Министерство образования Республики Беларусь

Учреждение образования

«Брестский государственный технический университет»

Кафедра ИИТ

Лабораторная работа №3

По дисциплине: «Обработка изображений в ИС»

Тема: «Обучение детекторов объектов»

Выполнила:

Студентка 4 курса

Группы ИИ-21

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Проверил:

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Брест 2024

Цель: осуществлять обучение нейросетевого детектора для решения задачи обнаружения дорожных знаков.

Ход работы:

Вариант 15

В-т	**Детектор**
15	YOLOv9s

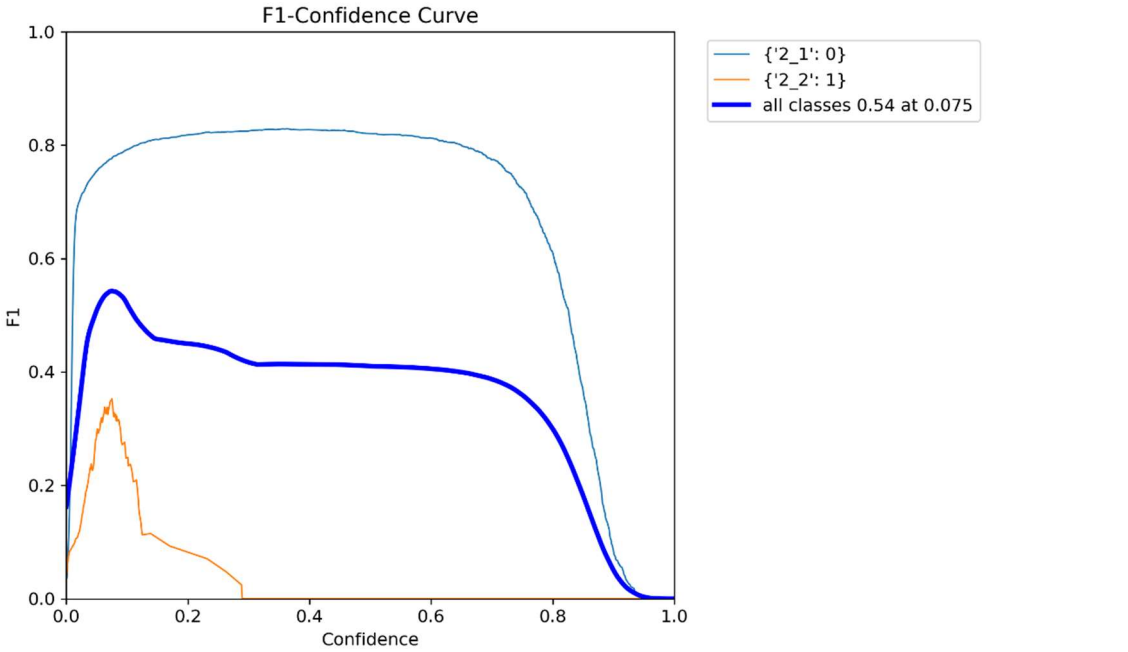
Код программы:

