

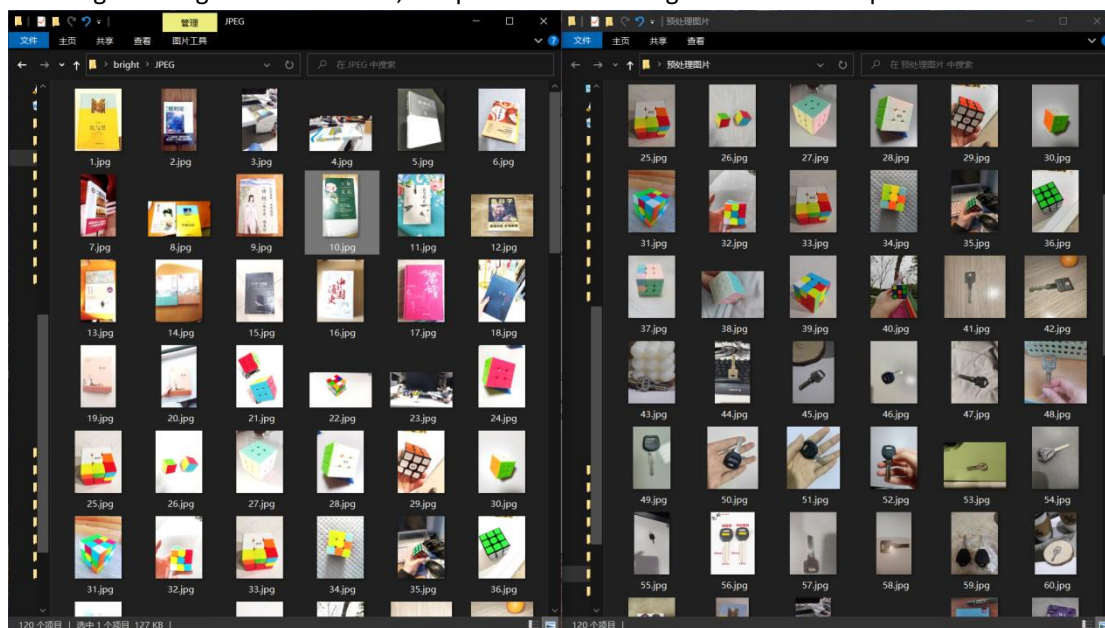
Report on recognition accuracy in light and dark environments

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Firstly, we use Photoshop to batch process test set images, simulate bright or dark environments by adjusting brightness and exposure.



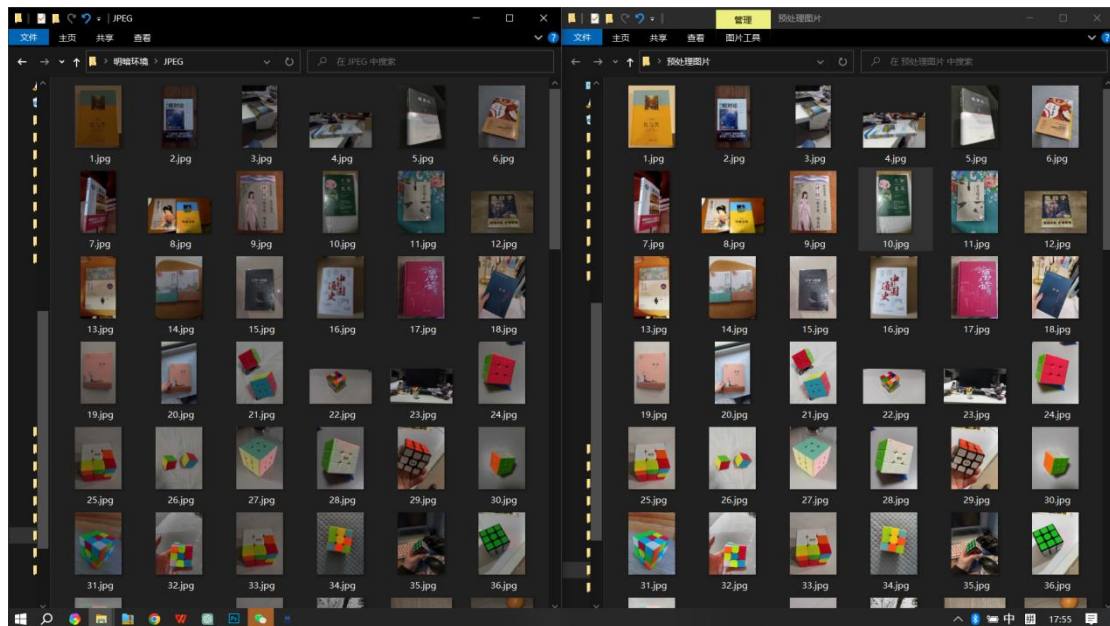
For images in bright environments, our parameters are brightness 70 and exposure 0.3.



