loss	dfl_loss	Instances	Size				
5/10	3.81G	0.8841	1.343	1.1	1.591	4	768: 100% ————— 7/7 4.1it/s 1.7s				
	Class all	Images	Instances	Box(P)	R	mAP50	mAP50-95)	Mask(P)	R	mAP50	mAP50-95): 100% ————— 1/1 6.7it/s 0.1s
		8	15	0.615	0.8	0.71	0.498	0.645	0.467	0.499	0.304
Epoch	GPU_mem	box_loss	seg_loss	cls_loss	dfl_loss	Instances	Size				
6/10	3.81G	0.7241	1.133	0.9741	1.422	4	768: 100% ————— 7/7 3.9it/s 1.8s				
	Class all	Images	Instances	Box(P)	R	mAP50	mAP50-95)	Mask(P)	R	mAP50	mAP50-95): 100% ————— 1/1 4.5it/s 0.2s
		8	15	0.657	0.8	0.661	0.471	0.645	0.467	0.414	0.21
Epoch	GPU_mem	box_loss	seg_loss	cls_loss	dfl_loss	Instances	Size				
7/10	3.83G	0.7442	0.8931	0.9407	1.377	3	768: 100% ————— 7/7 3.4it/s 2.0s				
	Class	Images	Instances	Box(P)	R	mAP50	mAP50-95)	Mask(P)	R	mAP50	mAP50-95): 100% ————— 1/1 6.4it/s 0.2s

		all	8	15	0.538	0.667	0.636	0.454	0.651	0.533	0.458	0.274
Epoch	GPU_mem	box_loss	seg_loss	cls_loss	dfl_loss	Instances	Size					
8/10	3.85G	0.7021	0.7934	0.7887	1.359	3	768: 100%	7/7	4.1it/s	1.7s		
	Class all	Images	Instances	Box(P	R	mAP50	mAP50-95)	Mask(P	R	mAP50	mAP50-95): 100%	1/1 5.8it/s 0.2s
		8	15	0.775	0.459	0.539	0.347	0.461	0.533	0.402	0.243	
Epoch	GPU_mem	box_loss	seg_loss	cls_loss	dfl_loss	Instances	Size					
9/10	3.88G	0.6484	0.7297	0.8231	1.23	3	768: 100%	7/7	4.2it/s	1.7s		
	Class all	Images	Instances	Box(P	R	mAP50	mAP50-95)	Mask(P	R	mAP50	mAP50-95): 100%	1/1 6.0it/s 0.2s
		8	15	0.548	0.727	0.589	0.335	0.62	0.4	0.44	0.264	
Epoch	GPU_mem	box_loss	seg_loss	cls_loss	dfl_loss	Instances	Size					
10/10	3.92G	0.6753	0.6944	0.7426	1.321	5	768: 100%	7/7	4.2it/s	1.7s		
	Class all	Images	Instances	Box(P	R	mAP50	mAP50-95)	Mask(P	R	mAP50	mAP50-95): 100%	1/1 5.7it/s 0.2s
		8	15	0.579	0.733	0.615	0.35	0.449	0.6	0.473	0.281	

10 epochs completed in 0.013 hours.

Optimizer stripped from /content/runs/segment/fine_tune/lane_finetune/weights/last.pt, 20.5MB

Optimizer stripped from /content/runs/segment/fine_tune/lane_finetune/weights/best.pt, 20.5MB

Validating /content/runs/segment/fine_tune/lane_finetune/weights/best.pt...

Ultralytics 8.3.203 🚀 Python-3.12.11 torch-2.8.0+cu126 CUDA:0 (Tesla T4, 15095MiB)

YOLOv11s-seg summary (fused): 113 layers, 10,067,203 parameters, 0 gradients, 32.8 GFLOPs

WARNING ! Model does not support 'augment=True', reverting to single-scale prediction.

Class	Images	Instances	Box(P	R	mAP50	mAP50-95)	Mask(P	R	mAP50	mAP50-95): 100%	1/1 4.4it/s 0.2s
all	8	15	0.618	0.8	0.71	0.498	0.644	0.467	0.492	0.302	

Speed: 0.3ms preprocess, 11.2ms inference, 0.0ms loss, 2.5ms postprocess per image

```
1 !yolo task=segment mode=train model=/content/runs/segment/fine_tune/lane_finetune/weights/best.pt \
2 data=/content/Lane_detection-1/data.yaml epochs=10 imgsz=832 batch=4 \
3 name=lane_finetune_v2 augment=True plots=True
```

Ultralytics 8.3.203 🚀 Python-3.12.11 torch-2.8.0+cu126 CUDA:0 (Tesla T4, 15095MiB)

engine/trainer: agnostic_nms=False, amp=True, augment=True, auto_augment=randaugment, batch=4, bgr=0.0, box=7.5, cache=False, cfg=None, classes=None, close_mosaic=10, cls=0.5, compile=

	from	n	params	module	arguments
0		-1	1	928 ultralytics.nn.modules.conv.Conv	[3, 32, 3, 2]
1		-1	1	18560 ultralytics.nn.modules.conv.Conv	[32, 64, 3, 2]
2		-1	1	26080 ultralytics.nn.modules.block.C3k2	[64, 128, 1, False, 0.25]
3		-1	1	147712 ultralytics.nn.modules.conv.Conv	[128, 128, 3, 2]
4		-1	1	103360 ultralytics.nn.modules.block.C3k2	[128, 256, 1, False, 0.25]
5		-1	1	590336 ultralytics.nn.modules.conv.Conv	[256, 256, 3, 2]
6		-1	1	346112 ultralytics.nn.modules.block.C3k2	[256, 256, 1, True]
7		-1	1	1180672 ultralytics.nn.modules.conv.Conv	[256, 512, 3, 2]
8		-1	1	1380352 ultralytics.nn.modules.block.C3k2	[512, 512, 1, True]
9		-1	1	656896 ultralytics.nn.modules.block.SPPF	[512, 512, 5]
10		-1	1	990976 ultralytics.nn.modules.block.C2PSA	[512, 512, 1]
11		-1	1	0 torch.nn.modules.upsampling.Upsample	[None, 2, 'nearest']
12		[-1, 6]	1	0 ultralytics.nn.modules.conv.Concat	[1]
13		-1	1	443776 ultralytics.nn.modules.block.C3k2	[768, 256, 1, False]
14		-1	1	0 torch.nn.modules.upsampling.Upsample	[None, 2, 'nearest']
15		[-1, 4]	1	0 ultralytics.nn.modules.conv.Concat	[1]
16		-1	1	127680 ultralytics.nn.modules.block.C3k2	[512, 128, 1, False]
17		-1	1	147712 ultralytics.nn.modules.conv.Conv	[128, 128, 3, 2]
18		[-1, 13]	1	0 ultralytics.nn.modules.conv.Concat	[1]
19		-1	1	345472 ultralytics.nn.modules.block.C3k2	[384, 256, 1, False]
20		-1	1	590336 ultralytics.nn.modules.conv.Conv	[256, 256, 3, 2]
21		[-1, 10]	1	0 ultralytics.nn.modules.conv.Concat	[1]

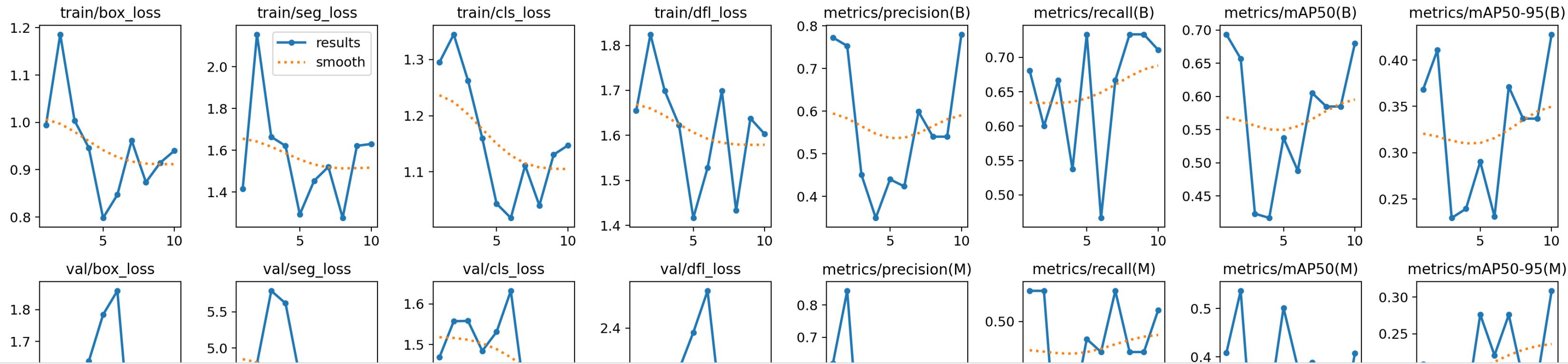
```

22      -1 1 1511424 ultralytics.nn.modules.block.C3k2 [768, 512, 1, True]
23      [16, 19, 22] 1 1474291 ultralytics.nn.modules.head.Segment [1, 32, 128, [128, 256, 512]]
YOL011s-seg summary: 203 layers, 10,082,675 parameters, 10,082,659 gradients, 33.1 GFLOPs

Transferred 561/561 items from pretrained weights
Freezing layer 'model.23.dfl.conv.weight'
AMP: running Automatic Mixed Precision (AMP) checks...
AMP: checks passed ✅
train: Fast image access ✅ (ping: 0.0±0.0 ms, read: 2445.0±878.2 MB/s, size: 109.6 KB)
train: Scanning /content/Lane_detection-1/train/labels.cache... 51 images, 0 backgrounds, 0 corrupt: 100% ━━━━━━━━ 51/51 764.0Kit/s 0.0s
albumentations: Blur(p=0.01, blur_limit=(3, 7)), MedianBlur(p=0.01, blur_limit=(3, 7)), ToGray(p=0.01, method='weighted_average', num_output_channels=3), CLAHE(p=0.01, clip_limit=(1.0,
val: Fast image access ✅ (ping: 0.0±0.0 ms, read: 972.2±531.1 MB/s, size: 58.9 KB)
val: Scanning /content/Lane_detection-1/valid/labels.cache... 8 images, 0 backgrounds, 0 corrupt: 100% ━━━━━━━━ 8/8 61.3Kit/s 0.0s
Plotting labels to /content/runs/segment/lane_finetune_v2/labels.jpg...
optimizer: 'optimizer=auto' found, ignoring 'lr0=0.01' and 'momentum=0.937' and determining best 'optimizer', 'lr0' and 'momentum' automatically...
optimizer: AdamW(lr=0.002, momentum=0.9) with parameter groups 90 weight(decay=0.0), 101 weight(decay=0.0005), 100 bias(decay=0.0)
Image sizes 832 train, 832 val
Using 2 dataloader workers
Logging results to /content/runs/segment/lane_finetune_v2
Starting training for 10 epochs...
Closing dataloader mosaic
albumentations: Blur(p=0.01, blur_limit=(3, 7)), MedianBlur(p=0.01, blur_limit=(3, 7)), ToGray(p=0.01, method='weighted_average', num_output_channels=3), CLAHE(p=0.01, clip_limit=(1.0,
```

Epoch	GPU_mem	box_loss	seg_loss	cls_loss	dfl_loss	Instances	Size				
1/10	2.31G	0.9941	1.415	1.295	1.655	3	832: 100% ━━━━━━━━ 13/13 0.6it/s 21.1s				
	Class all	Images 8	Instances 15	Box(P 0.773	R 0.681	mAP50 0.694	mAP50-95) 0.368	Mask(P 0.619	R 0.533	mAP50 0.408	mAP50-95): 100% ━━━━━━━━ 1/1 0.3it/s 2.9s
Epoch	GPU_mem	box_loss	seg_loss	cls_loss	dfl_loss	Instances	Size				
2/10	2.85G	1.186	2.156	1.345	1.824	9	832: 100% ━━━━━━━━ 13/13 5.5it/s 2.4s				
	Class all	Images 8	Instances 15	Box(P 0.753	R 0.6	mAP50 0.657	mAP50-95) 0.411	Mask(P 0.844	R 0.533	mAP50 0.536	mAP50-95): 100% ━━━━━━━━ 1/1 6.0it/s 0.2s

```
1 from IPython.display import Image
2
3 Image("/content/runs/segment/lane_finetune_v2/results.png")
```



```
1 from ultralytics import YOLO
2
3 model = YOLO("/content/runs/segment/fine_tune/lane_finetune/weights/best.pt")
4 model.train(
5     data="/content/Lane_detection-1/data.yaml",
6     epochs=25,
7     imgsz=832,
8     batch=4,
9     optimizer="AdamW",
10    lr0=0.0015,
11    lrf=0.03,
12    momentum=0.9,
13    weight_decay=0.0003,
14    box=0.08,
15    cls=0.5,
16    cos_lr=True,
17    freeze=10,
18    plots=True,
19    name="lane_finetune_v3"
20 )
```

Ultralytics 8.3.203 🚀 Python-3.12.11 torch-2.8.0+cu126 CUDA:0 (Tesla T4, 15095MiB)

engine/trainer: agnostic_nms=False, amp=True, augment=False, auto_augment=randaugment, batch=4, bgr=0.0, box=0.08, cache=False, cfg=None, classes=None, close_mosaic=10, cls=0.5, compil

	from	n	params	module	arguments
0	-1	1	928	ultralytics.nn.modules.conv.Conv	[3, 32, 3, 2]
1	-1	1	18560	ultralytics.nn.modules.conv.Conv	[32, 64, 3, 2]
2	-1	1	26080	ultralytics.nn.modules.block.C3k2	[64, 128, 1, False, 0.25]
3	-1	1	147712	ultralytics.nn.modules.conv.Conv	[128, 128, 3, 2]
4	-1	1	103360	ultralytics.nn.modules.block.C3k2	[128, 256, 1, False, 0.25]

```

5      -1 1    590336 ultralytics.nn.modules.conv.Conv      [256, 256, 3, 2]
6      -1 1    346112 ultralytics.nn.modules.block.C3k2   [256, 256, 1, True]
7      -1 1    1180672 ultralytics.nn.modules.conv.Conv    [256, 512, 3, 2]
8      -1 1    1380352 ultralytics.nn.modules.block.C3k2   [512, 512, 1, True]
9      -1 1    656896 ultralytics.nn.modules.block.SPPF    [512, 512, 5]
10     -1 1    990976 ultralytics.nn.modules.block.C2PSA   [512, 512, 1]
11     -1 1    0 torch.nn.modules.upsampling.Upsample      [None, 2, 'nearest']
12     [-1, 6] 1    0 ultralytics.nn.modules.conv.Concat   [1]
13     -1 1    443776 ultralytics.nn.modules.block.C3k2   [768, 256, 1, False]
14     -1 1    0 torch.nn.modules.upsampling.Upsample      [None, 2, 'nearest']
15     [-1, 4] 1    0 ultralytics.nn.modules.conv.Concat   [1]
16     -1 1    127680 ultralytics.nn.modules.block.C3k2   [512, 128, 1, False]
17     -1 1    147712 ultralytics.nn.modules.conv.Conv    [128, 128, 3, 2]
18     [-1, 13] 1    0 ultralytics.nn.modules.conv.Concat   [1]
19     -1 1    345472 ultralytics.nn.modules.block.C3k2   [384, 256, 1, False]
20     -1 1    590336 ultralytics.nn.modules.conv.Conv    [256, 256, 3, 2]
21     [-1, 10] 1    0 ultralytics.nn.modules.conv.Concat   [1]
22     -1 1    1511424 ultralytics.nn.modules.block.C3k2  [768, 512, 1, True]
23     [16, 19, 22] 1    1474291 ultralytics.nn.modules.head.Segment [1, 32, 128, [128, 256, 512]]
YOL011s-seg summary: 203 layers, 10,082,675 parameters, 10,082,659 gradients, 33.1 GFLOPs