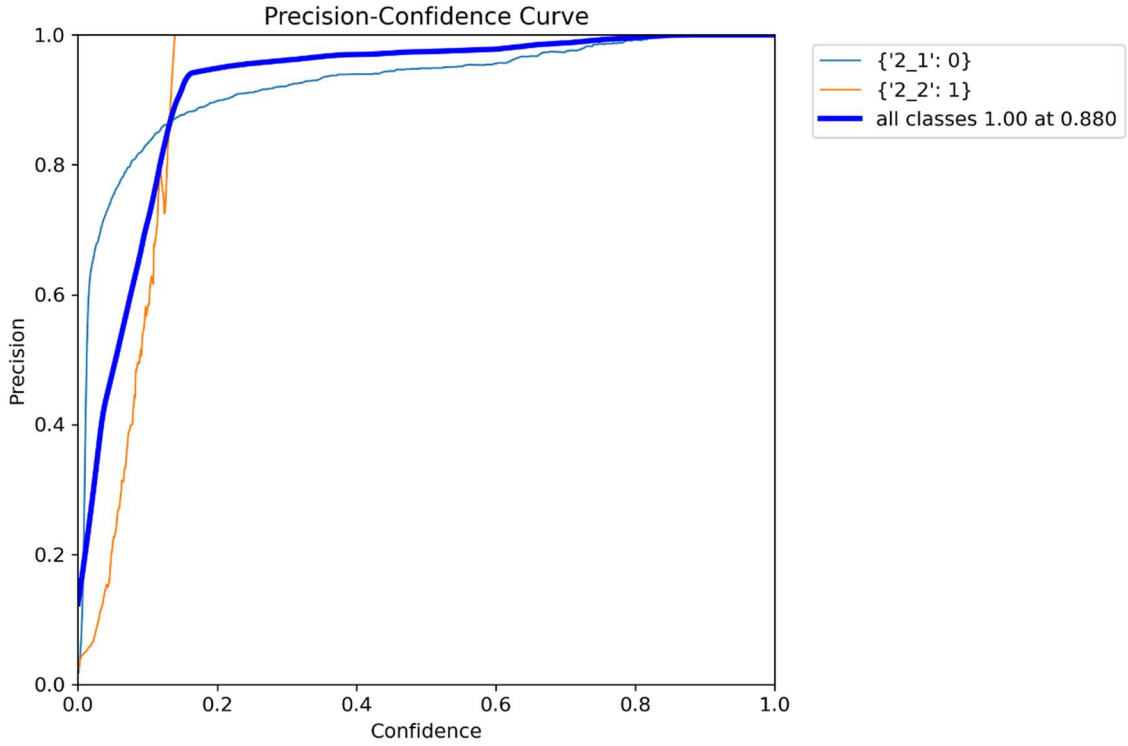
```
!pip install ultralytics
!pip install torch torchvision torchaudio
from ultralytics import YOLO
main_path = "/content/drive/MyDrive/Colab Notebooks/dataset"
dataset_path = main_path + "/annotations"
data_yaml = main_path + "/data.yaml"
model_path = main_path + "/yolov8s.pt"
model = YOLO('yolov8n.pt')
!pip install tensorboard
model.train(data=data_yaml, epochs=20, imgsz=640, batch=16, device=0,
project='runs/train')
video_day = "/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест день.mp4"
video_night = "/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест ночь.mp4"
output_dir = "/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/out"
model.predict(source='/content/drive/MyDrive/Colab
Notebooks/dataset/annotations/test/images/autosave21_01_2013_10_36_00_2.jpg',
save=True, save_dir=output_dir)
model.predict(source=video_day, save=True, save_dir=output_dir)
model.predict(source=video_night, save=True, save_dir=output_dir)
```

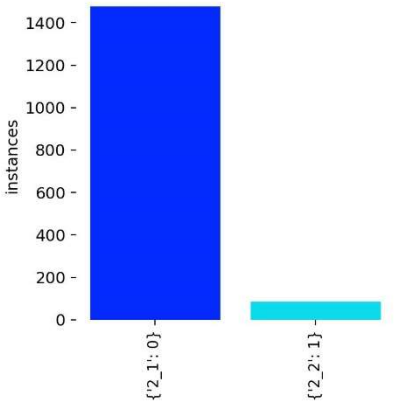
Результат работы:

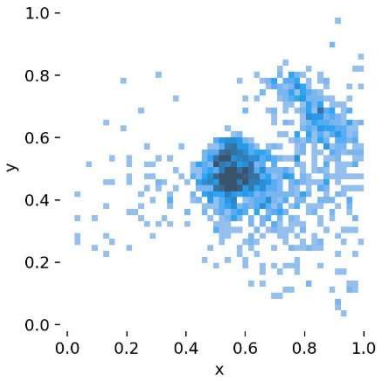
```
keypoints: None
 masks: None
 names: {0: "{'2_1': 0}", 1: "{'2_2': 1}"}
 obb: None
 orig_img: array([[[153, 161, 130],
         [153, 161, 130],
         [151, 162, 130],
         ...,
         [123, 131, 108],
         [114, 121, 100],
         [100, 107,  86]],

        [[153, 161, 130],
         [153, 161, 130],
         [151, 162, 130],
         ...,
         [119, 127, 104],
         [113, 120,  99],
         [102, 109,  88]],
```

