

التدريب الصيفي 2
SUMMER TRAINING 2

التدريب التقني المتقدم لمعمل إنترنت الأشياء

لصيف ١٤٤١ هـ - ٢٠٢٠



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وادي طيبة
TAIBAH VALLEY

التدريب الصيفي 2
SUMMER TRAINING 2

مشروع التخرج

نظام جمع بيانات دقيق في عملية
توزيع عبوات مياه الشرب مبني
على تقنية إنترنت الأشياء



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الطلاب المشاركون:

وادي طيبة
TAIBAH VALLEY

محمد عدي عثمان، صلاح الدين الكفراوي، مازن عبدالله.

تعريف المشكلة:

مصرفات
غير مباشرة

مجهود ضائع

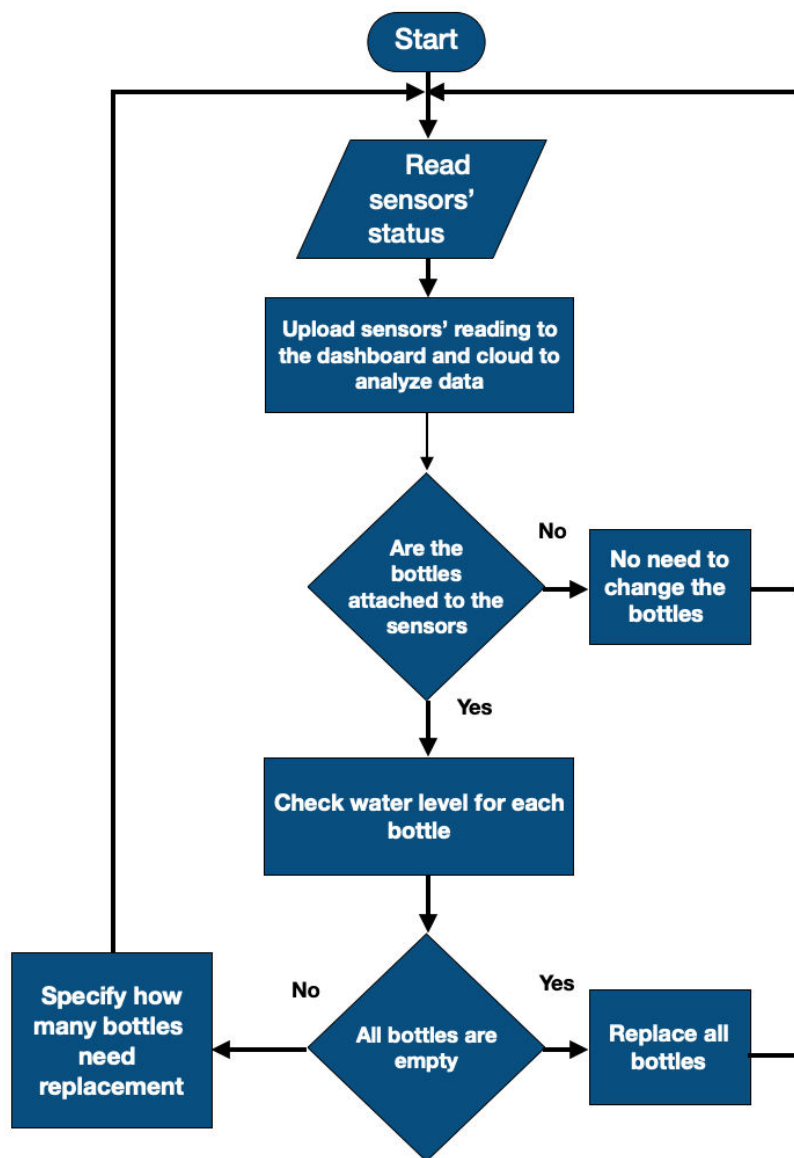
وقود ضائع

وقت ضائع

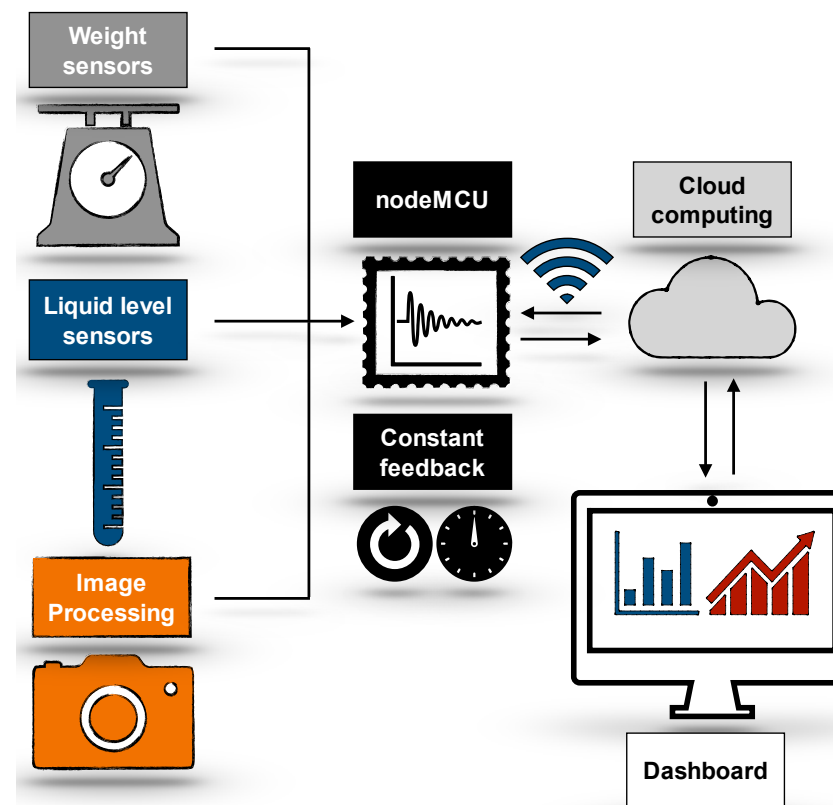
صعوبة الشراء
مقارنة
بالتسوق
الإلكتروني



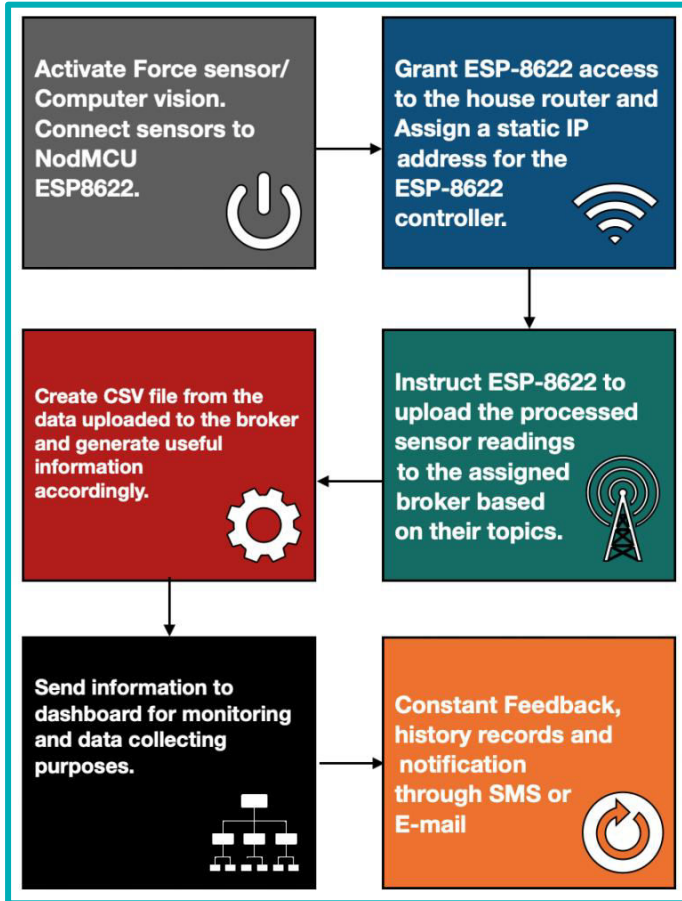
Flowchart



