影像處理期中報告

使用YOLOv4進行鐘面時間影像識別

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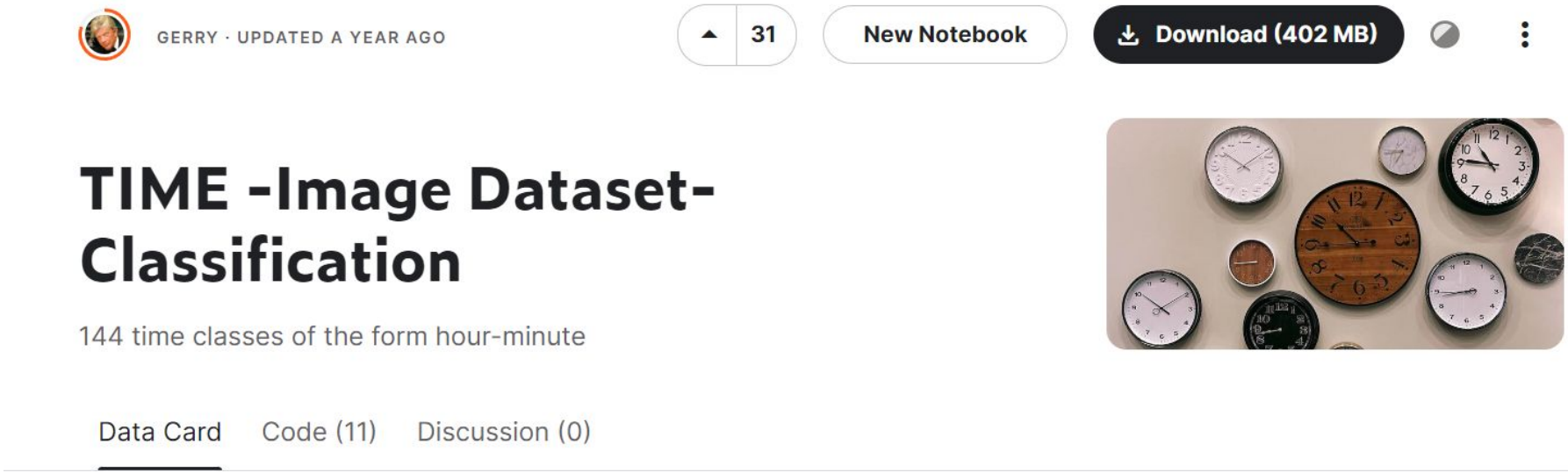
資料集搜尋



https://www.kaggle.com/datasets/gpiosenka/time-image-datasetclassification

TIME -Image Dataset-Classification

Data Card | Code (11) | Discussion (0) | 31 | New Notebook | Download (402 MB)

test (144 directories)

About this directory

This directory contains the test images. All images are 224 X 224 X 3 jpg format. The directory has 144 subdirectories , one for each class. Each sub directory contains 10 images

1-00
10 files

1-05
10 files

1-10
10 files

Data Explorer

418.7 MB

- test
- train
- valid
- clocks.csv
- time-99.68.h5

修改指引路徑

	A	B	C	D
1	class index	filepaths	labels	data set
2	0	train/1-00/0.jpg	1_00	train
3	0	train/1-00/1.jpg	1_00	train
4	0	train/1-00/11.jpg	1_00	train
5	0	train/1-00/12.jpg	1_00	train
6	0	train/1-00/13.jpg	1_00	train
7	0	train/1-00/14.jpg	1_00	train
8	0	train/1-00/15.jpg	1_00	train
9	0	train/1-00/16.jpg	1_00	train
10	0	train/1-00/17.jpg	1_00	train
11	0	train/1-00/18.jpg	1_00	train
12	0	train/1-00/19.jpg	1_00	train
13	0	train/1-00/2.jpg	1_00	train
14	0	train/1-00/20.jpg	1_00	train
15	0	train/1-00/21.jpg	1_00	train

my_train.txt ×

```
1 data/train/1-00/0.jpg
2 data/train/1-00/1.jpg
3 data/train/1-00/11.jpg
4 data/train/1-00/12.jpg
5 data/train/1-00/13.jpg
6 data/train/1-00/14.jpg
7 data/train/1-00/15.jpg
8 data/train/1-00/16.jpg
9 data/train/1-00/17.jpg
10 data/train/1-00/18.jpg
11 data/train/1-00/19.jpg
12 data/train/1-00/2.jpg
13 data/train/1-00/20.jpg
14 data/train/1-00/21.jpg
15 data/train/1-00/22.jpg
16 data/train/1-00/23.jpg
```