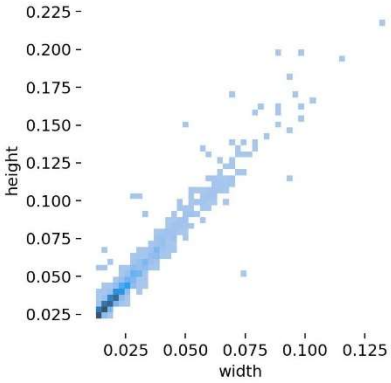
```
Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
       1/20      2.16G      2.101      6.162      1.073         20        640:
100%|██████████| 96/96 [00:50<00:00,  1.92it/s]
                 Class     Images  Instances      Box(P          R      mAP50  mAP50-95):
100%|██████████| 48/48 [00:25<00:00,  1.86it/s]
                   all       1533       1557      0.973      0.132      0.303       0.17

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
       2/20      2.16G       1.78      3.133     0.9906         26        640:
100%|██████████| 96/96 [00:41<00:00,  2.30it/s]
                 Class     Images  Instances      Box(P          R      mAP50  mAP50-95):
100%|██████████| 48/48 [00:22<00:00,  2.15it/s]
                   all       1533       1557      0.373      0.342      0.317      0.175

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
       3/20      2.16G      1.755       2.41     0.9799         24        640:
100%|██████████| 96/96 [00:43<00:00,  2.20it/s]
                 Class     Images  Instances      Box(P          R      mAP50  mAP50-95):
100%|██████████| 48/48 [00:21<00:00,  2.22it/s]
                   all       1533       1557      0.879      0.323      0.322      0.192

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
       4/20      2.16G      1.776       1.97      0.996         23        640:
100%|██████████| 96/96 [00:42<00:00,  2.28it/s]
                 Class     Images  Instances      Box(P          R      mAP50  mAP50-95):
100%|██████████| 48/48 [00:23<00:00,  2.03it/s]
                   all       1533       1557      0.926      0.319      0.351      0.177

      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
       5/20      2.15G      1.671       1.71     0.9614         26        640:
100%|██████████| 96/96 [00:40<00:00,  2.38it/s]
                 Class     Images  Instances      Box(P          R      mAP50  mAP50-95):
100%|██████████| 48/48 [00:22<00:00,  2.14it/s]
                   all       1533       1557      0.944      0.339      0.373       0.23


      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
       6/20      2.14G      1.596      1.503     0.9462         24        640:
100%|██████████| 96/96 [00:41<00:00,  2.33it/s]
                 Class     Images  Instances      Box(P          R      mAP50  mAP50-95):
100%|██████████| 48/48 [00:21<00:00,  2.19it/s]
                   all       1533       1557      0.888      0.346      0.351      0.212


      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
       7/20      2.14G      1.558      1.383     0.9435         30        640:
100%|██████████| 96/96 [00:41<00:00,  2.32it/s]
                 Class     Images  Instances      Box(P          R      mAP50  mAP50-95):
100%|██████████| 48/48 [00:24<00:00,  1.97it/s]
                   all       1533       1557      0.922      0.326      0.373      0.204


      Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
       8/20      2.14G      1.531      1.313     0.9474         23        640:
100%|██████████| 96/96 [00:40<00:00,  2.39it/s]
                 Class     Images  Instances      Box(P          R      mAP50  mAP50-95):
100%|██████████| 48/48 [00:22<00:00,  2.16it/s]
                   all       1533       1557      0.949      0.354       0.43      0.273
```