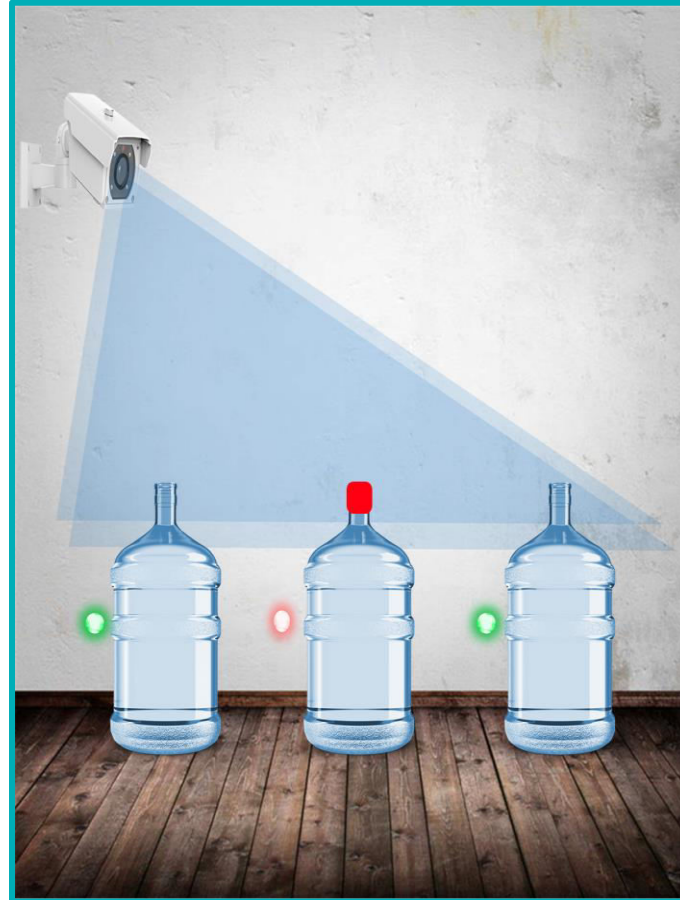
Architecture



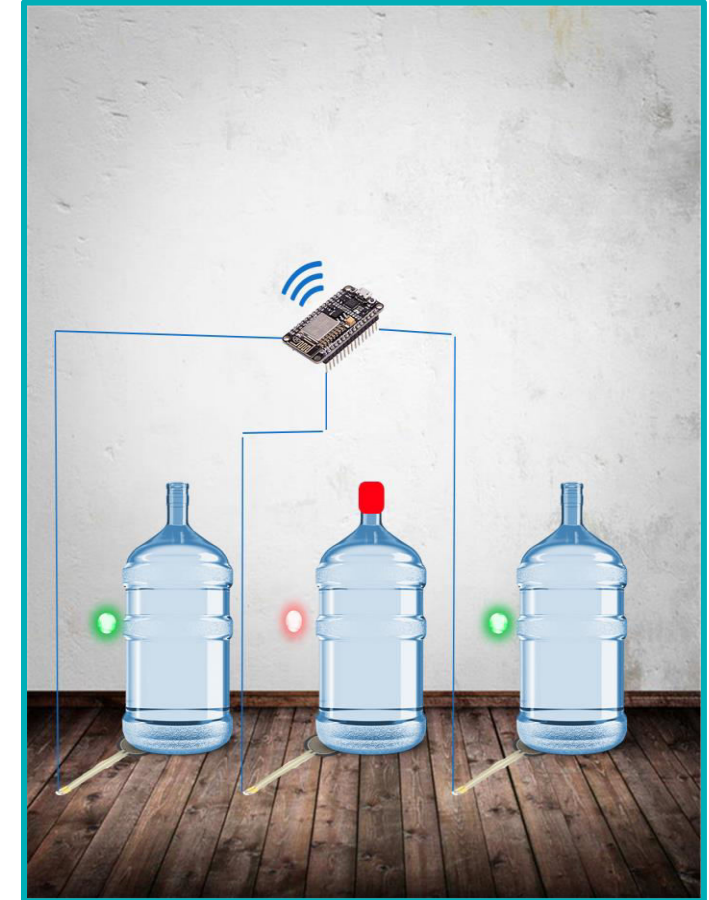
Procedure



Computer Vision

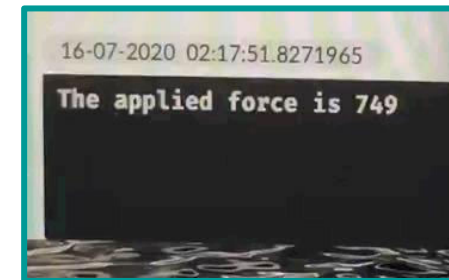
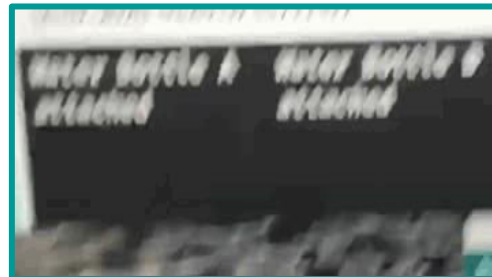
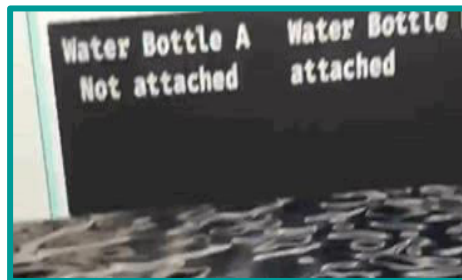
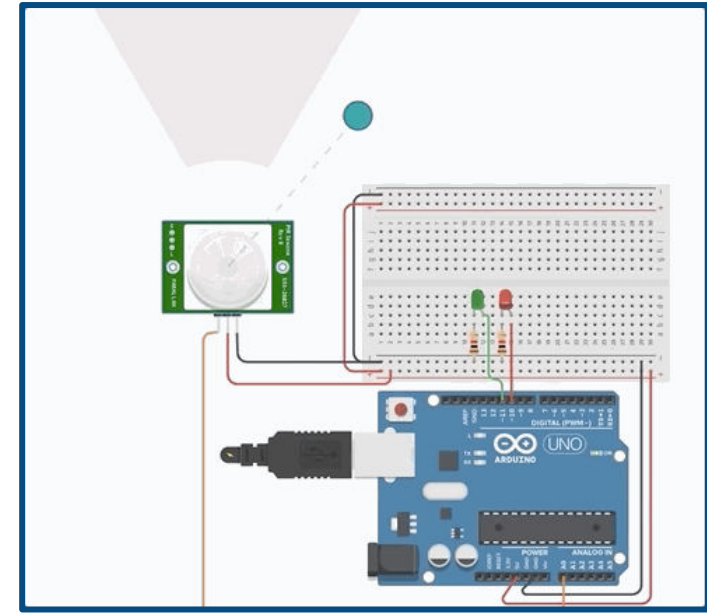
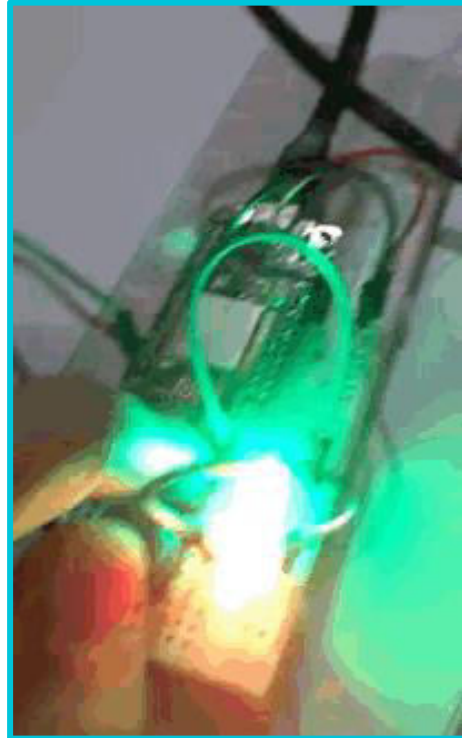


Analog Sensors



Sensors Based Solutions:

- A. Mechanical solutions
- B. InfraRed solution
- C. Force sensors solution



Computer vision Based Solutions:



```
total_loss = 196036, rewritten_loss = 0.000000 %
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 161 Avg (IOU: 0.509145, GSD: 0.451215), Class: 0.621771, Obj: 0.420093, No Obj: 0.006422, .58
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 139 Avg (IOU: 0.000000, GSD: 0.000000), Class: 0.000000, Obj: 0.000000, No Obj: 0.000129, .58
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 150 Avg (IOU: 0.656304, GSD: 0.591647), Class: 0.535292, Obj: 0.573774, No Obj: 0.002416, .58
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 161 Avg (IOU: 0.465849, GSD: 0.408461), Class: 0.607632, Obj: 0.460063, No Obj: 0.004816, .58
total_loss = 194551, rewritten_loss = 0.000000 %
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 139 Avg (IOU: 0.000000, GSD: 0.000000), Class: 0.000000, Obj: 0.000000, No Obj: 0.000130, .58
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 150 Avg (IOU: 0.538764, GSD: 0.497115), Class: 0.573415, Obj: 0.200994, No Obj: 0.001895, .58
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 161 Avg (IOU: 0.492105, GSD: 0.490245), Class: 0.536987, Obj: 0.514524, No Obj: 0.005899, .58
total_loss = 191646, rewritten_loss = 0.000000 %
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 139 Avg (IOU: 0.000000, GSD: 0.000000), Class: 0.000000, Obj: 0.000000, No Obj: 0.000127, .58
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 150 Avg (IOU: 0.647954, GSD: 0.655539), Class: 0.505160, Obj: 0.133995, No Obj: 0.001855, .58
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 161 Avg (IOU: 0.485182, GSD: 0.465478), Class: 0.662946, Obj: 0.368121, No Obj: 0.006137, .58
total_loss = 194081, rewritten_loss = 0.000000 %
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 139 Avg (IOU: 0.000000, GSD: 0.000000), Class: 0.000000, Obj: 0.000000, No Obj: 0.000140, .58
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 150 Avg (IOU: 0.633097, GSD: 0.620116), Class: 0.605528, Obj: 0.171941, No Obj: 0.001926, .58
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 161 Avg (IOU: 0.453315, GSD: 0.427500), Class: 0.674732, Obj: 0.398932, No Obj: 0.004854, .58
total_loss = 194094, rewritten_loss = 0.000000 %
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 139 Avg (IOU: 0.081462, GSD: -0.560352), Class: 0.513692, Obj: 0.000200, No Obj: 0.000132, .58
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 150 Avg (IOU: 0.585066, GSD: 0.513365), Class: 0.562609, Obj: 0.249899, No Obj: 0.002016, .58
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 161 Avg (IOU: 0.500895, GSD: 0.462894), Class: 0.597811, Obj: 0.534799, No Obj: 0.009704, .58
total_loss = 191126, rewritten_loss = 0.000000 %
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 139 Avg (IOU: 0.414875, GSD: 0.229098), Class: 0.512878, Obj: 0.000559, No Obj: 0.000164, .58
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 150 Avg (IOU: 0.480182, GSD: 0.396157), Class: 0.520216, Obj: 0.157499, No Obj: 0.003893, .58
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 161 Avg (IOU: 0.505974, GSD: 0.477113), Class: 0.572731, Obj: 0.227029, No Obj: 0.009919, .58
total_loss = 194177, rewritten_loss = 0.000000 %
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 139 Avg (IOU: 0.327708, GSD: 0.143138), Class: 0.494057, Obj: 0.000327, No Obj: 0.000176, .58
v3 (iou loss, Normalizer: (iou: 0.07, cls: 1.00) Region 150 Avg (IOU: 0.511437, GSD: 0.466723), Class: 0.516945, Obj: 0.146870, No Obj: 0.004937, .58
```