my_val.txt ×

```
1 data/valid/1-00/24.jpg
2 data/valid/1-00/41.jpg
3 data/valid/1-00/51.jpg
4 data/valid/1-00/69.jpg
5 data/valid/1-00/7.jpg
6 data/valid/1-00/8.jpg
7 data/valid/1-00/81.jpg
8 data/valid/1-00/84.jpg
9 data/valid/1-00/92.jpg
10 data/valid/1-00/96.jpg
11 data/valid/1-05/0.jpg
12 data/valid/1-05/15.jpg
13 data/valid/1-05/22.jpg
14 data/valid/1-05/31.jpg
15 data/valid/1-05/49.jpg
16 data/valid/1-05/5.jpg
```

修改標籤分類

my_obj.data

```
1 classes  =  144
2 train    =  data/my_train.txt
3 valid    =  data/my_val.txt
4 names  =  data/my_obj.names
5 backup  =  /my_drive/yolov4-tiny_time/
```

my_obj.names

```
1 1_00
2 1_05
3 1_10
4 1_15
5 1_20
6 1_25
7 1_30
8 1_35
9 1_40
10 1_45
11 1_50
12 1_55
```

TIME -Image Dataset-Classification

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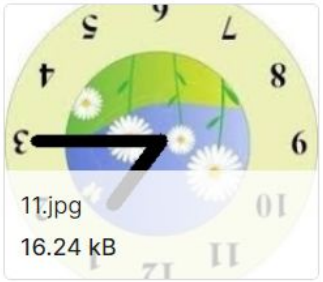
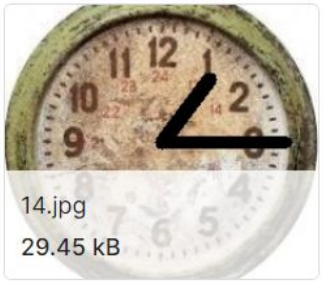
1-15 (10 files)

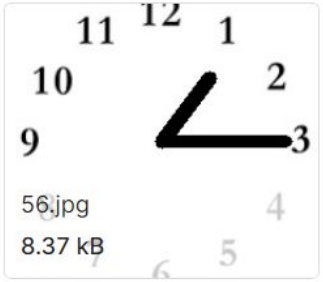

0.jpg
22.57 kB


11.jpg
16.24 kB


14.jpg
29.45 kB


21.jpg
17.51 kB


26.jpg
13.75 kB


56.jpg
8.37 kB

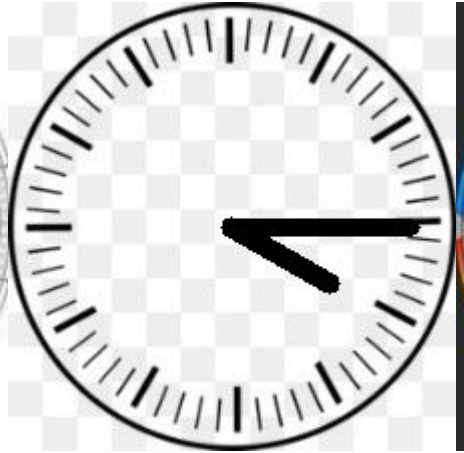
Data Explorer

418.7 MB

- test
- train
- valid
  - 1-00
  - 1-05
  - 1-10
  - 1-15
    - 0.jpg
    - 11.jpg
    - 14.jpg
    - 21.jpg
    - 26.jpg
    - 56.jpg
    - 61.jpg

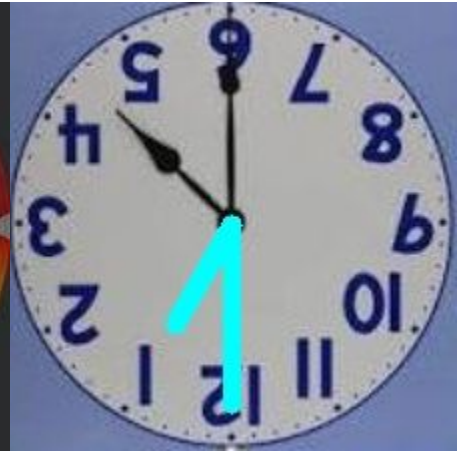
資料集圖片檔

\train\1-00\15.jpg



\train\1-00\0.jpg

\train\1-00\39.jpg



\train\1-00\65.jpg

批量創建TXT檔

```
import os
for layer1 in ['train', 'valid']:
    classes = os.listdir('/content/darknet/data/'+layer1)
    for layer2 in classes:
        files = os.listdir('/content/darknet/data/'+layer1+'/'+layer2)
        os.chdir('/content/darknet/data/'+layer1+'/'+layer2)
        classes_num = int((int(layer2[:-3])-1)*12+int(layer2[-2:])/5)
        for layer3 in files:
            f = open(layer3[:-4]+'.txt', 'w')
            f.write(str(classes_num)+' 0.5 0.5 1 1')
            f.close()
```