```

```

Transferred 561/561 items from pretrained weights
Freezing layer 'model.0.conv.weight'
Freezing layer 'model.0.bn.weight'
Freezing layer 'model.0.bn.bias'
Freezing layer 'model.1.conv.weight'
Freezing layer 'model.1.bn.weight'
Freezing layer 'model.1.bn.bias'
Freezing layer 'model.2.cv1.conv.weight'
Freezing layer 'model.2.cv1.bn.weight'
Freezing layer 'model.2.cv1.bn.bias'
Freezing layer 'model.2.cv2.conv.weight'
Freezing layer 'model.2.cv2.bn.weight'
Freezing layer 'model.2.cv2.bn.bias'
Freezing layer 'model.2.m.0.cv1.conv.weight'
Freezing layer 'model.2.m.0.cv1.bn.weight'
Freezing layer 'model.2.m.0.cv1.bn.bias'
Freezing layer 'model.2.m.0.cv2.conv.weight'
Freezing layer 'model.2.m.0.cv2.bn.weight'
Freezing layer 'model.2.m.0.cv2.bn.bias'
Freezing layer 'model.3.conv.weight'
Freezing layer 'model.3.bn.weight'
Freezing layer 'model.3.bn.bias'
Freezing layer 'model.4.cv1.conv.weight'
Freezing layer 'model.4.cv1.bn.weight'
Freezing layer 'model.4.cv1.bn.bias'
Freezing layer 'model.4.cv2.conv.weight'
Freezing layer 'model.4.cv2.bn.weight'
Freezing layer 'model.4.cv2.bn.bias'

```

```

1 from ultralytics import YOLO
2
3 model = YOLO('/content/runs/segment/fine_tune/lane_finetune/weights/best.pt')
4
5 model.train(
6   task='segment',
7   data='/content/Lane_detection-1/data.yaml',
8   epochs=25,

```

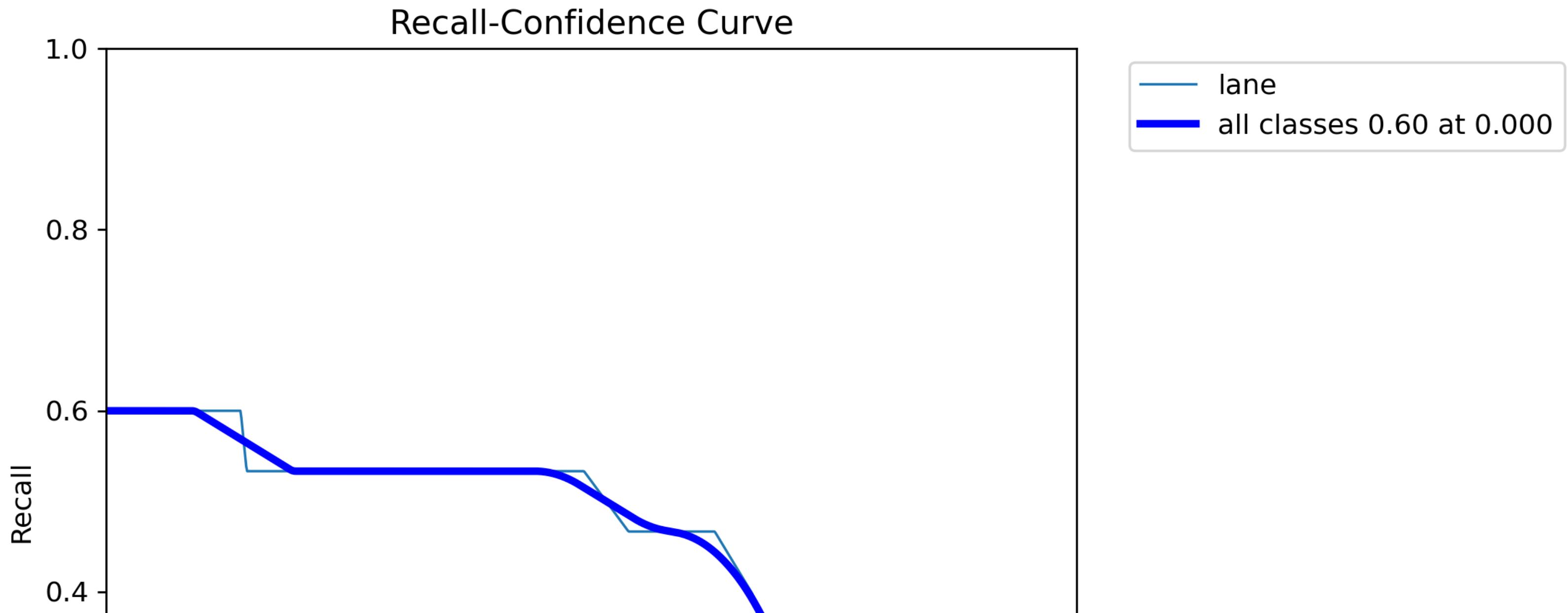
```

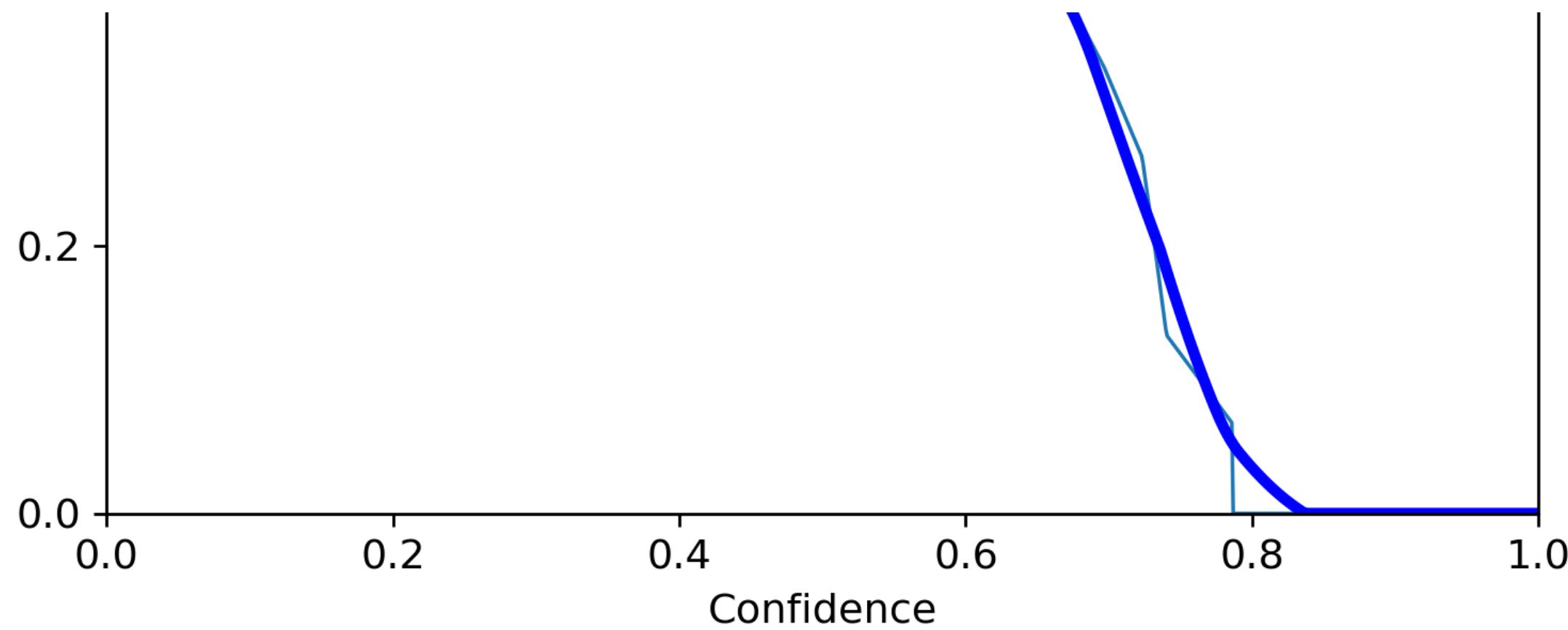
9     imgsz=832,
10    batch=4,
11    optimizer='AdamW',
12    lr0=0.0015,
13    lrf=0.03,
14    momentum=0.9,
15    weight_decay=0.0003,
16    box=0.08,
17    cls=0.5,
18    cos_lr=True,
19    freeze=10,
20    plots=True,
21    name='lane_finetune_v3'
22 )

```

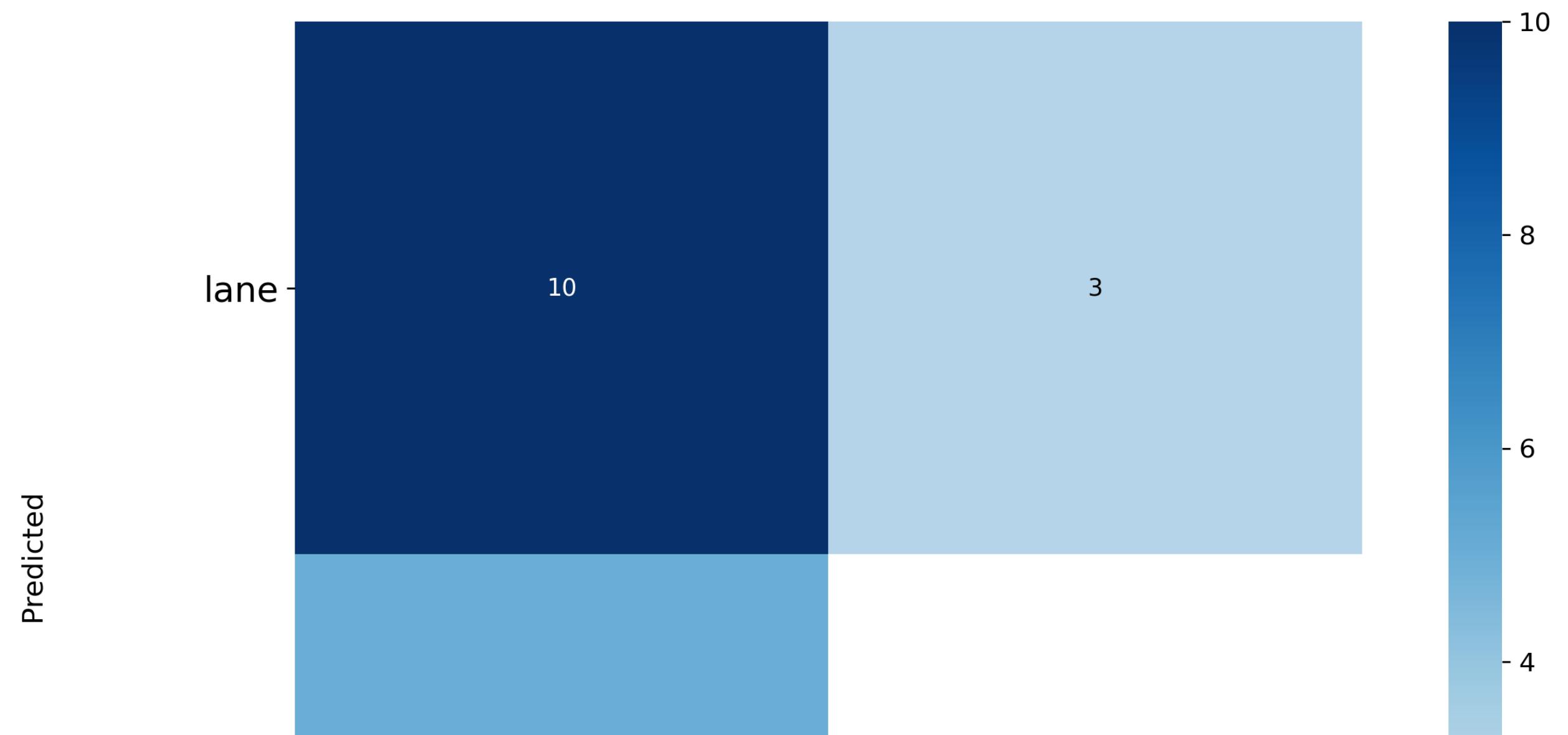
0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,
0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,
0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,
0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,
0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,
0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,	0.53333,
0.52707,	0.52562,	0.52417,	0.52271,	0.52126,	0.5198,	0.51835,	0.5169,	0.51544,	0.51399,	0.53289,	0.53144,	0.52998,	0.52853,	
0.49363,	0.49218,	0.49073,	0.48927,	0.48782,	0.48636,	0.48491,	0.48346,	0.482,	0.48055,	0.49945,	0.498,	0.49654,	0.49509,	
0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	
0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	
0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	
0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	
0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	
0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	
0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	
0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	
0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	0.46667,	
0.45305,	0.45127,	0.4495,	0.44772,	0.44595,	0.44417,	0.4424,	0.44062,	0.43885,	0.43707,	0.46015,	0.45837,	0.4566,	0.45482,	
0.41222,	0.41045,	0.40867,	0.4069,	0.40512,	0.40335,	0.40157,	0.39976,	0.39769,	0.39562,	0.41932,	0.41755,	0.41577,	0.414,	
0.36663,	0.36456,	0.36249,	0.36042,	0.35835,	0.35628,	0.35421,	0.35214,	0.35007,	0.348,	0.37492,	0.37284,	0.37077,	0.3687,	
0.31582,	0.31329,	0.31076,	0.30823,	0.3057,	0.30317,	0.30064,	0.2981,	0.29557,	0.29304,	0.26773,	0.26227,	0.25468,	0.24709,	
0.2395,	0.2319,	0.22431,	0.21672,	0.20912,	0.20153,	0.19358,	0.18554,	0.1775,	0.16946,	0.12541,	0.12397,	0.12254,	0.1211,	
0.11966,	0.11822,	0.11678,	0.11534,	0.1139,	0.11246,	0.11103,	0.10959,	0.10815,	0.10671,	0.092324,	0.090885,	0.089447,	0.088008,	
0.086569,	0.085131,	0.083692,	0.082253,	0.080815,	0.079376,	0.077938,	0.076499,	0.07506,	0.073622,	0.092324,	0.090885,	0.089447,	0.088008,	
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	