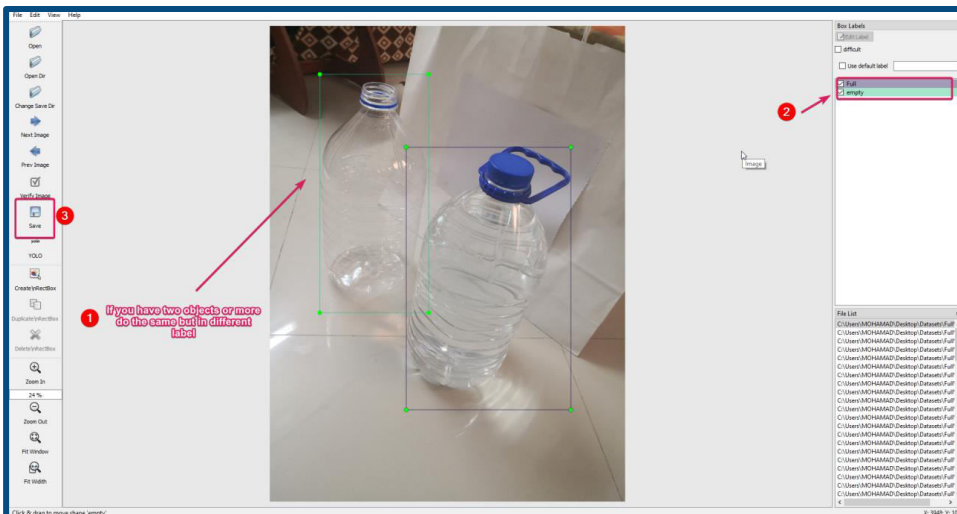
Results:

After 1300 iterations and 14 hours of training:

□ mean average precision = 86.13 %

average losses:

- Empty item < 1.2
- Full item < 1.4



```
vid = cv2.VideoCapture(video_path)
```

```
out = None
```