/content/darknet/data/train/1-00/0.jpg

classes = [‘1-00’,’1-05’,...,’9-55’]

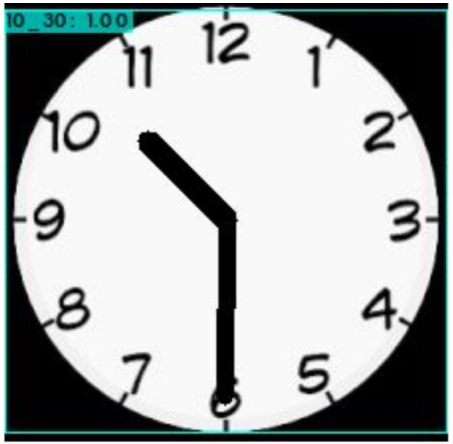
files = [‘0.jpg’,’1.jpg’,...,’99.jpg’]

YOLOv4-tiny Darknet 訓練結果

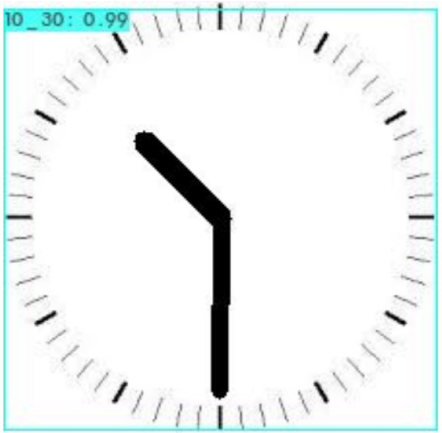
```
H23888/288000: loss=0.3 hours left=53.0
 23888: 0.271762, 0.174612 avg loss, 0.002610 rate, 0.682971 seconds, 1528832 images, 53.021074 hours left
OpenCV exception: draw_train_loss()
Loaded: 0.000083 seconds
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 30 Avg (IOU: 0.867869), count: 64, class_loss = 0.396061, iou_loss = 0.045137, total_loss = 0.44
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 37 Avg (IOU: 0.000000), count: 1, class_loss = 0.000000, iou_loss = 0.000000, total_loss = 0.000
 total_bbox = 1528667, rewritten_bbox = 0.000000 %

 Tensor Cores are used.
H23889/288000: loss=0.2 hours left=53.0
 23889: 0.198103, 0.176961 avg loss, 0.002610 rate, 0.687249 seconds, 1528896 images, 52.991973 hours left
OpenCV exception: draw_train_loss()
Loaded: 0.000087 seconds
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 30 Avg (IOU: 0.856429), count: 64, class_loss = 0.400641, iou_loss = 0.043511, total_loss = 0.44
v3 (iou loss, Normalizer: (iou: 0.07, obj: 1.00, cls: 1.00) Region 37 Avg (IOU: 0.000000), count: 1, class_loss = 0.000000, iou_loss = 0.000000, total_loss = 0.000
 total_bbox = 1528731, rewritten_bbox = 0.000000 %

 Tensor Cores are used.
H23890/288000: loss=0.2 hours left=53.0
 23890: 0.200399, 0.179305 avg loss, 0.002610 rate, 0.741142 seconds, 1528960 images, 52.966316 hours left
OpenCV exception: draw_train_loss()
Loaded: 0.000081 seconds
```