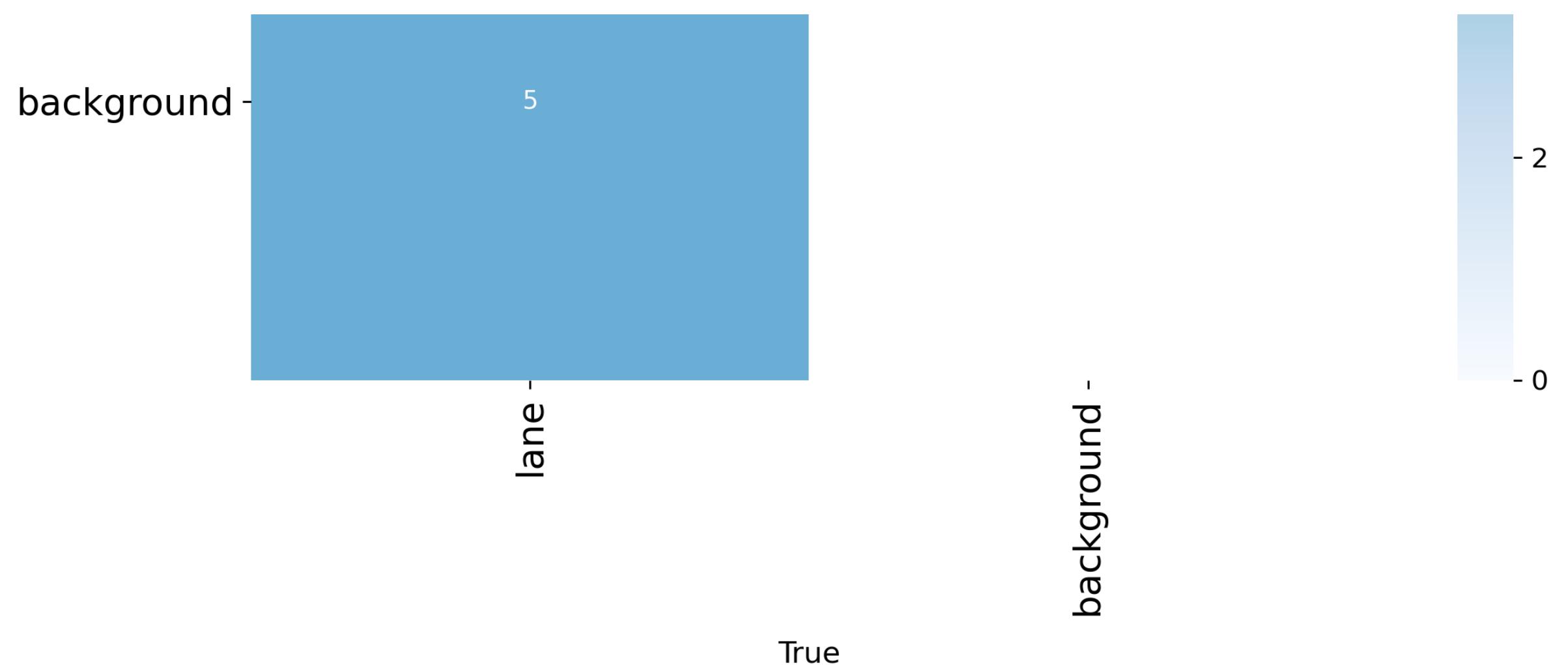
```
1 import os  
2 from IPython.display import Image, display  
3  
4 plot_dir = '/content/runs/segment/lane_finetune_v3/'  
5 for file in os.listdir(plot_dir):  
6     if file.endswith('.png') or file.endswith('.jpg'):  
7         display(Image(os.path.join(plot_dir, file)))
```





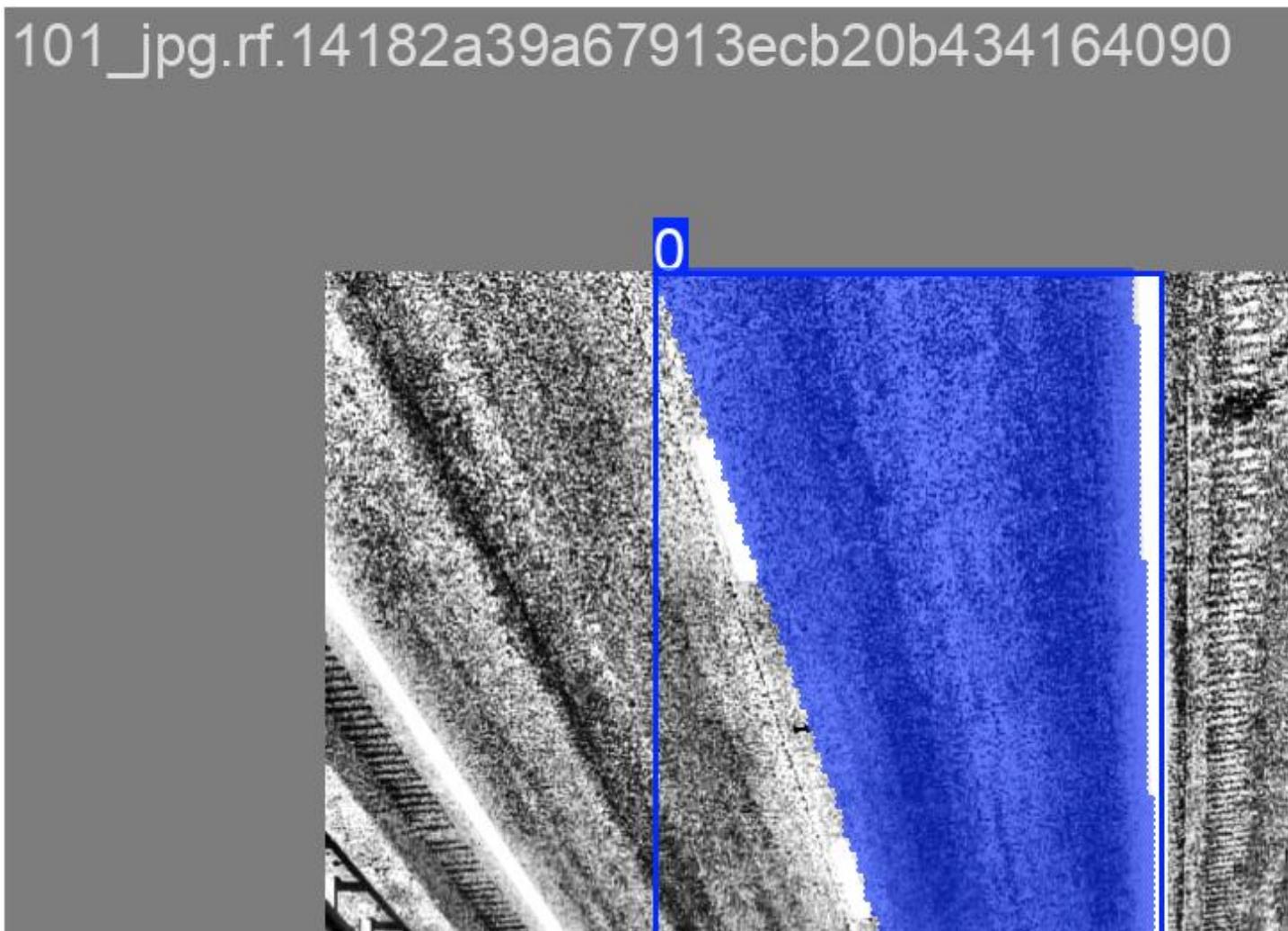
Confusion Matrix



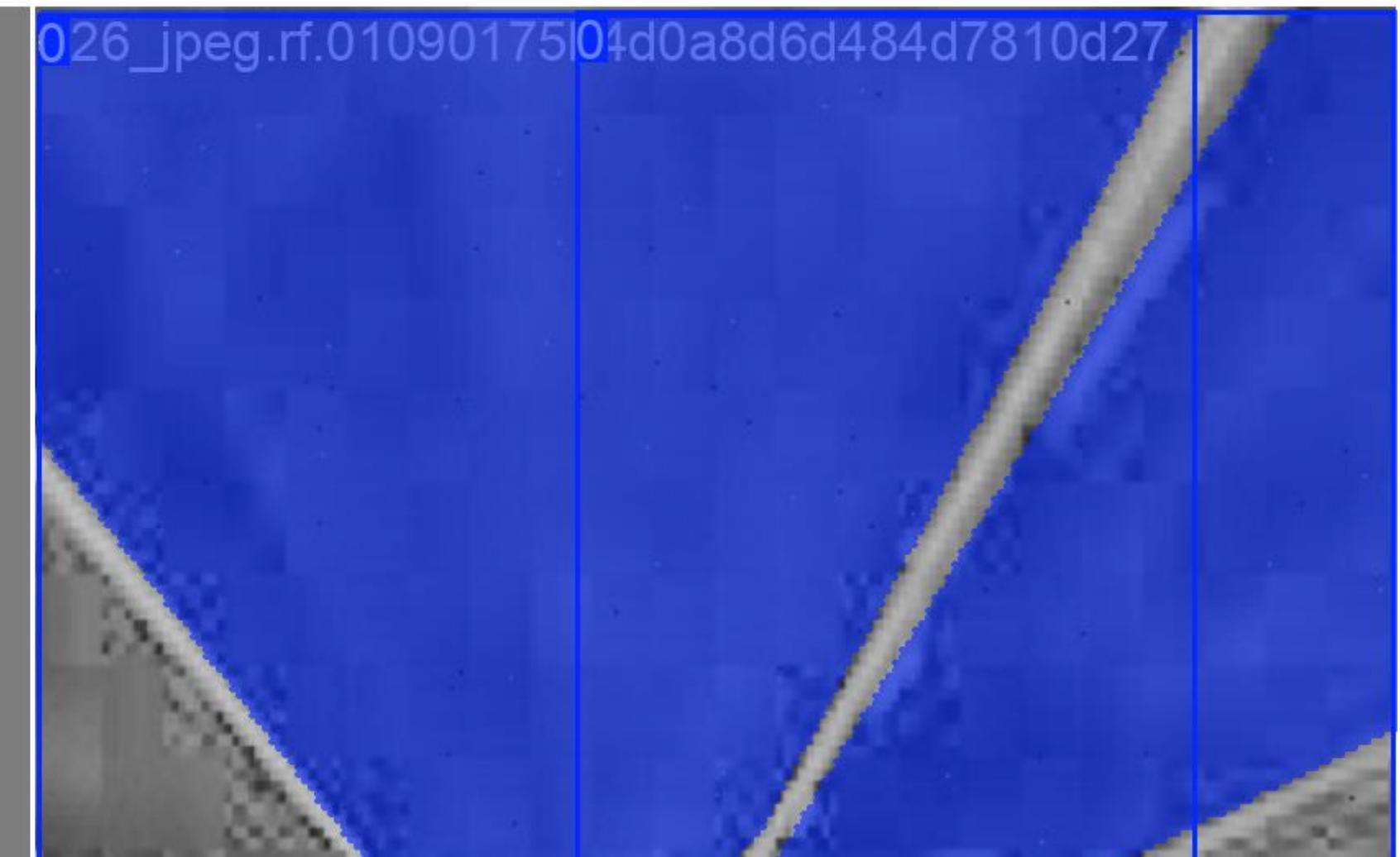


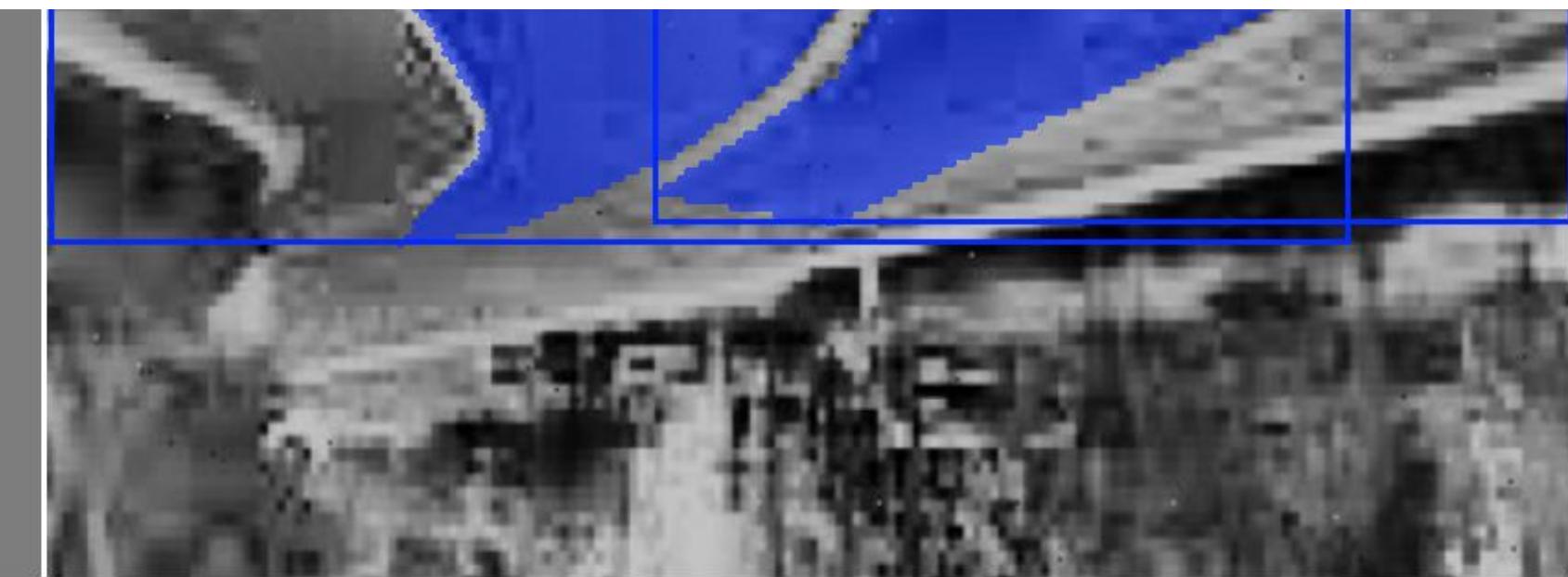
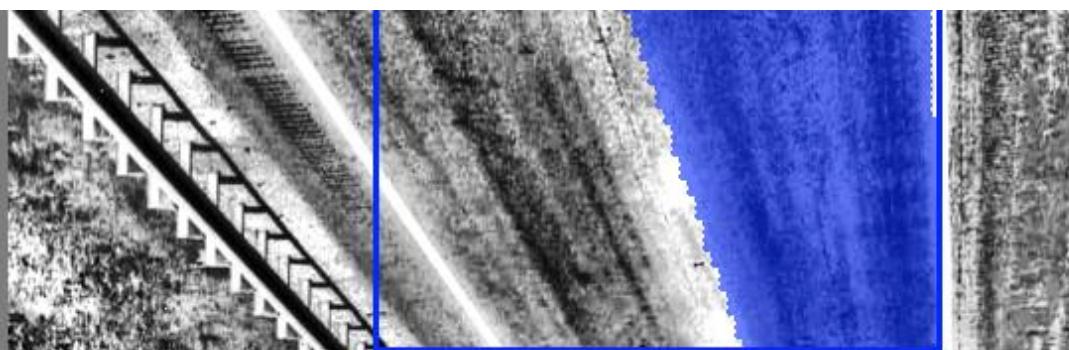
True