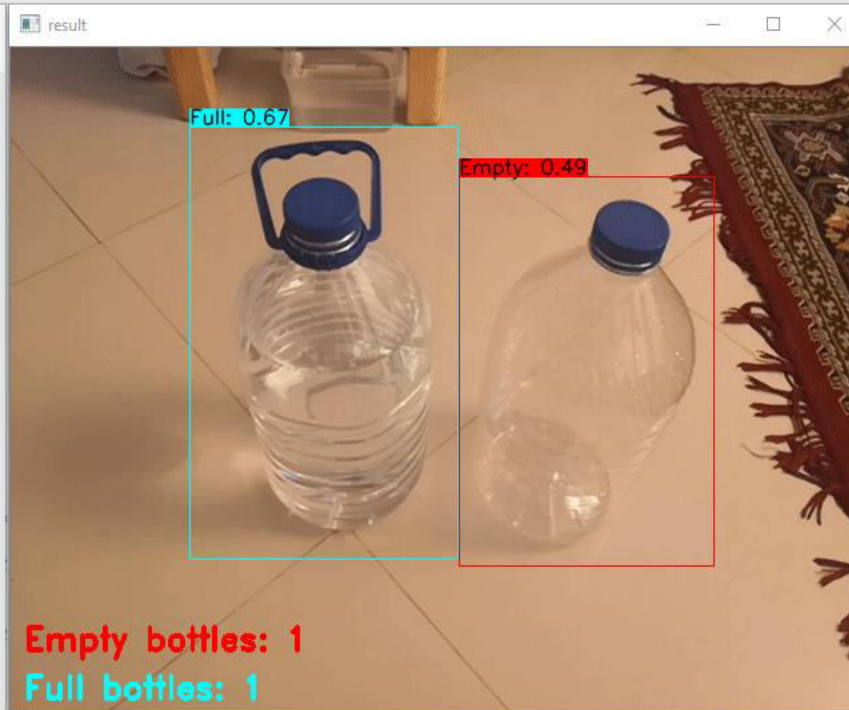
```
if FLAGS.output:
    # by default VideoCapture returns float instead of int
    width = int(vid.get(cv2.CAP_PROP_FRAME_WIDTH))
    height = int(vid.get(cv2.CAP_PROP_FRAME_HEIGHT))
    fps = int(vid.get(cv2.CAP_PROP_FPS))
```

```
*Python 3.6.7 Shell
File Edit Shell Debug Options Window Help

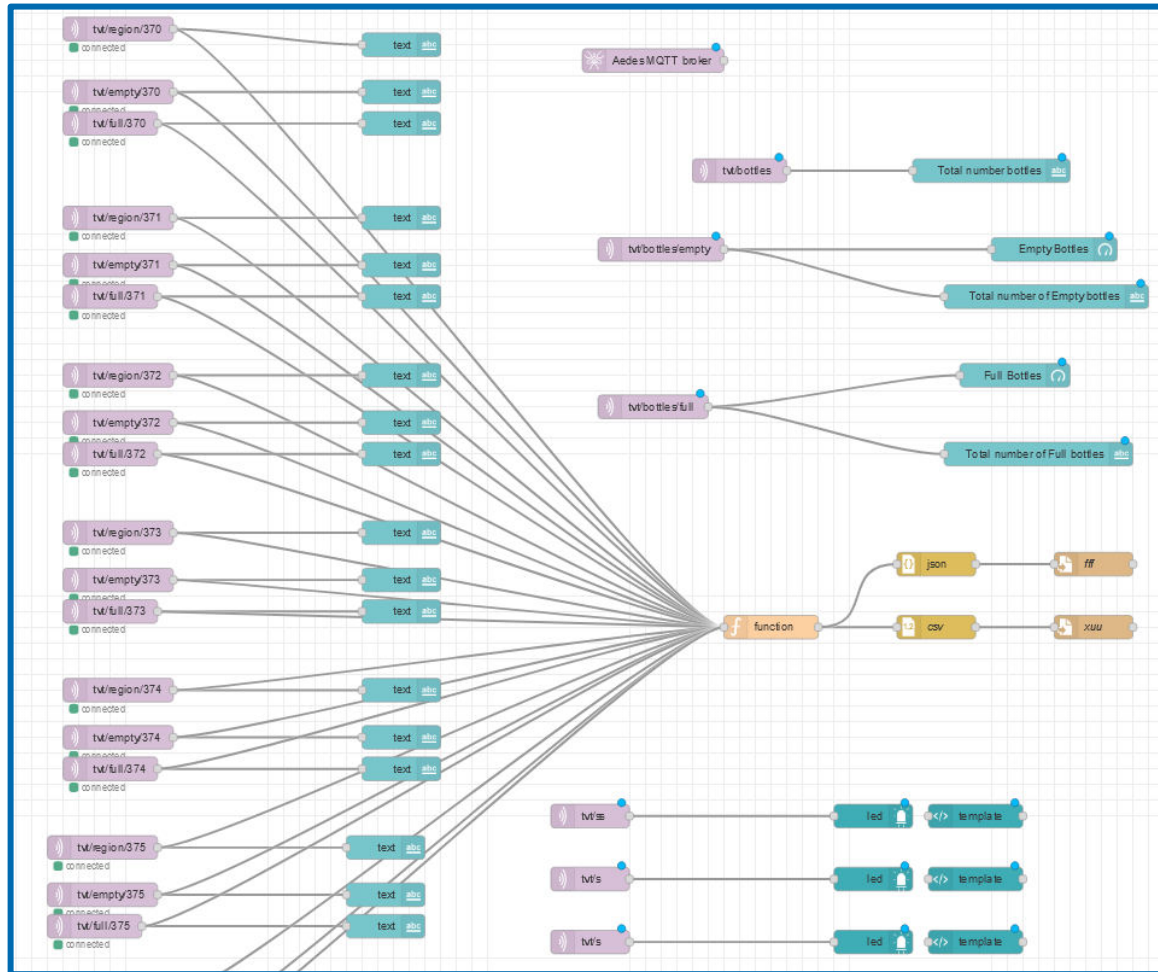
1 1
Bottle 1: Full      :confidence score: 0.64
Bottle 2: Empty     :confidence score: 0.44
1 1
Bottle 1: Full      :confidence score: 0.7
Bottle 2: Empty     :confidence score: 0.42
1 1
Bottle 1: Full      :confidence score: 0.73
Bottle 2: Empty     :confidence score: 0.41
1 1
Bottle 1: Full      :confidence score: 0.73
Bottle 2: Empty     :confidence score: 0.42
1 1
Bottle 1: Full      :confidence score: 0.71
1 0
Bottle 1: Full      :confidence score: 0.62
1 0
Bottle 1: Full      :confidence score: 0.67
