

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»

Выполнил:
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Группы ИИ-21
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Брест 2024

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

Вариант 8.

8	YOLOv8n
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Код программы:

```
!pip install ultralytics
!pip install torch torchvision torchaudio

from ultralytics import YOLO

main_path = "/content/drive/MyDrive/Colab Notebooks/lab3-Oivis"
dataset_path = main_path + "/dataset"
data_yaml = main_path + "/data.yaml"

model = YOLO('yolov8n.pt')

model.train(data = data_yaml, epochs = 20, imgsz = 640, batch = 16, device = 0)

Starting training for 20 epochs...

      Epoch    GPU_mem  box_loss  cls_loss  dfl_loss  Instances    Size
      1/20      2.38G      1.618      2.585      0.8935         9      640:
100%|██████████| 218/218 [01:50<00:00, 1.97it/s]
      Class    Images  Instances    Box(P          R      mAP50  mAP50-95):
100%|██████████| 109/109 [00:52<00:00, 2.06it/s]
           all      3478      5941      0.503      0.138      0.112      0.0702

      Epoch    GPU_mem  box_loss  cls_loss  dfl_loss  Instances    Size
      2/20      2.42G      1.63      2.369      0.8907        22      640:
100%|██████████| 218/218 [01:54<00:00, 1.90it/s]
      Class    Images  Instances    Box(P          R      mAP50  mAP50-95):
100%|██████████| 109/109 [00:56<00:00, 1.94it/s]
           all      3478      5941      0.538      0.153      0.126      0.0777

      Epoch    GPU_mem  box_loss  cls_loss  dfl_loss  Instances    Size
      3/20      2.41G      1.62      2.174      0.8918        15      640:
100%|██████████| 218/218 [01:44<00:00, 2.08it/s]
      Class    Images  Instances    Box(P          R      mAP50  mAP50-95):
100%|██████████| 109/109 [00:55<00:00, 1.96it/s]
           all      3478      5941      0.561      0.142      0.136      0.0837...

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/lab3-
Oivis/dataset/test/images/autosave21_01_2013_11_00_39_0.jpg', save=True,
save_dir=output_dir)

image 1/1 /content/drive/MyDrive/Colab Notebooks/lab3-
Oivis/dataset/test/images/autosave21_01_2013_11_00_39_0.jpg: 384x640 1 {'6_6': 2}, 7.4ms
Speed: 2.0ms preprocess, 7.4ms inference, 1.7ms postprocess per image at shape (1, 3, 384,
640)
Results saved to runs/detect/train24
[ultralytics.engine.results.Results object with attributes:

boxes: ultralytics.engine.results.Boxes object
keypoints: None
```

```

masks: None
names: {0: '{"'5_19_1': 0}"', 1: '{"'5_20': 1}"', 2: '{"'6_6': 2}"', 3: '{"'6_4': 3}"', 4:
"{'5_15_2': 4}"', 5: '{"'5_6': 5}"', 6: '{"'5_7_1': 6}"', 7: '{"'5_5': 7}"', 8: '{"'5_7_2': 8}"', 9:
"{'6_3_1': 9}"', 10: '{"'5_15_5': 10}"', 11: '{"'6_7': 11}"', 12: '{"'5_15_3': 12}"', 13:
"{'5_15_1': 13}"', 14: '{"'5_15_2_2': 14}"', 15: '{"'5_22': 15}"', 16: '{"'5_3': 16}"', 17:
"{'6_2_n50': 17}"', 18: '{"'6_2_n70': 18}"', 19: '{"'5_15_7': 19}"', 20: '{"'5_14': 20}"', 21:
"{'5_21': 21}"', 22: '{"'6_2_n60': 22}"', 23: '{"'5_11': 23}"', 24: '{"'5_8': 24}"', 25:
"{'6_2_n20': 25}"'}
obb: None
orig_img: array([[169, 165, 124],
                  [169, 165, 124],
                  [169, 165, 124],
                  ...],