101_jpg.rf.14182a39a67913ecb20b434164090

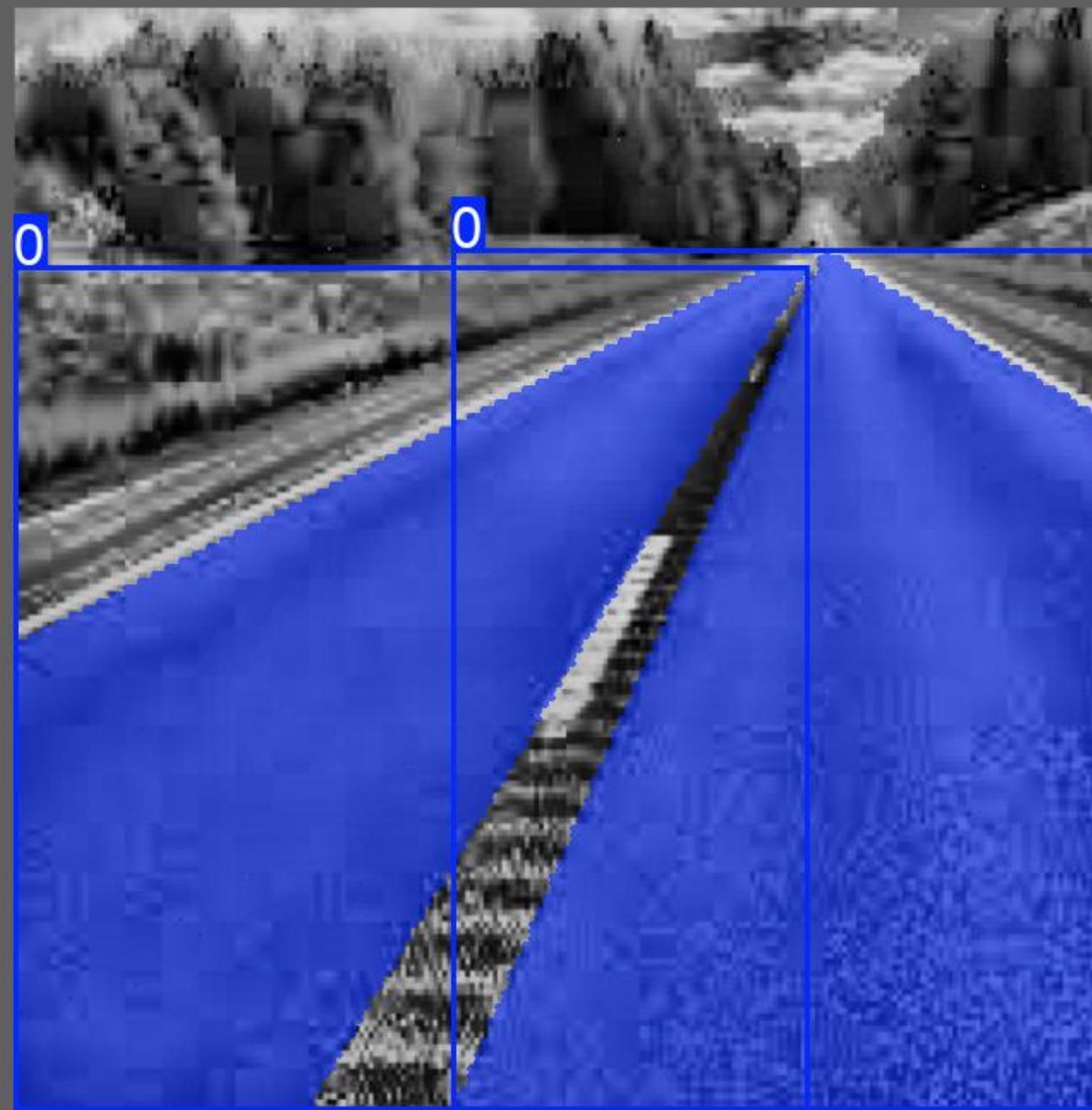


026_jpeg.rf.01090175|04d0a8d6d484d7810d27

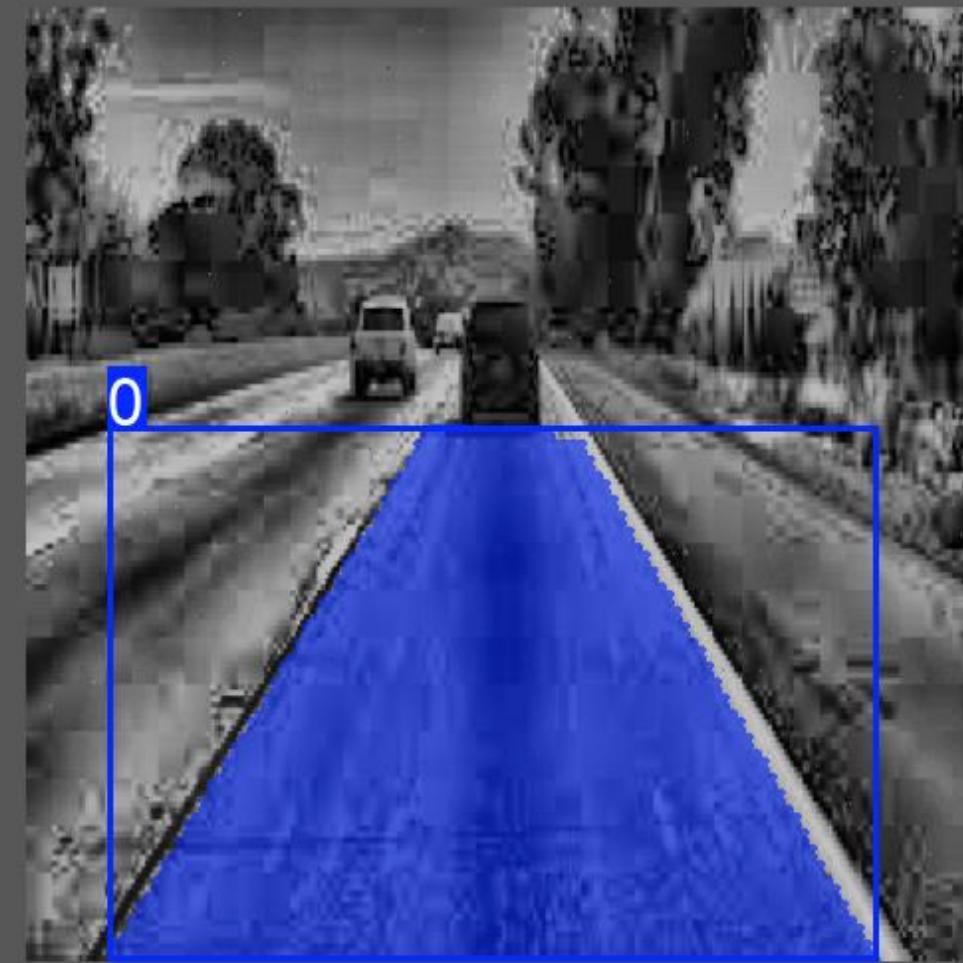


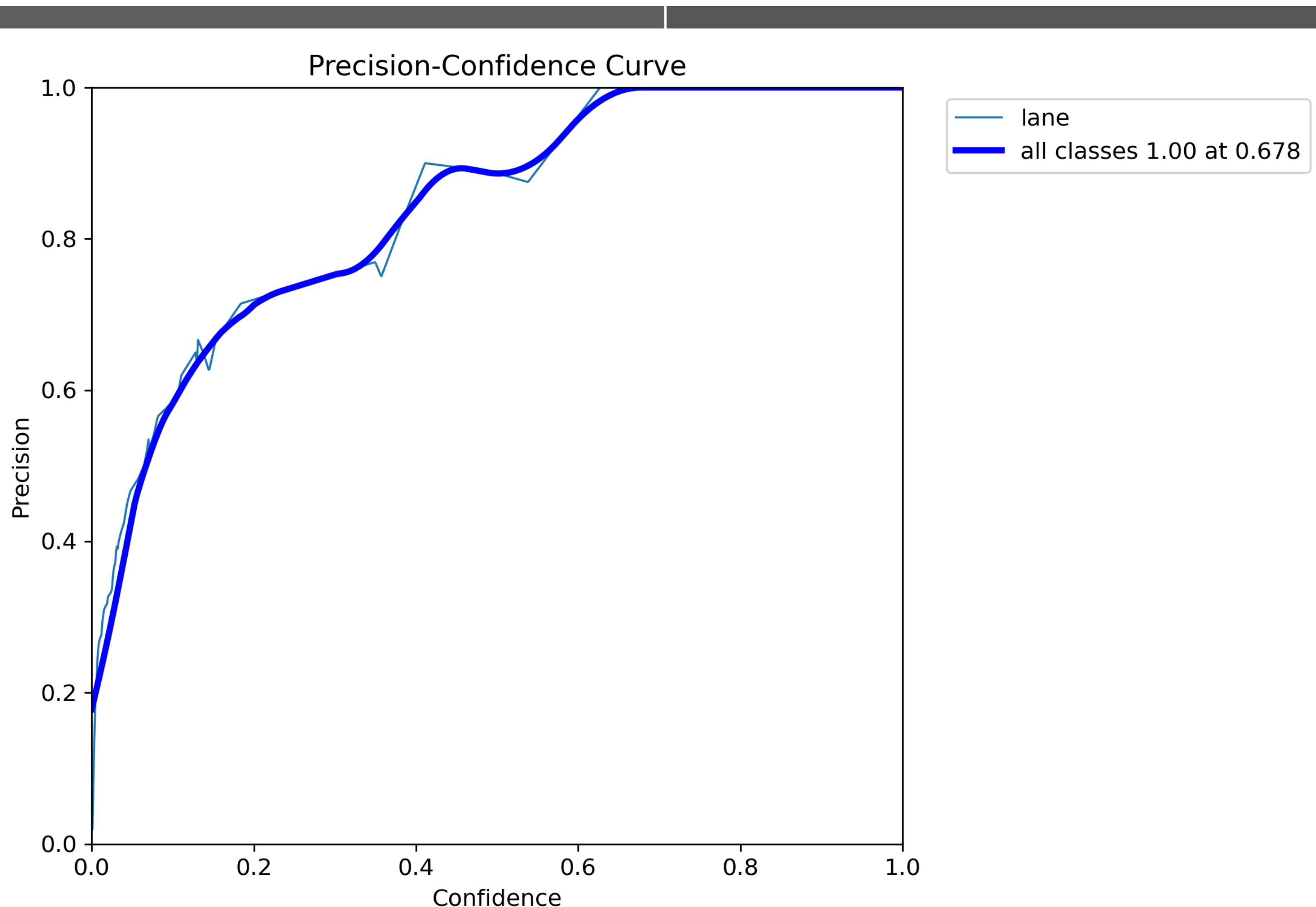


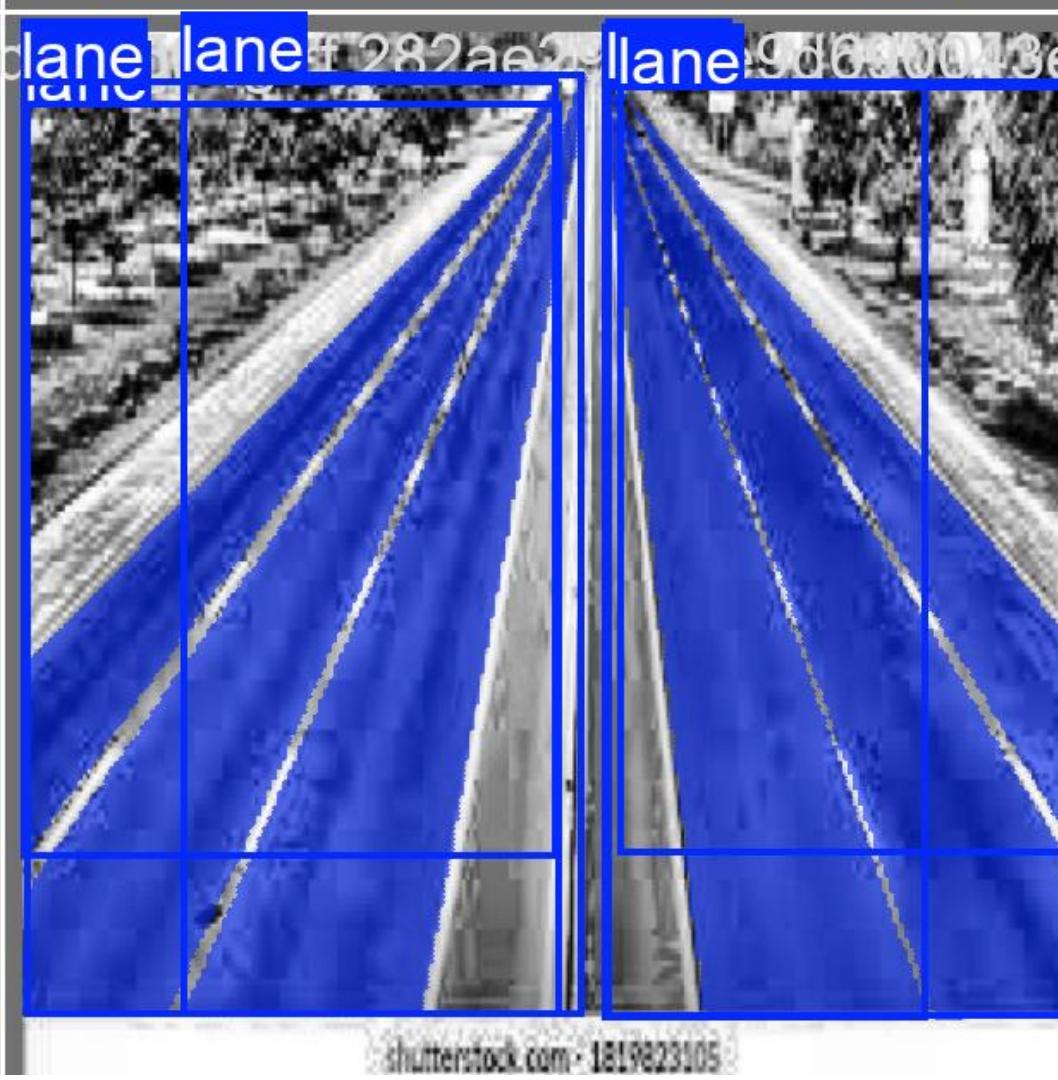