(Bright images)

(Original images)

For images in dark environments, our parameters are brightness -70 and exposure -0.3.



(Dark images)

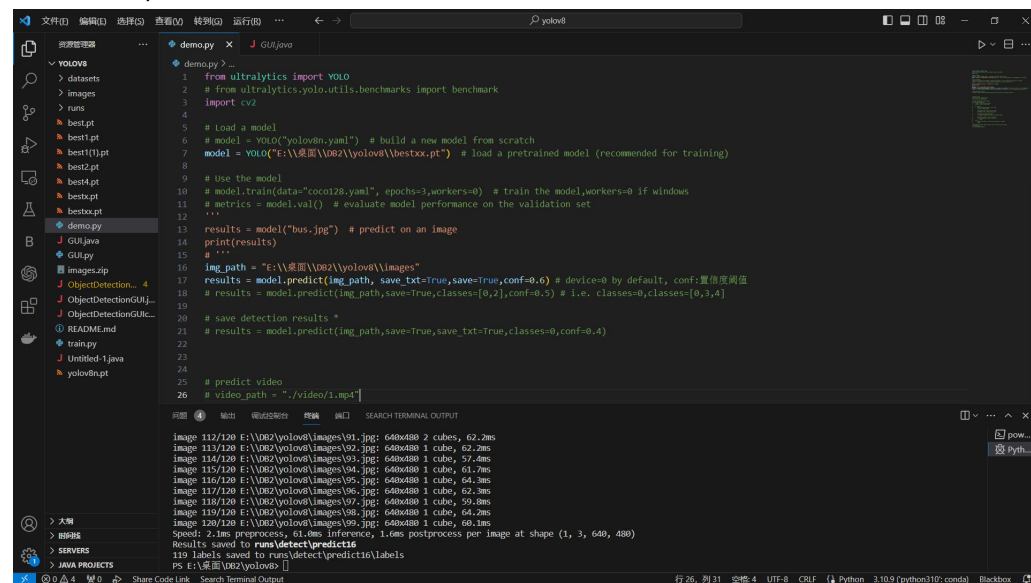
(Original images)