Bottle 2: Empty     :confidence score: 0.49
1 1
Bottle 1: Full      :confidence score: 0.63
Bottle 2: Empty     :confidence score: 0.43
1 1
Bottle 1: Full      :confidence score: 0.66
Bottle 2: Empty     :confidence score: 0.58
1 1
Bottle 1: Full      :confidence score: 0.71
1 0
Bottle 1: Full      :confidence score: 0.67
Bottle 2: Empty     :confidence score: 0.5
1 1
Bottle 1: Full      :confidence score: 0.67
Bottle 2: Empty     :confidence score: 0.42
1 1
Bottle 1: Full      :confidence score: 0.64
1 0
Bottle 1: Full      :confidence score: 0.67
Bottle 2: Empty     :confidence score: 0.49
1 1

Ln: 5 Col: 0

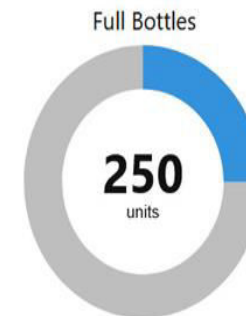
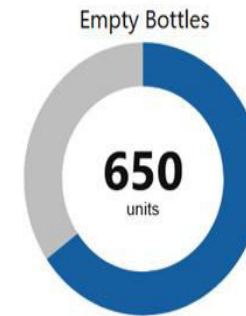
pred_bbox = [boxes.numpy(), scores.numpy(), classes.numpy(), valid_detections.numpy()]
d1 = pred_bbox[2].ravel().tolist()
d2 = pred_bbox[1].ravel().tolist()
f = 0
```