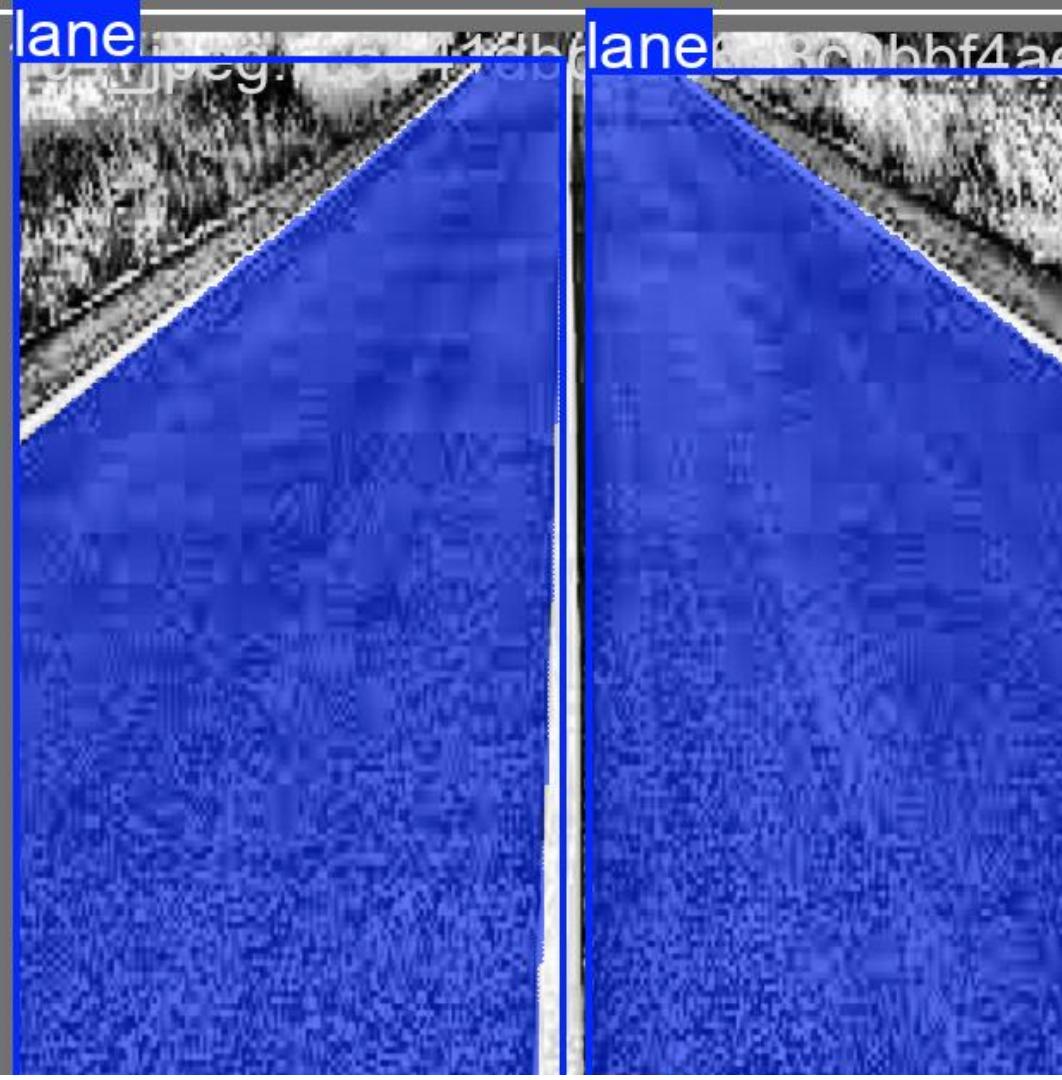
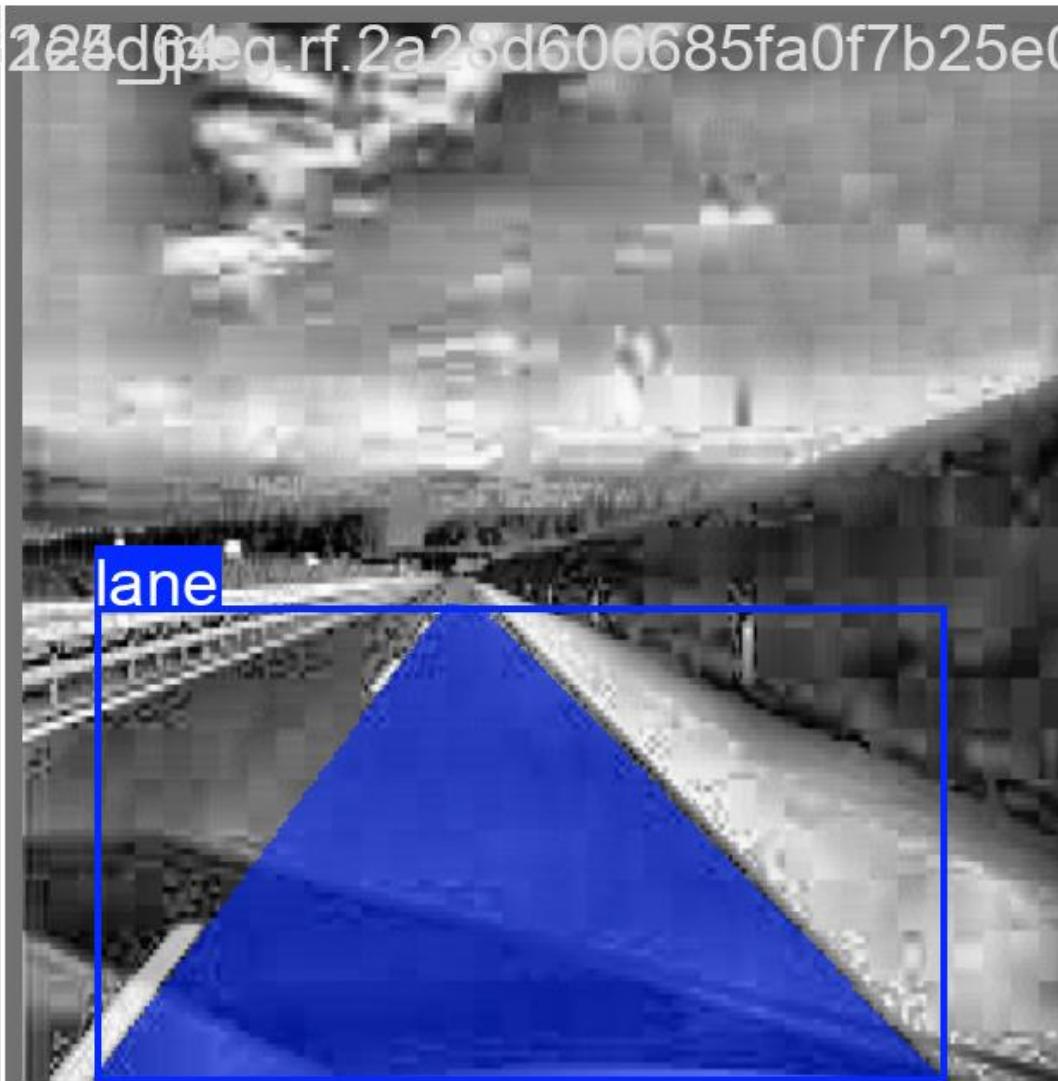
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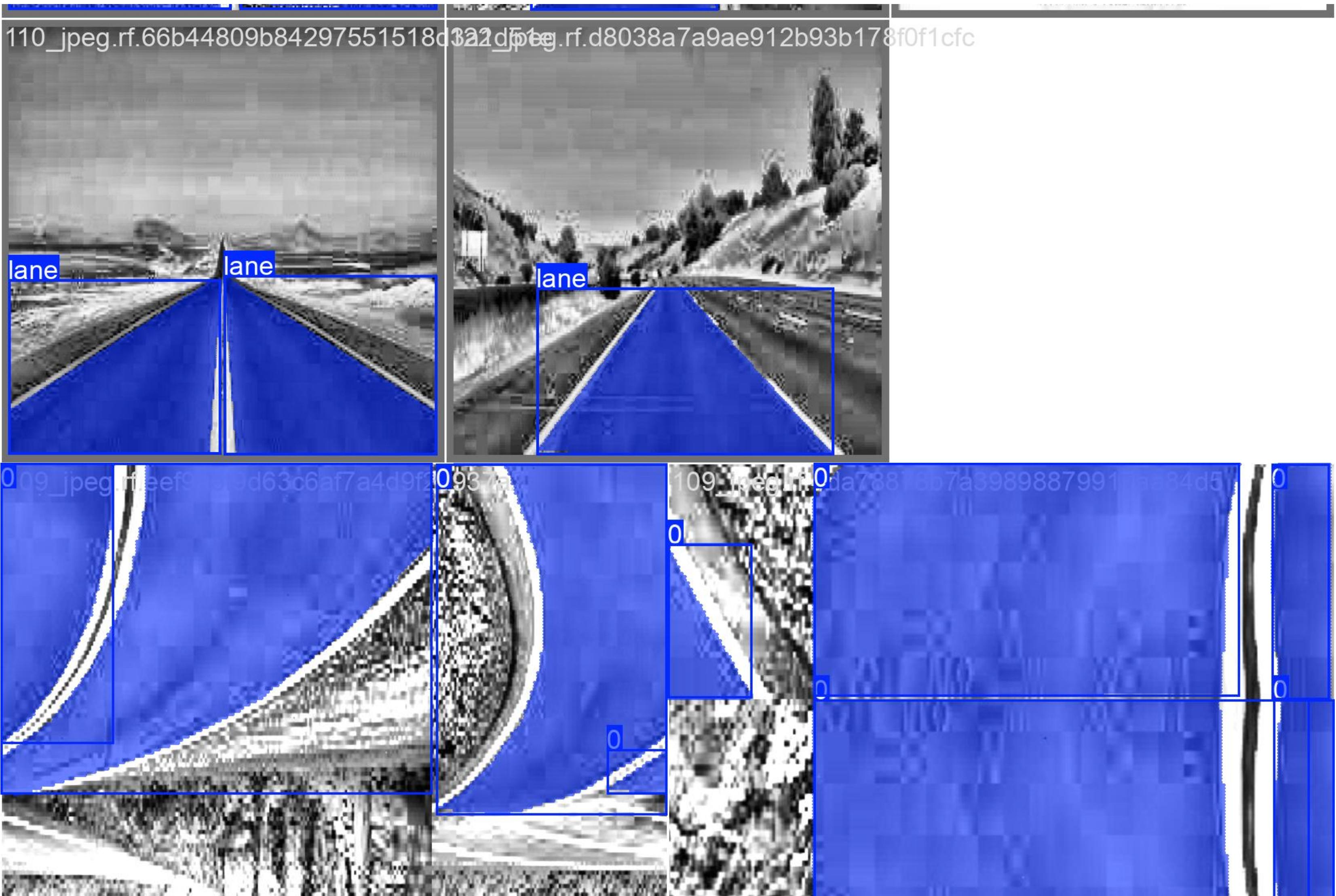
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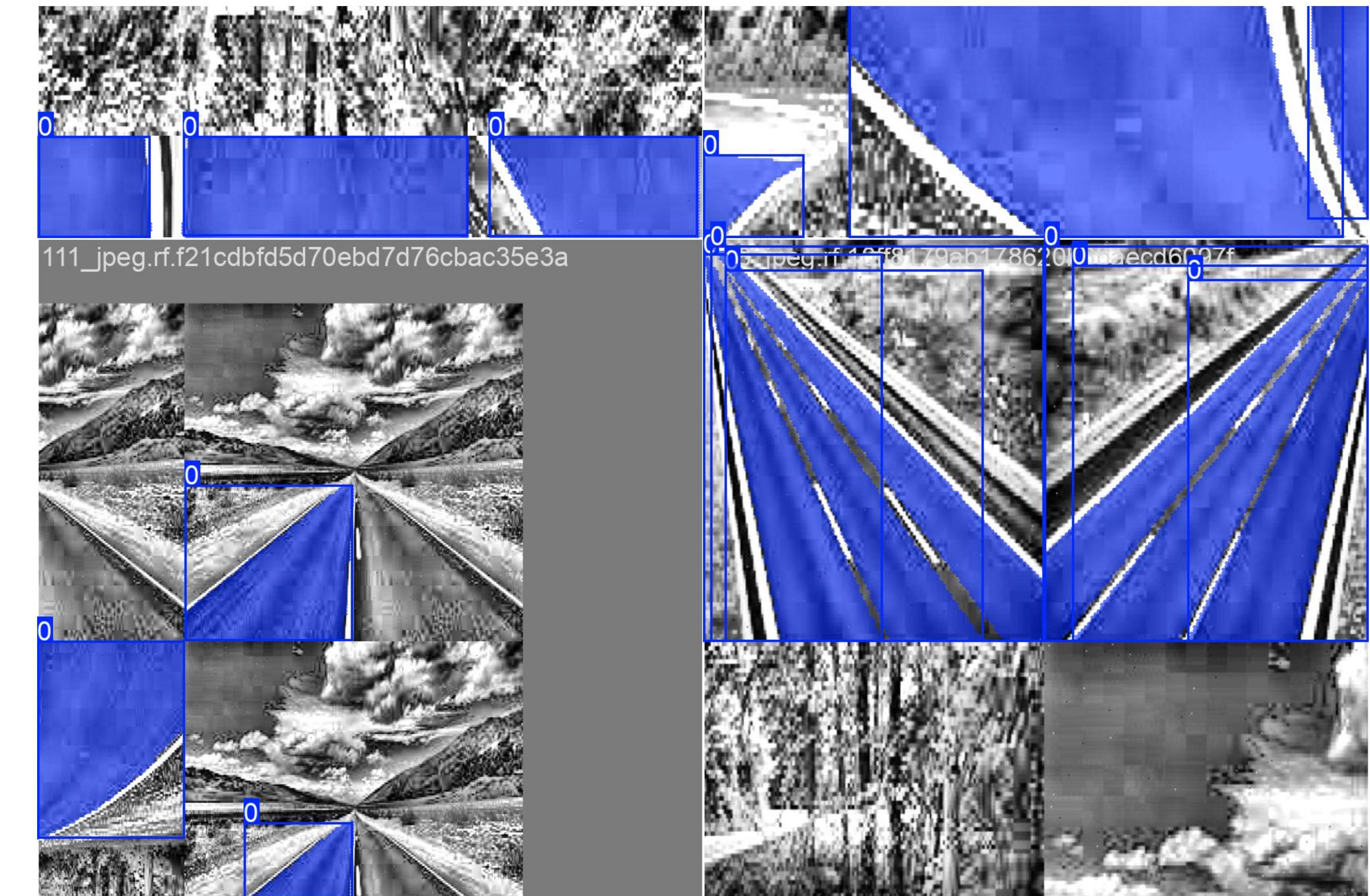