Then we identify the original test set, 119 out of 120 images can be correctly identified, with a recognition accuracy rate of almost 100 percent.

```

1 from ultralytics import YOLO
2 # from ultralytics.yolo.utils.benchmarks import benchmark
3 import cv2
4
5 # Load a model
6 # model = YOLO("yolov8n.yaml") # build a new model from scratch
7 model = YOLO("E:\\桌面\\YOLOv8\\bestxx.pt") # load a pretrained model (recommended for training)
8
9 # Use the model
10 model.train(data="coco128.yaml", epochs=3, workers=0) # train the model, workers=0 if windows
11 metrics = model.val() # evaluate model performance on the validation set
12
13 results = model("bus.jpg") # predict on an image
14 print(results)
15
16 # ***
17 img_path = "E:\\桌面\\YOLOv8\\images"
18 results = model.predict(img_path, save_txt=True, save=True, conf=0.6) # device=0 by default, conf:置信度阈值
19 # results = model.predict(img_path, save=True, classes=[0,2], conf=0.5) # i.e. classes=0, classes=[0,3,4]
20
21 # save detection results
22 # results = model.predict(img_path, save=True, save_txt=True, classes=0, conf=0.4)
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24 # predict video
25 # video_path = "video/1.mp4"
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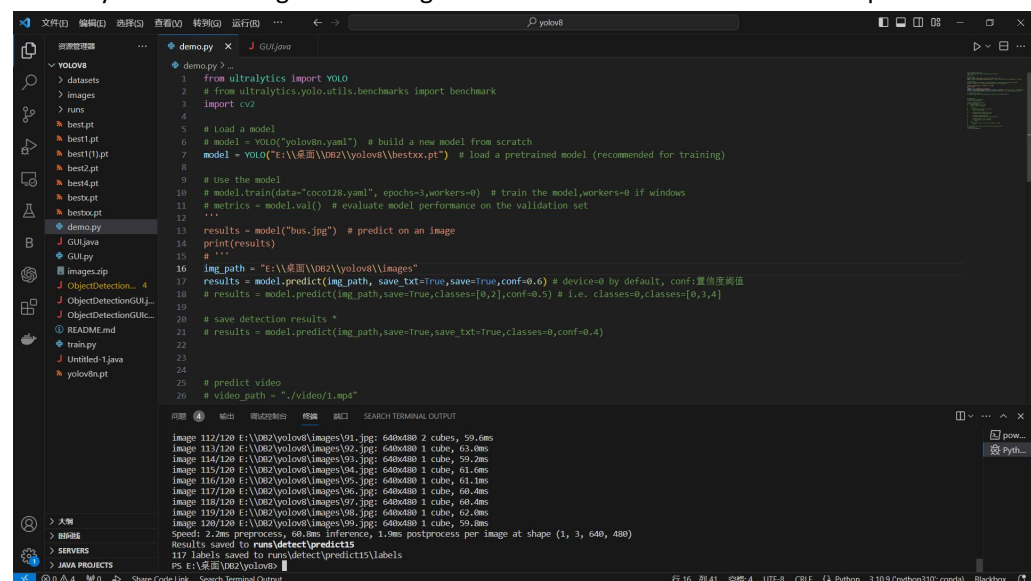
Afterwards, we tested the test set simulating dim environments and found that the results did not change. It can be concluded that the recognition accuracy of the model in dim environments has little impact.