```

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model.predict(source=video_day, save=True, save_dir=output_dir)

```

```

video 1/1 (frame 1/22804) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест день.mp4:
384x640 (no detections), 7.3ms video 1/1 (frame 2/22804) /content/drive/MyDrive/Colab
Notebooks/lab3-Oivis/Брест день.mp4: 384x640 (no detections), 20.0ms video 1/1 (frame
3/22804) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест день.mp4: 384x640 (no
detections), 14.0ms video 1/1 (frame 4/22804) /content/drive/MyDrive/Colab Notebooks/lab3-
Oivis/Брест день.mp4: 384x640 (no detections), 25.4ms video 1/1 (frame 5/22804)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест день.mp4: 384x640 (no detections),
6.9ms video 1/1 (frame 6/22804) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест
день.mp4: 384x640 (no detections), 7.8ms video 1/1 (frame 7/22804)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест день.mp4: 384x640 (no detections),
8.3ms video 1/1 (frame 8/22804) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест
день.mp4: 384x640 (no detections), 10.4ms video 1/1 (frame 9/22804)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест день.mp4: 384x640 (no detections),
15.5ms video 1/1 (frame 10/22804) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест
день.mp4: 384x640 (no detections), 7.4ms video 1/1 (frame 11/22804)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест день.mp4: 384x640 (no detections),
7.1ms video 1/1 (frame 12/22804) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест
день.mp4: 384x640 (no detections), 12.7ms video 1/1 (frame 13/22804)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест день.mp4: 384x640 (no detections),
7.4ms video 1/1 (frame 14/22804) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест
день.mp4: 384x640 (no detections), 7.9ms video 1/1 (frame 15/22804)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест день.mp4: 384x640 (no detections),
6.8ms video 1/1 (frame 16/22804) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест
день.mp4: 384x640 (no detections), 14.5ms video 1/1 (frame 17/22804)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест день.mp4: 384x640 (no detections),
14.3ms video 1/1 (frame 18/22804) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест
день.mp4: 384x640 (no detections), 20.9ms video 1/1 (frame 19/22804)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест день.mp4: 384x640 (no detections),
9.5ms

```

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video 1/1 (frame 54/22804) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест
день.mp4: 384x640 1 {'5_19_1': 0}, 29.9ms video 1/1 (frame 55/22804)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест день.mp4: 384x640 (no detections),
9.4ms video 1/1 (frame 56/22804) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест
день.mp4: 384x640 (no detections), 26.1ms video 1/1 (frame 57/22804)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест день.mp4: 384x640 (no detections),
9.0ms video 1/1 (frame 58/22804) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест
день.mp4: 384x640 1 {'5_19_1': 0}, 20.2ms video 1/1 (frame 59/22804)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест день.mp4: 384x640 (no detections),
23.1ms video 1/1 (frame 60/22804) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест
день.mp4: 384x640 (no detections), 17.7ms video 1/1 (frame 61/22804)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест день.mp4: 384x640 (no detections),
22.9ms video 1/1 (frame 62/22804) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест
день.mp4: 384x640 (no detections), 7.8ms video 1/1 (frame 63/22804)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест день.mp4: 384x640 1 {'5_15_3': 12},
8.4ms video 1/1 (frame 64/22804) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест
день.mp4: 384x640 (no detections), 33.5ms video 1/1 (frame 65/22804)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брест день.mp4: 384x640 1 {'5_15_5': 10},