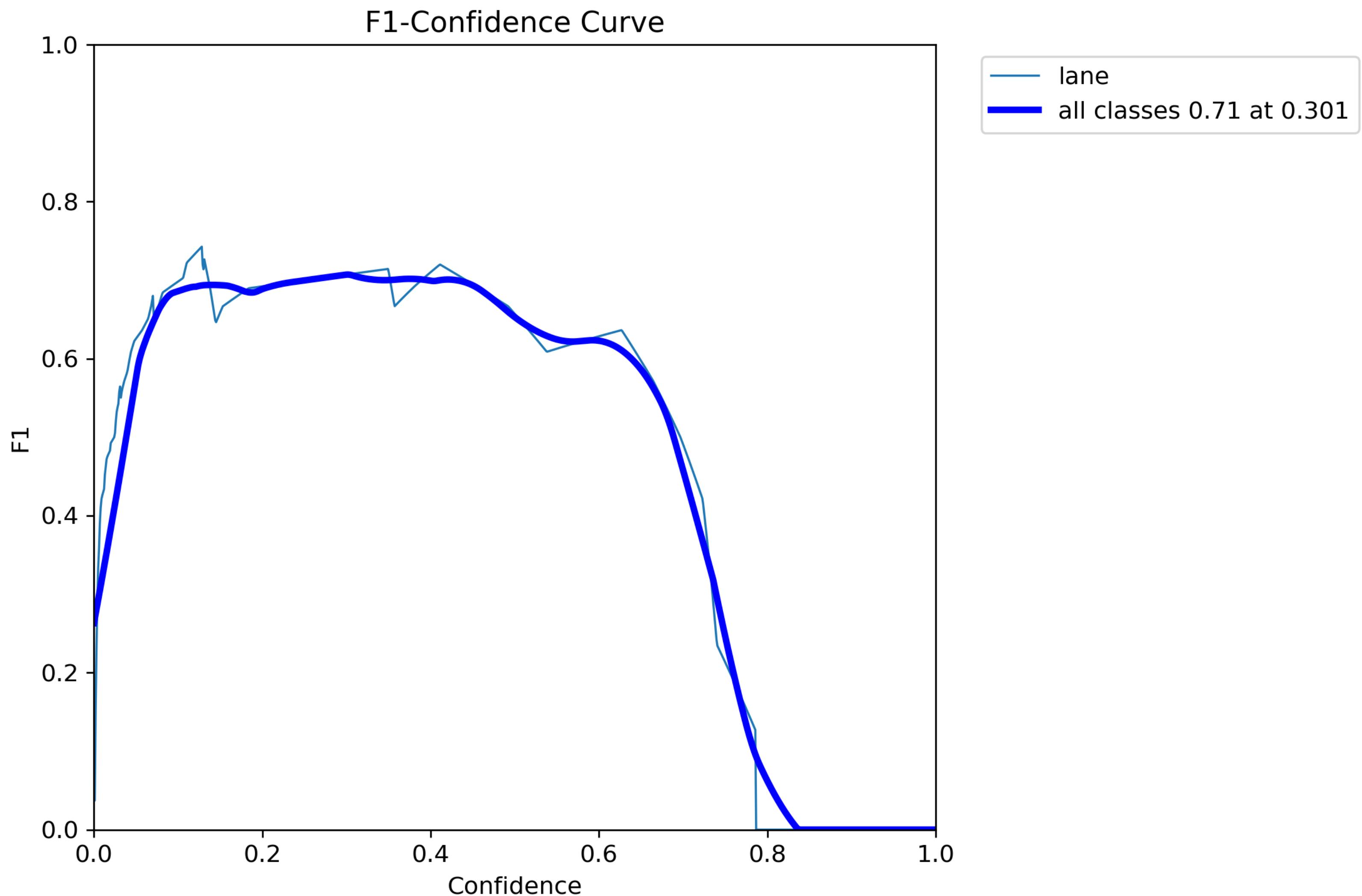


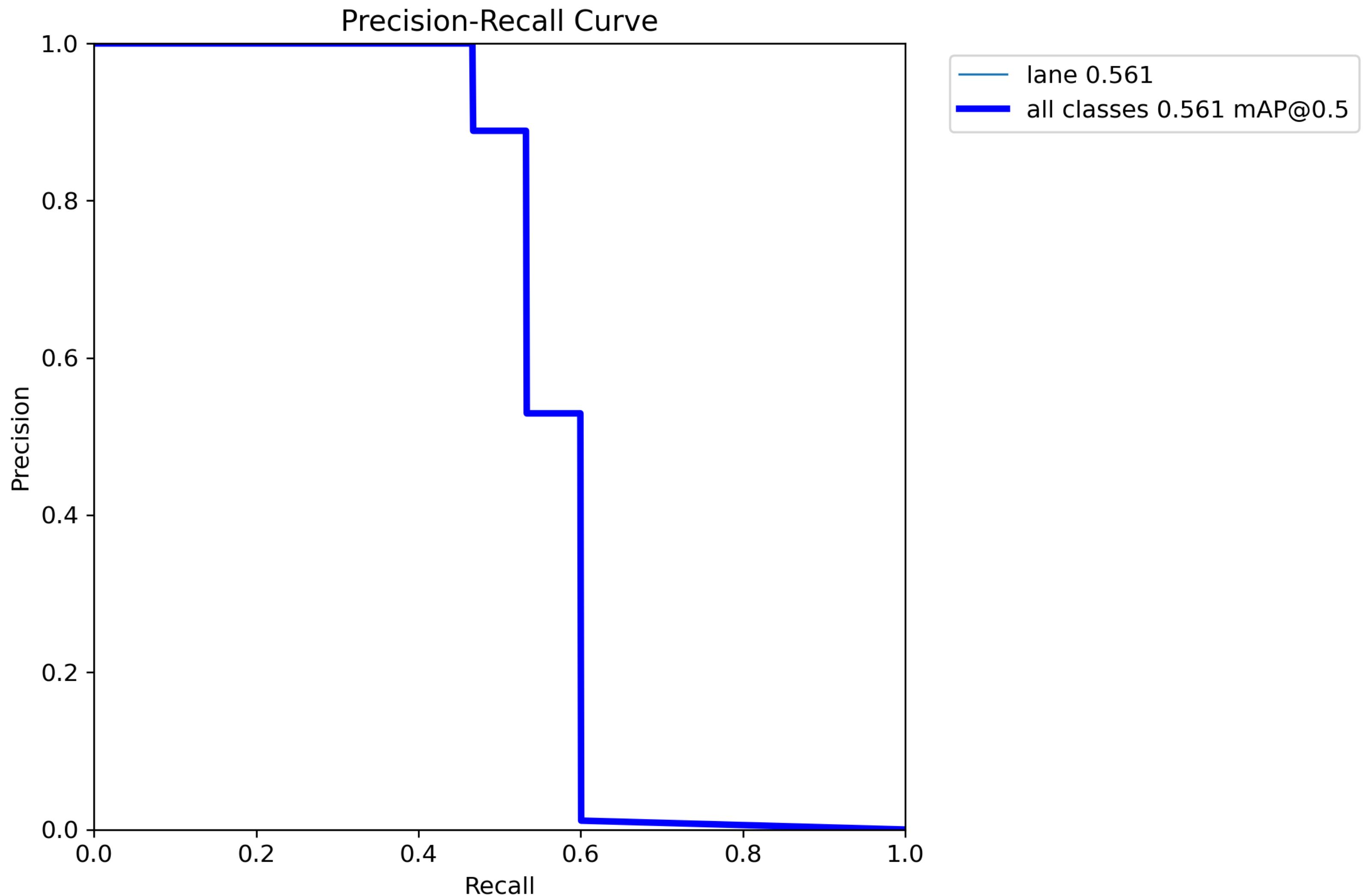


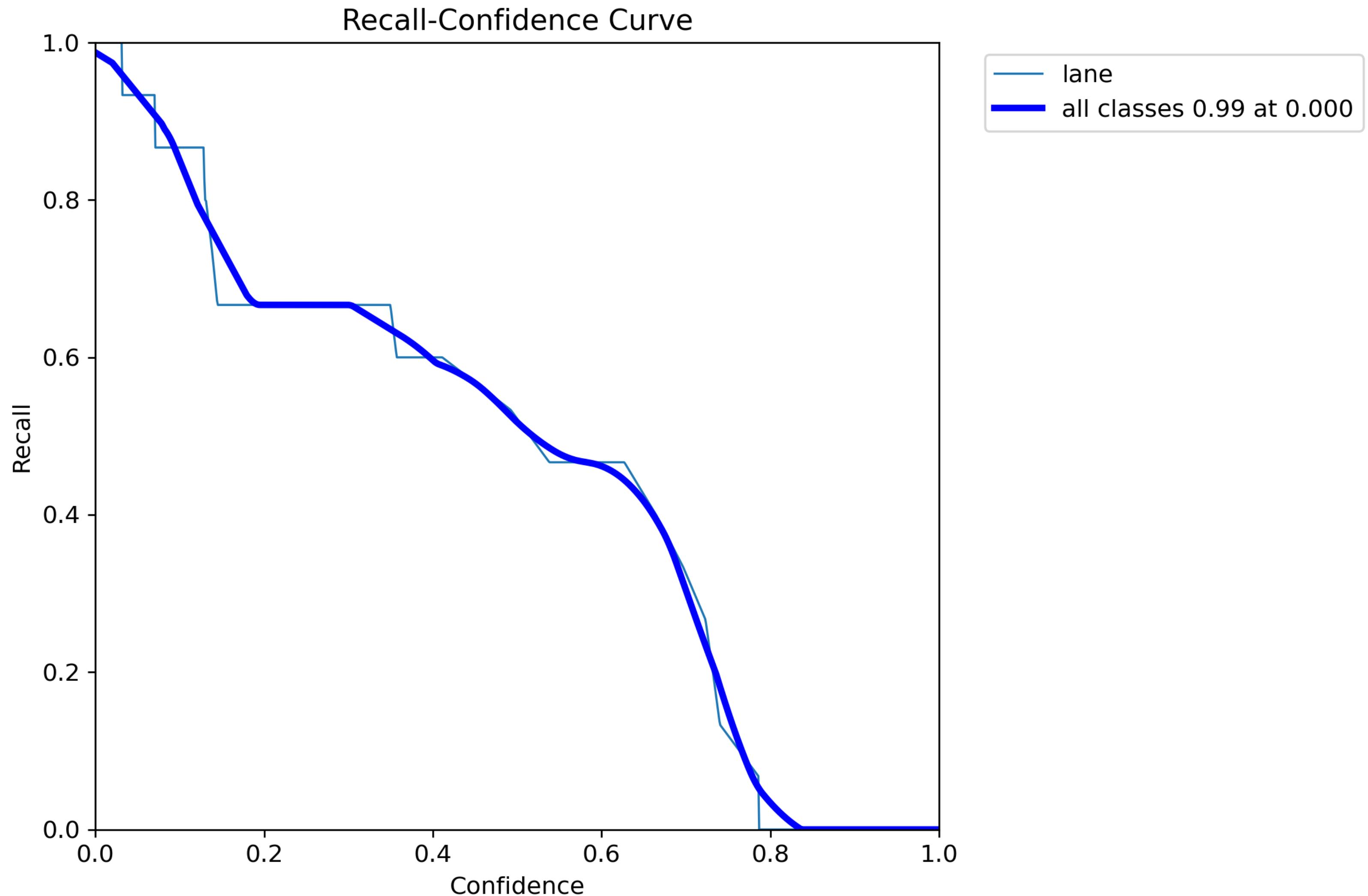
shutterstock.com - 1819823105

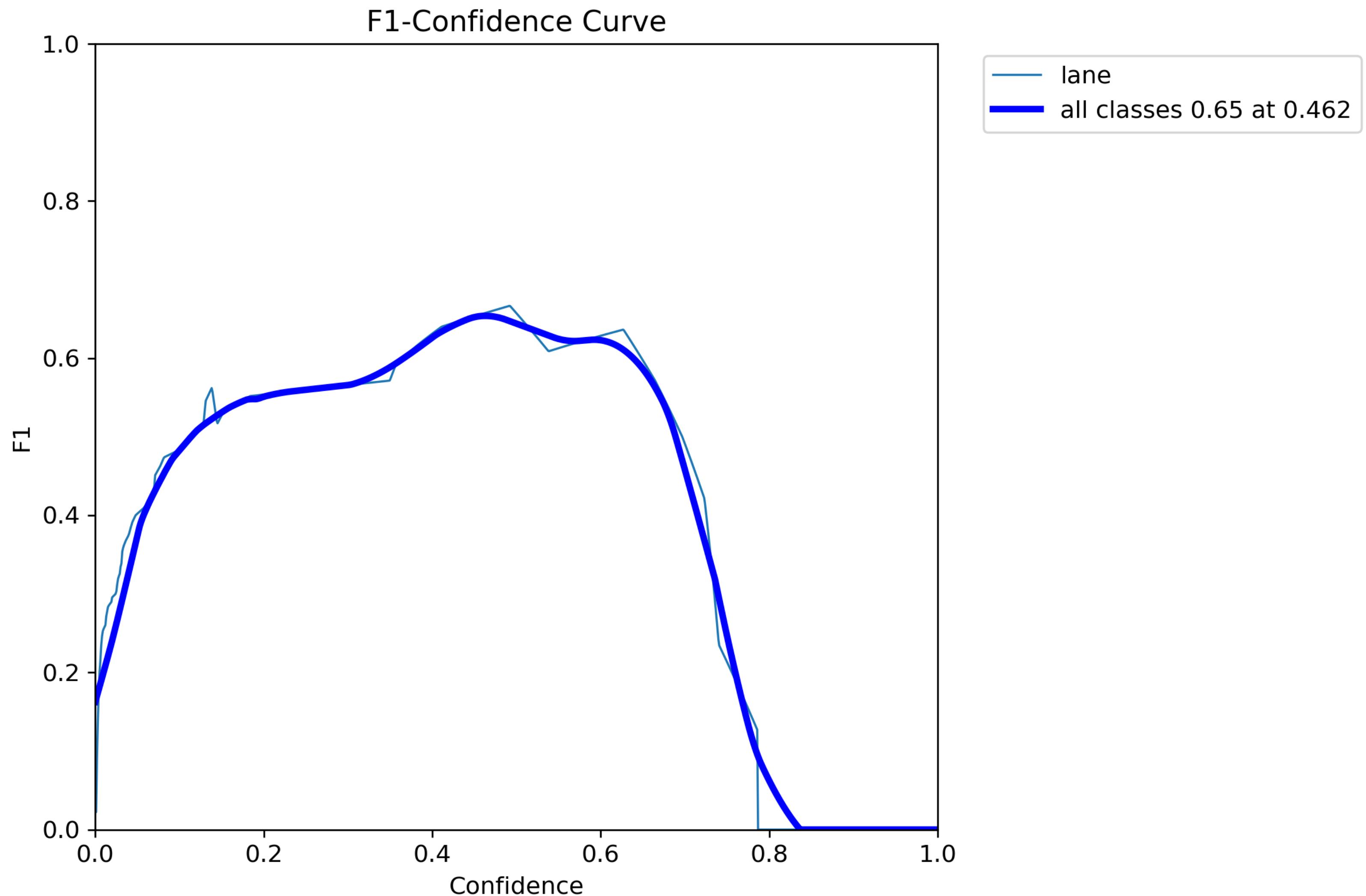


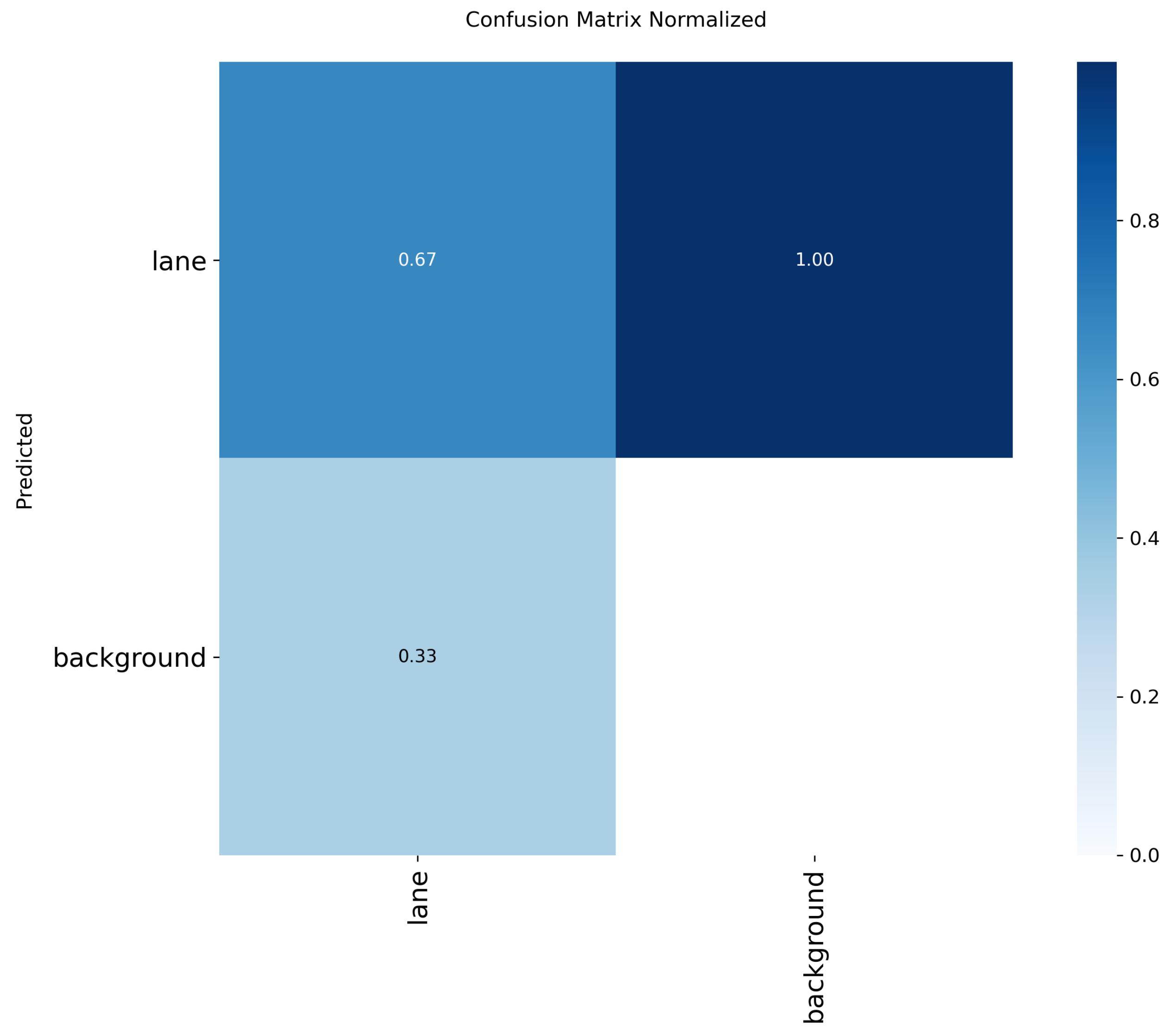




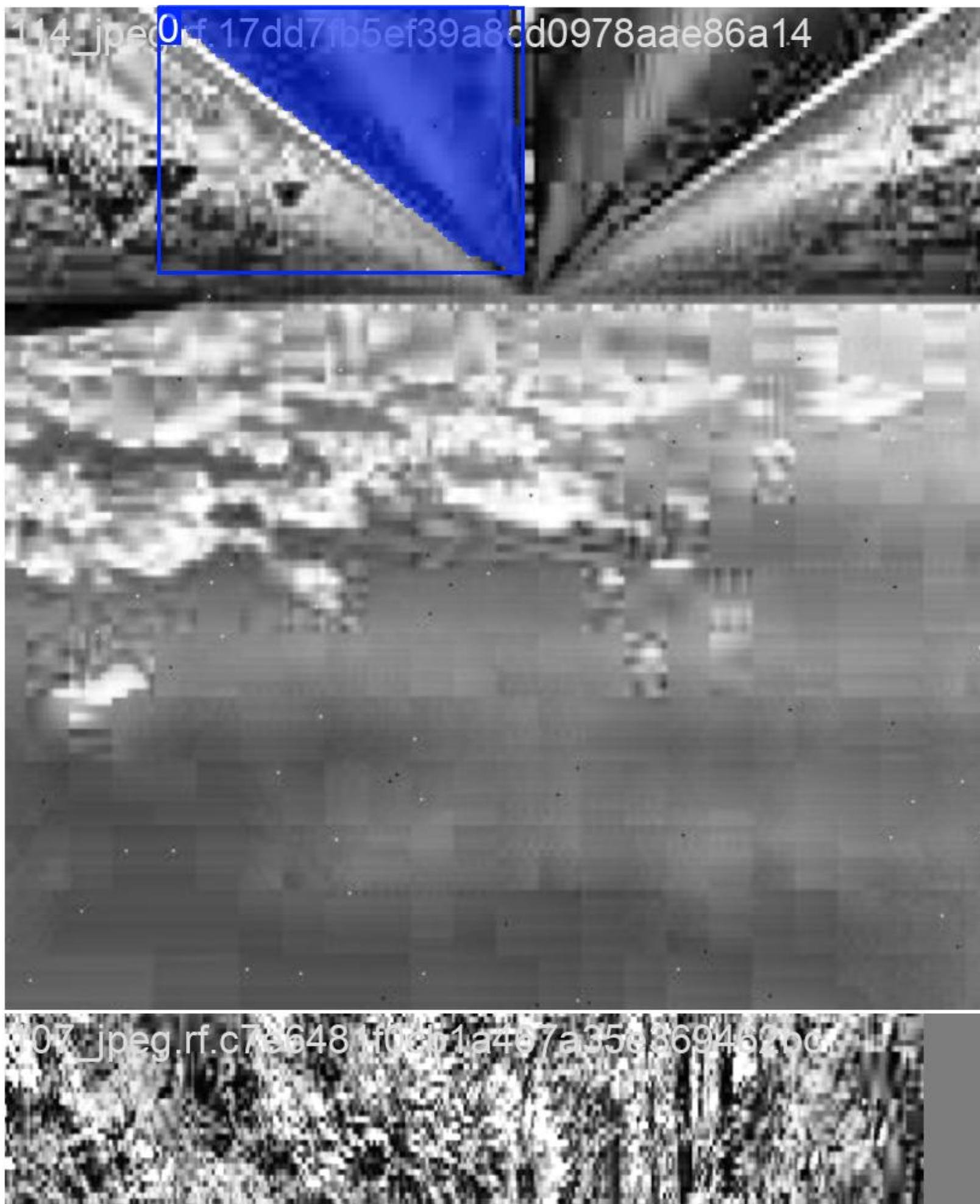


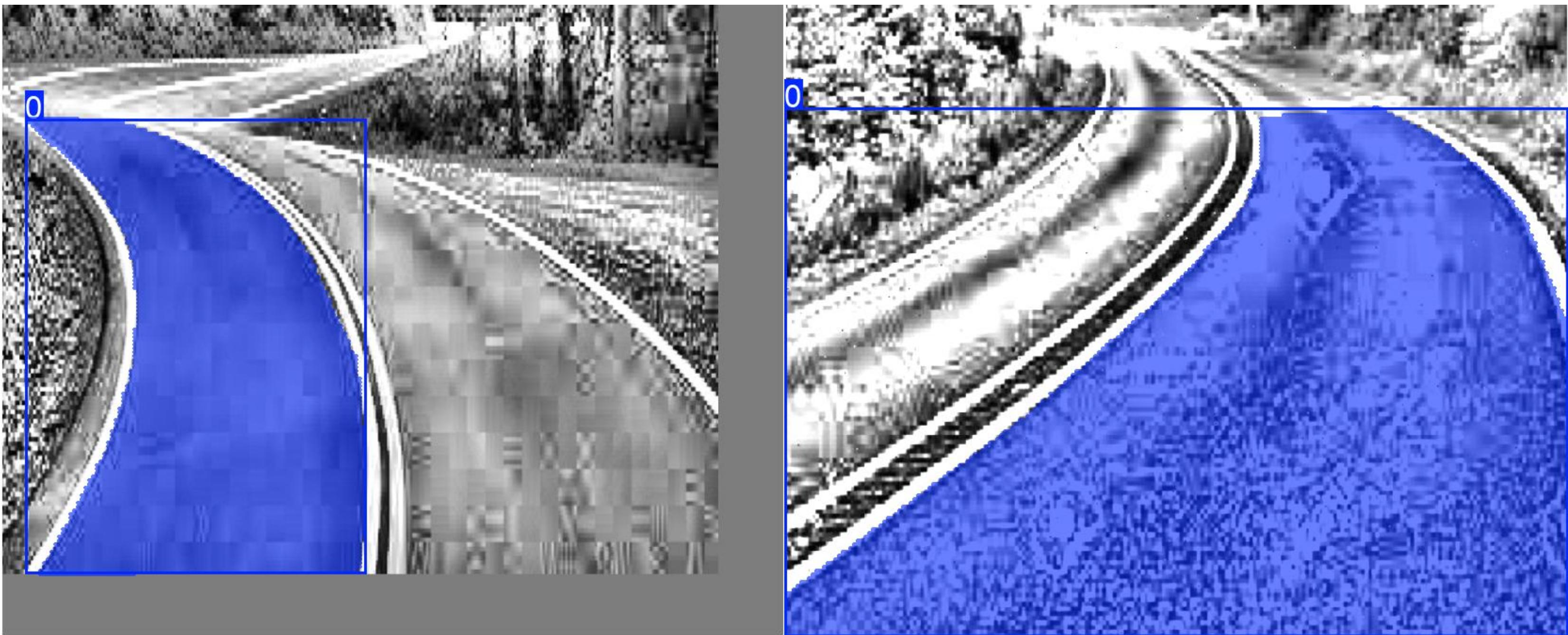




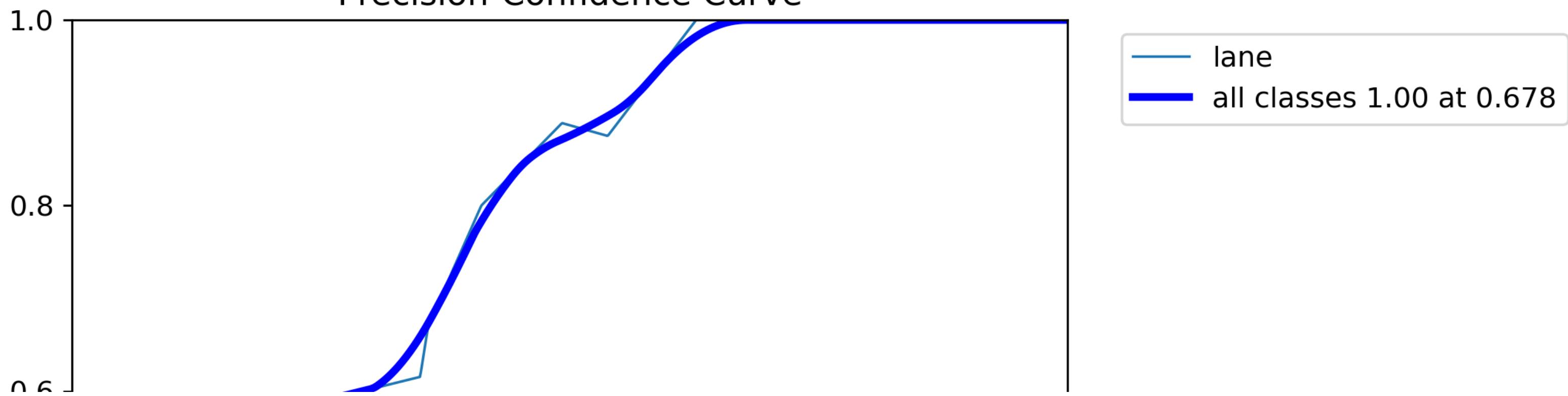


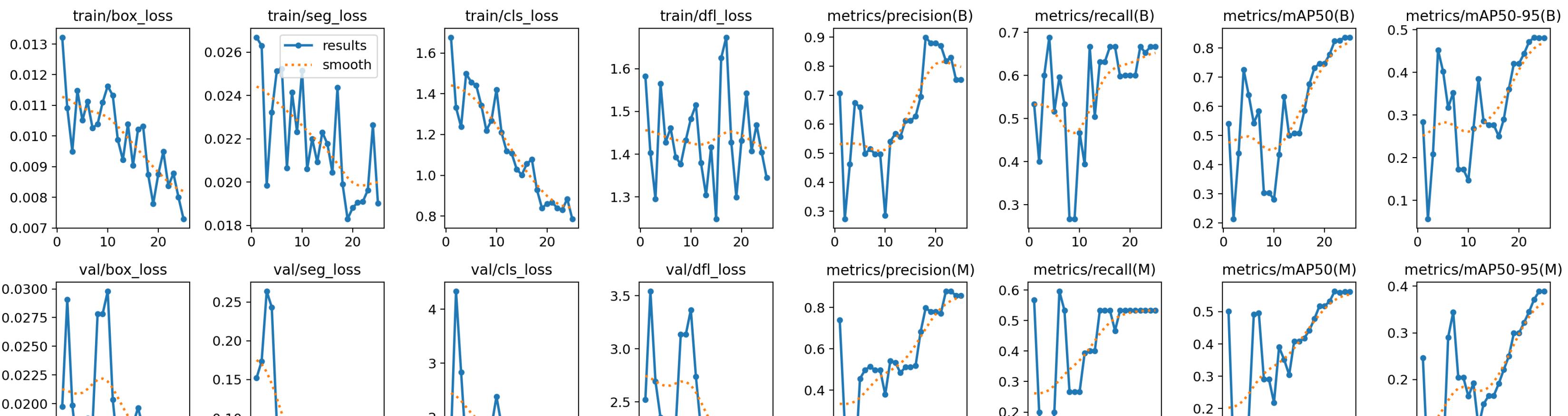
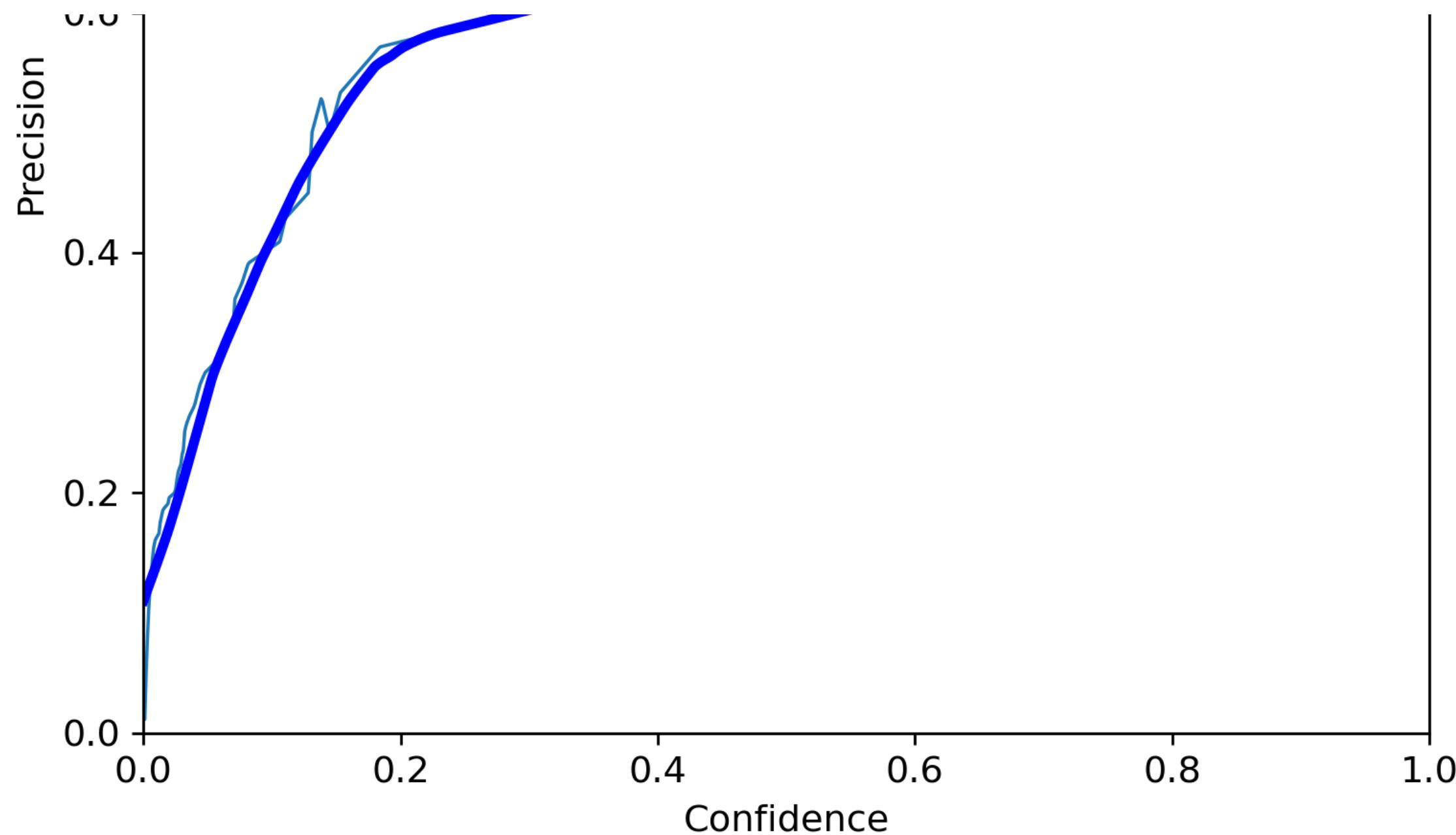
True

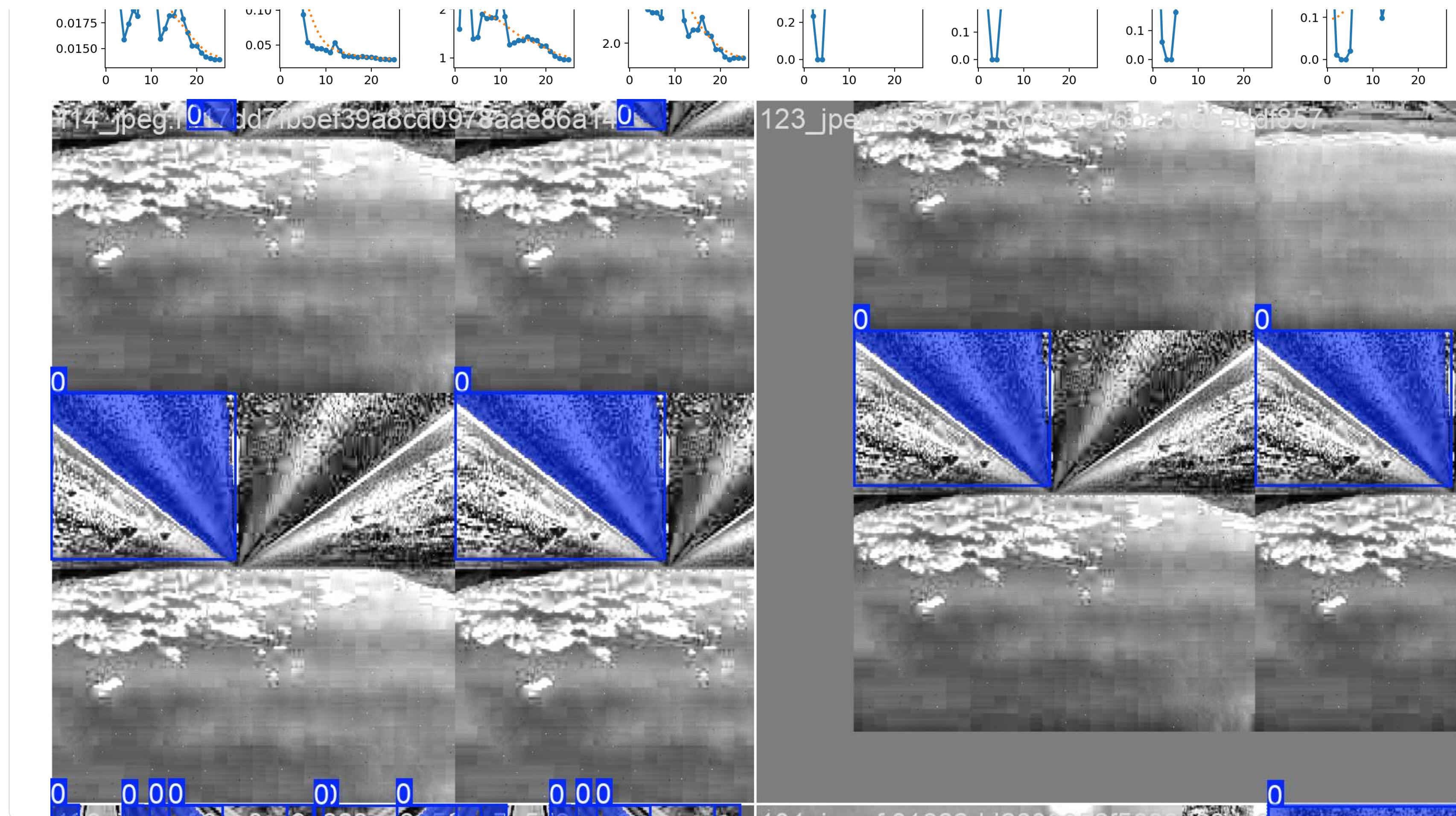




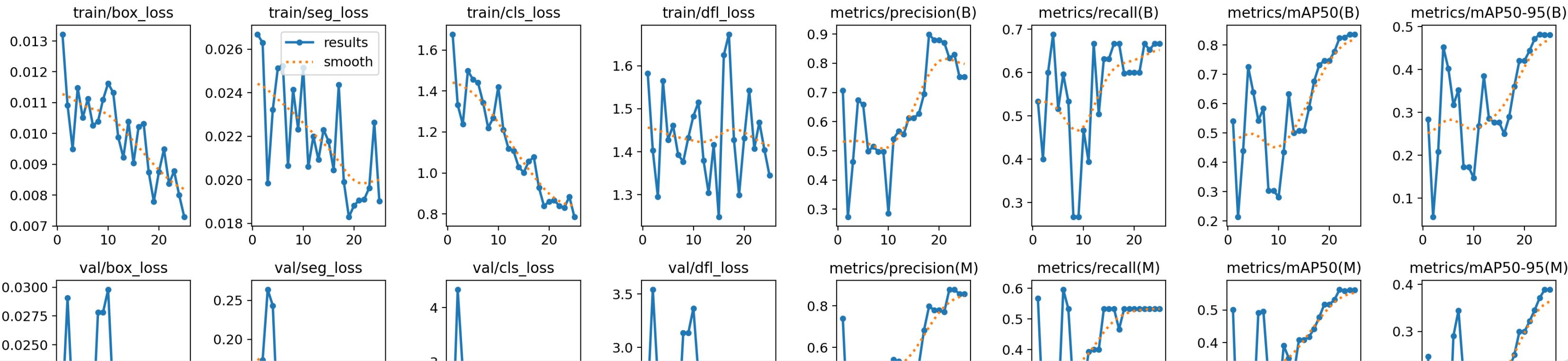
Precision-Confidence Curve







```
1 from IPython.display import Image
2
3 Image('/content/runs/segment/lane_finetune_v3/results.png')
```



```