```
demo.py > ...
1 from ultralytics import YOLO
2 # from ultralytics.yolo.utils.benchmarks import benchmark
3 import cv2
4
5 # Load a model
6 # model = YOLO("yolov8n.yaml") # build a new model from scratch
7 model = YOLO("E:\\桌面\\YOLOv8\\bestxx.pt") # load a pretrained model (recommended for training)
8
9 # Use the model
10 # model.train(data="coco128.yaml", epochs=3, workers=0) # train the model, workers=0 if windows
11 # metrics = model.val() # evaluate model performance on the validation set
12 ...
13 results = model("bus.jpg") # predict on an image
14 print(results)
15 ...
16 img_path = "E:\\桌面\\YOLOv8\\images"
17 results = model.predict(img_path, save=True, save_txt=True, conf=0.6) # device=0 by default, conf=置信度阈值
18 # results = model.predict(img_path, save=True, classes=[0,2], conf=0.5) # i.e. classes=0, classes=[0,3,4]
19
20 # save detection results *
21 # results = model.predict(img_path, save=True, save_txt=True, classes=0, conf=0.4)
22
23
24
25 # predict video
26 # video_path = "./video/1.mp4"
```

image 112/120 E:\\YOLOv8\\images\\91.jpg: 640x480 2 cubes, 62.2ms
image 113/120 E:\\YOLOv8\\images\\92.jpg: 640x480 1 cube, 62.2ms
image 114/120 E:\\YOLOv8\\images\\93.jpg: 640x480 1 cube, 57.4ms
image 115/120 E:\\YOLOv8\\images\\94.jpg: 640x480 1 cube, 61.7ms
image 116/120 E:\\YOLOv8\\images\\95.jpg: 640x480 1 cube, 64.3ms
image 117/120 E:\\YOLOv8\\images\\96.jpg: 640x480 1 cube, 62.3ms
image 118/120 E:\\YOLOv8\\images\\97.jpg: 640x480 1 cube, 59.8ms
image 119/120 E:\\YOLOv8\\images\\98.jpg: 640x480 1 cube, 64.2ms
image 120/120 E:\\YOLOv8\\images\\99.jpg: 640x480 1 cube, 60.1ms
Speed: 2.4ms preprocess, 61.0ms inference, 1.6ms postprocess per image at shape (1, 3, 640, 480)
Results saved to runs\\detect\\predict16
PS E:\\桌面\\YOLOv8>

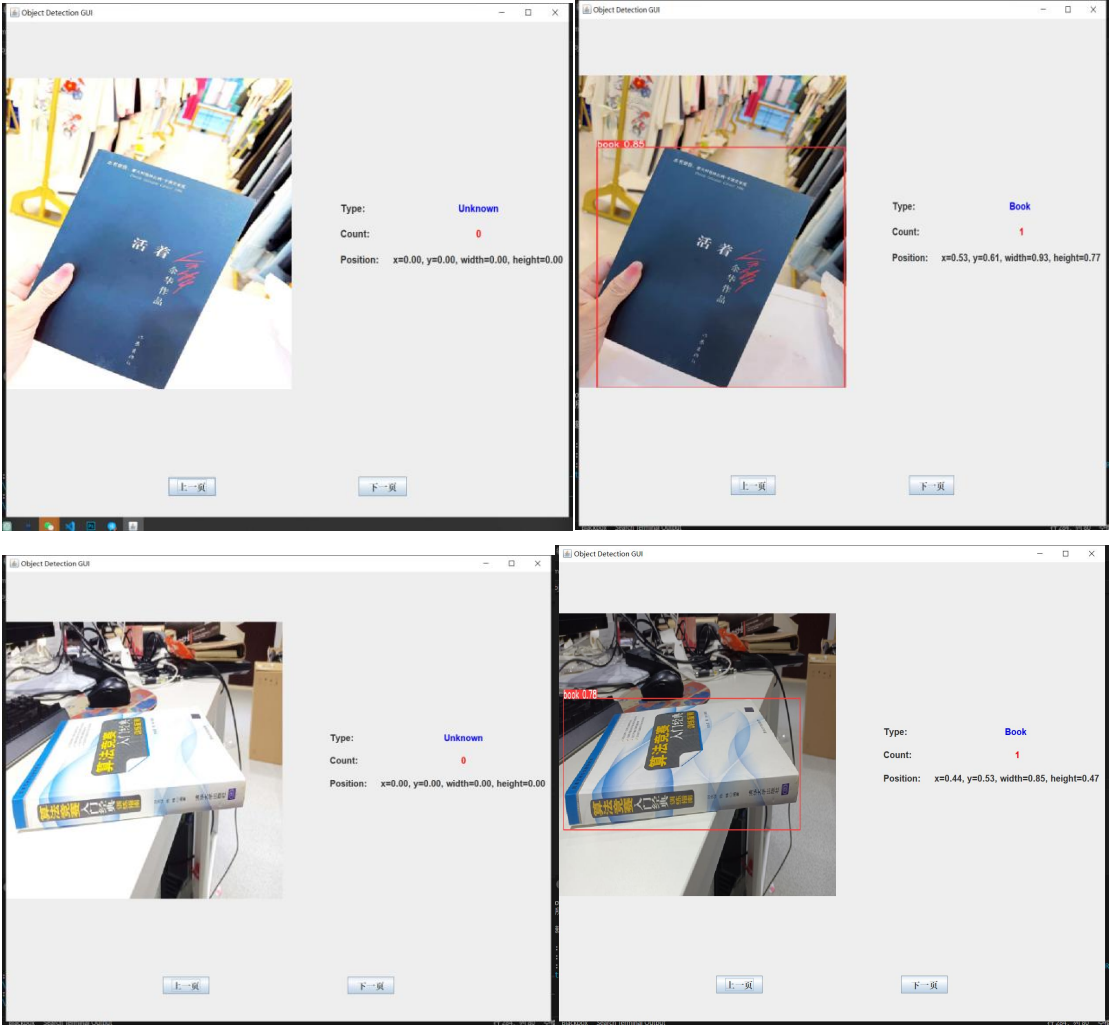
Then, we tested the test set that simulated a bright environment and found that the number of successful recognition was reduced by two, with an accuracy of 97.5%. It can be seen that the accuracy of model recognition in bright environments will have a certain impact.