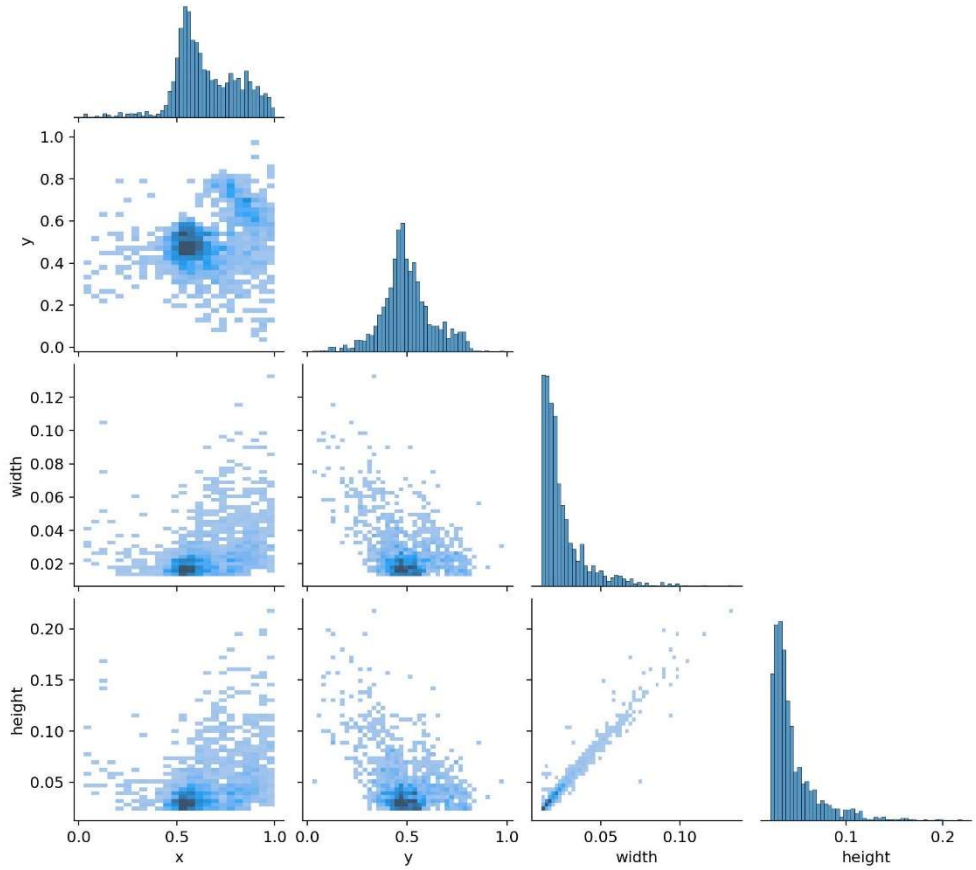

F1-Confidence Curve
{'2_1': 0}
{'2_2': 1}
all classes 0.54 at 0.075
F1
Confidence
0.0
0.2
0.4
0.6
0.8
1.0

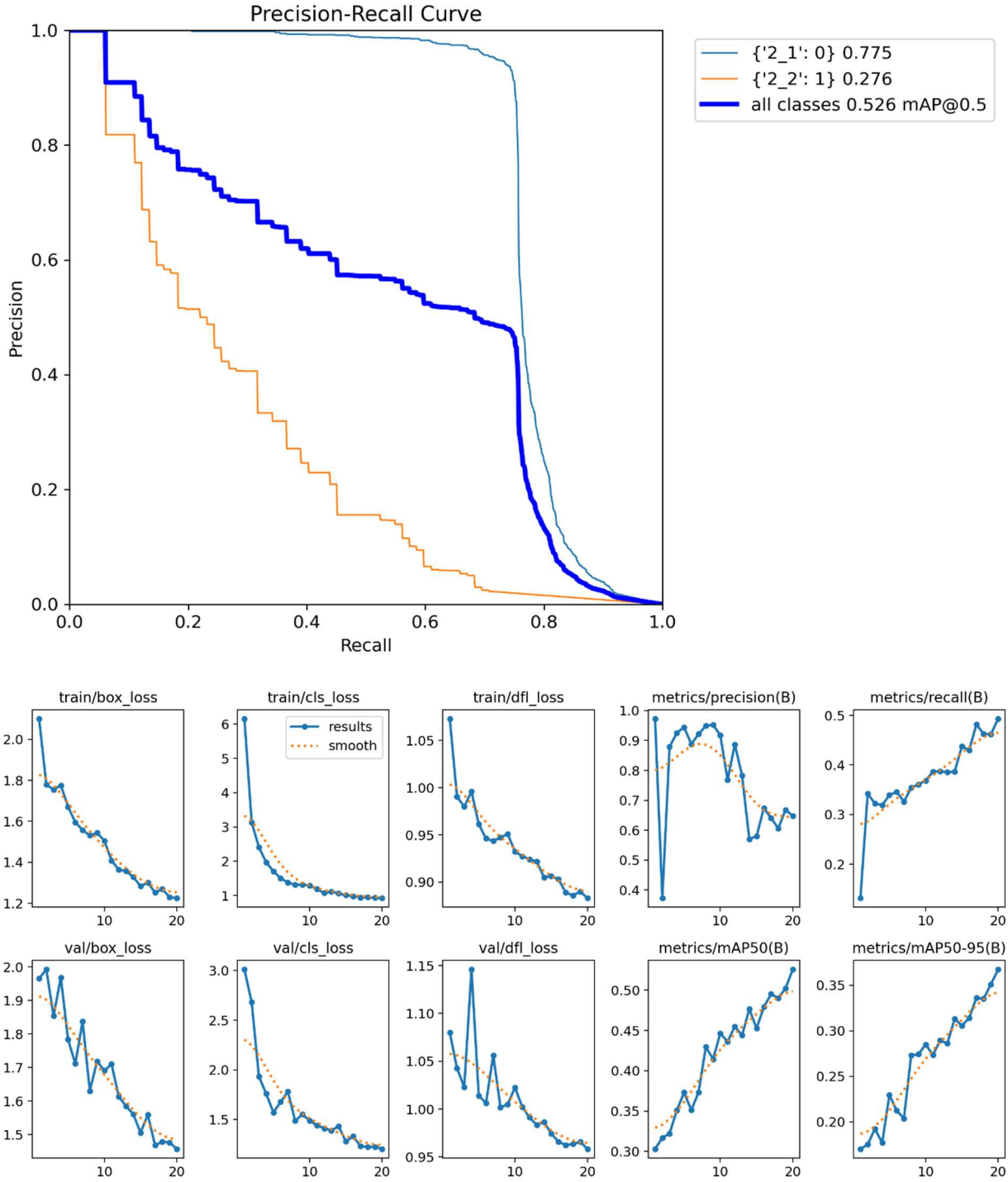

Precision-Confidence Curve
{'2_1': 0}
{'2_2': 1}
all classes 1.00 at 0.880
Precision
Confidence
0.0
0.2
0.4
0.6
0.8
1.0