取得10000.weigths、20000.weigths、last.weigths

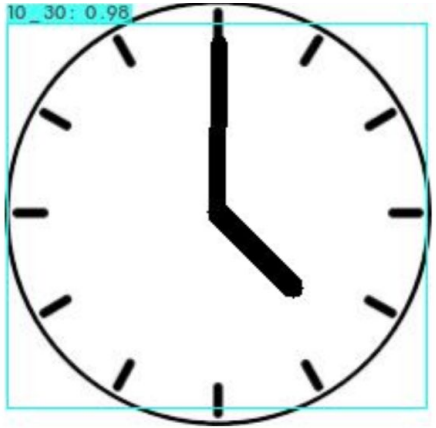
測驗圖片檔



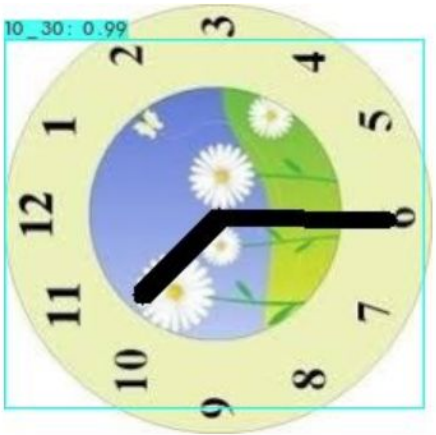
\test\10-30\26.jpg



\test\10-30\38.jpg

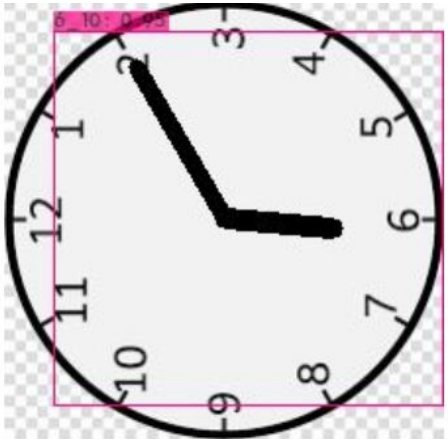


\test\10-30\51.jpg

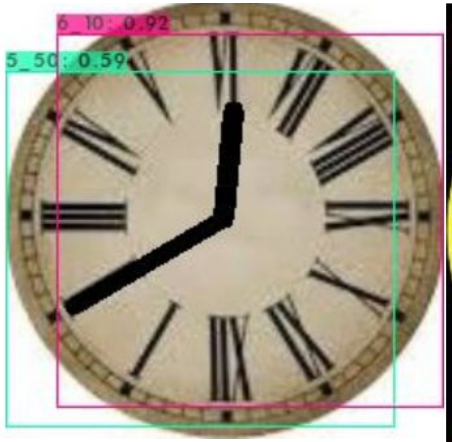


\test\10-30\11.jpg

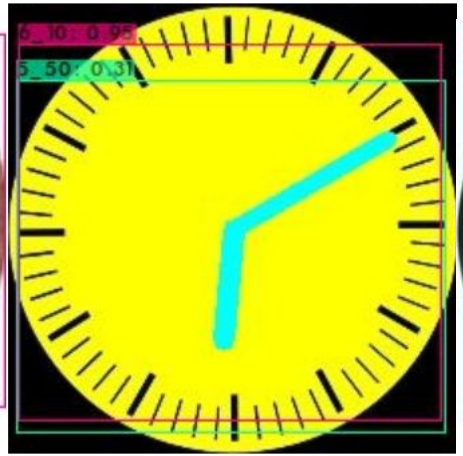
測驗圖片檔



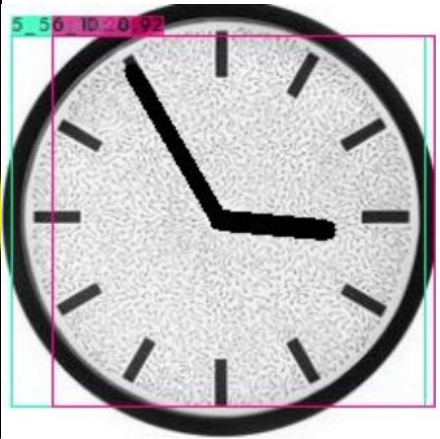
\test\6-10\10.jpg



\test\6-10\27.jpg



\test\6-10\36.jpg



\test\6-10\92.jpg

影響原因: 1.訓練次數只取到20000/288000

2.5_50與6_10指針角度差一致(125度)，呈現軸對稱(以6:00為軸)

問題與討論

- 如果鐘面旋轉角度不一?

  識別出刻度，藉由指針與刻度角度差來計算時間。

- 如何識別更為精確的時間?

  霍夫變換:一種特徵提取技術，可以識別出物件形狀。

  利用霍夫線變換求得時針、分針、秒針，透過角度差計算出時間。

- 如果資料集未經過預處理?

  先透過模型鎖定鐘面定位。

  利用霍夫圓變換求得鐘面，利用霍夫線變換計算時間。