```
demo.py > ...
1 from ultralytics import YOLO
2 # from ultralytics.yolo.utils.benchmarks import benchmark
3 import cv2
4
5 # Load a model
6 # model = YOLO("yolov8n.yaml") # build a new model from scratch
7 model = YOLO("E:\\桌面\\YOLOv8\\bestxx.pt") # load a pretrained model (recommended for training)
8
9 # Use the model
10 # model.train(data="coco128.yaml", epochs=3, workers=0) # train the model, workers=0 if windows
11 # metrics = model.val() # evaluate model performance on the validation set
12 ...
13 results = model("bus.jpg") # predict on an image
14 print(results)
15 ...
16 img_path = "E:\\桌面\\YOLOv8\\images"
17 results = model.predict(img_path, save=True, save_txt=True, conf=0.6) # device=0 by default, conf=置信度阈值
18 # results = model.predict(img_path, save=True, classes=[0,2], conf=0.5) # i.e. classes=0, classes=[0,3,4]
19
20 # save detection results *
21 # results = model.predict(img_path, save=True, save_txt=True, classes=0, conf=0.4)
22
23
24
25 # predict video
26 # video_path = "./video/1.mp4"
```

image 112/120 E:\\YOLOv8\\images\\91.jpg: 640x480 2 cubes, 59.6ms
image 113/120 E:\\YOLOv8\\images\\92.jpg: 640x480 1 cube, 63.0ms
image 114/120 E:\\YOLOv8\\images\\93.jpg: 640x480 1 cube, 59.2ms
image 115/120 E:\\YOLOv8\\images\\94.jpg: 640x480 1 cube, 61.6ms
image 116/120 E:\\YOLOv8\\images\\95.jpg: 640x480 1 cube, 61.1ms
image 117/120 E:\\YOLOv8\\images\\96.jpg: 640x480 1 cube, 60.4ms
image 118/120 E:\\YOLOv8\\images\\97.jpg: 640x480 1 cube, 60.4ms
image 119/120 E:\\YOLOv8\\images\\98.jpg: 640x480 1 cube, 62.0ms
image 120/120 E:\\YOLOv8\\images\\99.jpg: 640x480 1 cube, 59.8ms
Speed: 2.2ms preprocess, 60.8ms inference, 1.9ms postprocess per image at shape (1, 3, 640, 480)
Results saved to runs\\detect\\predict15
117 labels saved to runs\\detect\\predict15\\labels
PS E:\\桌面\\YOLOv8>

The following is a comparison between the recognition of unrecognized images and the original image.



Recognition accuracy in different environments

	Test set	Correctly recognized images	Accuracy
Original	120	119	99.1%
Dark	120	119	99.1%
Bright	120	117	97.5%

Summary

We found that when the model is in a dark environment, its recognition accuracy is almost unaffected, but when it is in a bright environment, its recognition accuracy is slightly affected, indicating that the model's recognition ability can still be trained and strengthened under bright conditions. Overall, the model we train can adapt to various different environments.