1 !yolo task=segment mode=predict model=/content/runs/segment/train/weights/best.pt source=/content/118.jpeg save=True
```

Ultralytics 8.3.203 🚀 Python-3.12.11 torch-2.8.0+cu126 CUDA:0 (Tesla T4, 15095MiB)
YOLOv11s-seg summary (fused): 113 layers, 10,067,203 parameters, 0 gradients, 32.8 GFLOPs

image 1/1 /content/118.jpeg: 480x640 2 lanes, 106.6ms
Speed: 9.1ms preprocess, 106.6ms inference, 182.5ms postprocess per image at shape (1, 3, 480, 640)
Results saved to /content/runs/segment/predict
💡 Learn more at <https://docs.ultralytics.com/modes/predict>

```
1 import cv2
2 from IPython.display import Image, display
3 import glob
4
5 result_file = glob.glob('/content/runs/segment/predict/*')[0]
6 display(Image(filename=result_file))
```



```
1 import cv2
2 import numpy as np
3 from IPython.display import display, Image
4 import glob
5
6 img_path = '/content/118.jpeg'
7 img = cv2.imread(img_path)
8 img = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
9
10 pred_path = glob.glob('/content/runs/segment/predict/*')[0]
11 mask = cv2.imread(pred_path, cv2.IMREAD_UNCHANGED)
12
13 if mask.shape[2] == 4:
14     alpha = mask[:, :, 3] / 255.0
15     for c in range(3):
16         img[:, :, c] = img[:, :, c] * (1 - alpha) + mask[:, :, c] * alpha
17 else:
18     overlay = cv2.addWeighted(img, 0.7, mask, 0.3, 0)
19     img = overlay
20
21 out_path = '/content/overlay_result.jpg'
22 cv2.imwrite(out_path, cv2.cvtColor(img, cv2.COLOR_RGB2BGR))
23 display(Image(filename=out_path))
```