```

7.8ms video 1/1 (frame 66/22804) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс
день.mp4: 384x640 1 {'5_15_5': 10}, 9.1ms

model.predict(source=video_night, save=True, save_dir=output_dir)

video 1/1 (frame 1/20104) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс ночь.mp4:
384x640 (no detections), 213.5ms video 1/1 (frame 2/20104) /content/drive/MyDrive/Colab
Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 (no detections), 12.9ms video 1/1 (frame
3/20104) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 (no
detections), 8.6ms video 1/1 (frame 4/20104) /content/drive/MyDrive/Colab Notebooks/lab3-
Oivis/Брепс ночь.mp4: 384x640 (no detections), 9.2ms video 1/1 (frame 5/20104)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 (no detections),
16.3ms video 1/1 (frame 6/20104) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс
ночь.mp4: 384x640 (no detections), 17.5ms video 1/1 (frame 7/20104)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 (no detections),
32.1ms video 1/1 (frame 8/20104) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс
ночь.mp4: 384x640 (no detections), 11.9ms video 1/1 (frame 9/20104)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 (no detections),
11.7ms video 1/1 (frame 10/20104) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс
ночь.mp4: 384x640 (no detections), 30.0ms video 1/1 (frame 11/20104)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 (no detections),
11.0ms video 1/1 (frame 12/20104) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс
ночь.mp4: 384x640 (no detections), 14.3ms video 1/1 (frame 13/20104)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 (no detections),
13.0ms video 1/1 (frame 14/20104) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс
ночь.mp4: 384x640 (no detections), 18.9ms video 1/1 (frame 15/20104)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 (no detections),
16.8ms video 1/1 (frame 16/20104) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс
ночь.mp4: 384x640 (no detections), 10.6ms video 1/1 (frame 17/20104)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 (no detections),
50.0ms video 1/1 (frame 18/20104) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс
ночь.mp4: 384x640 (no detections), 10.0ms video 1/1 (frame 19/20104)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 (no detections),
10.2ms video 1/1 (frame 20/20104) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс
ночь.mp4: 384x640 (no detections), 11.4ms video 1/1 (frame 21/20104)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 (no detections),
9.0ms

video 1/1 (frame 169/20104) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс
ночь.mp4: 384x640 1 {'5_15_1': 13}, 6.8ms video 1/1 (frame 170/20104)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 (no detections),
7.7ms video 1/1 (frame 171/20104) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс
ночь.mp4: 384x640 1 {'6_6': 2}, 1 {'5_15_1': 13}, 7.0ms video 1/1 (frame 172/20104)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 (no detections),
7.8ms video 1/1 (frame 173/20104) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс
ночь.mp4: 384x640 (no detections), 6.8ms video 1/1 (frame 174/20104)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 1 {'5_15_1': 13},
8.7ms video 1/1 (frame 175/20104) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс
ночь.mp4: 384x640 1 {'5_15_1': 13}, 12.7ms video 1/1 (frame 176/20104)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 1 {'5_15_1': 13},
15.6ms video 1/1 (frame 177/20104) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс
ночь.mp4: 384x640 (no detections), 10.9ms video 1/1 (frame 178/20104)
/content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 1 {'6_6': 2}, 1
{ '5_15_1': 13}, 15.0ms video 1/1 (frame 179/20104) /content/drive/MyDrive/Colab
Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 1 {'5_15_1': 13}, 7.3ms video 1/1 (frame
180/20104) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 1
{ '5_15_1': 13}, 9.3ms video 1/1 (frame 181/20104) /content/drive/MyDrive/Colab
Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 1 {'5_15_1': 13}, 7.3ms video 1/1 (frame
182/20104) /content/drive/MyDrive/Colab Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 1
{ '5_15_1': 13}, 8.4ms video 1/1 (frame 183/20104) /content/drive/MyDrive/Colab
Notebooks/lab3-Oivis/Брепс ночь.mp4: 384x640 1 {'5_15_1': 13}, 8.2ms

Ссылки на тесты:

1. Изображение:
<https://drive.google.com/file/d/1R5Kjlf4PwlhlC8BXkAAjRpiL5CnWCGFP/view?usp=sharing>
2. Отрывок из видео(день): <https://drive.google.com/file/d/1R7CawQ-nraZiKlzVATLv4B82P6c3v5Ci/view?usp=sharing>
3. Отрывок из видео(ночь): https://drive.google.com/file/d/1R72p8uVs-_KJHfsOTrr1PpVpZHSglc74/view?usp=sharing