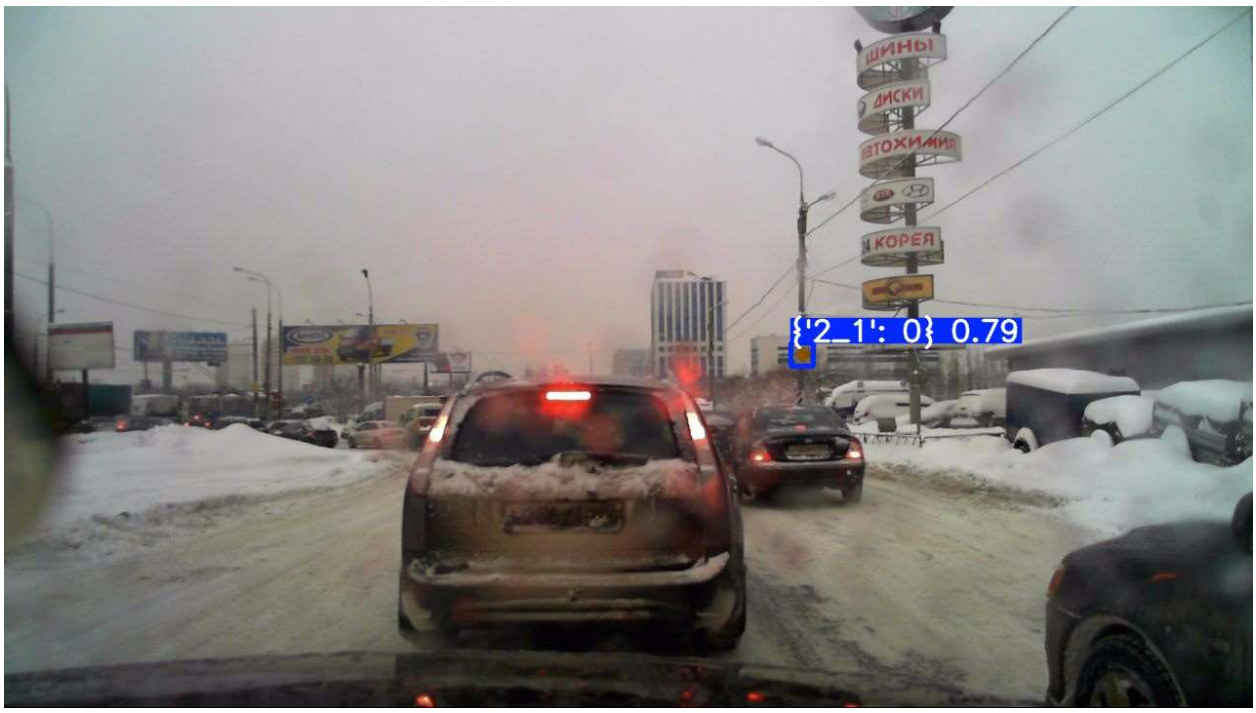

instances
1400
1200
1000
800
600
400
200
0
{'2_1': 0}
{'2_2': 1}


y
x
0.0
0.2
0.4
0.6
0.8
1.0


height
width
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
0.225


x
y
width
height


Precision-Recall Curve
{'2_1': 0} 0.775
{'2_2': 1} 0.276
all classes 0.526 mAP@0.5
Precision
Recall
train/box_loss
train/cls_loss
results
smooth
train/dfl_loss
metrics/precision(B)
metrics/recall(B)
val/box_loss
val/cls_loss
val/dfl_loss
metrics/mAP50(B)
metrics/mAP50-95(B)



Ссылка на папку, где отрывки видео: https://drive.google.com/drive/folders/1XyHauWcsMbbVu80PW_ESzVC6PfWhTNwi?usp=sharing

Вывод: в ходе лабораторной работы научилась осуществлять обучение нейросетевого детектора для решения задачи обнаружения дорожных знаков.