Dashboard



Water Bottles



Total number of Empty bottles 650
 Total number of Full bottles 250
 Total number bottles 750

City/district



MED:Qiblatain, ID:370

MED:Qiblatain, ID:371

MED:Qiblatain, ID:372

MED:Qiblatain, ID:373

MED:Qiblatain, ID:374

MED:Qiblatain, ID:375

MED:Qiblatain, ID:375

Empty Bottles



3

5

0

0

3

1

7

Full Bottles



4

0

2

2

3

4

1

Data Collection

```

C:\Users\MOHAMAD\Desktop\data.json - Notepad++
File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?
data.json
1 {"Time":1595227516760,"Topic":"tvt/region/370","Status":"MED:Qiblatain, ID:370"}
2 {"Time":1595227516761,"Topic":"tvt/empty/370","Status":"3"}
3 {"Time":1595227516763,"Topic":"tvt/full/370","Status":"4"}
4 {"Time":1595227516763,"Topic":"tvt/region/371","Status":"MED:Qiblatain, ID:371"}
5 {"Time":1595227516764,"Topic":"tvt/empty/371","Status":"5"}
6 {"Time":1595227516764,"Topic":"tvt/full/371","Status":"0"}
7 {"Time":1595227516765,"Topic":"tvt/region/372","Status":"MED:Qiblatain, ID:372"}
8 {"Time":1595227516766,"Topic":"tvt/empty/372","Status":"0"}
9 {"Time":1595227516766,"Topic":"tvt/full/372","Status":"2"}
10 {"Time":1595227516766,"Topic":"tvt/region/373","Status":"MED:Qiblatain, ID:373"}
11 {"Time":1595227516767,"Topic":"tvt/empty/373","Status":"0"}
12 {"Time":1595227516767,"Topic":"tvt/full/373","Status":"2"}
13 {"Time":1595227516768,"Topic":"tvt/region/374","Status":"MED:Qiblatain, ID:374"}
14 {"Time":1595227516974,"Topic":"tvt/empty/374","Status":"3"}
15 {"Time":1595227516974,"Topic":"tvt/full/374","Status":"3"}
16 {"Time":1595227516974,"Topic":"tvt/region/375","Status":"MED:Qiblatain, ID:375"}
17 {"Time":1595227516975,"Topic":"tvt/empty/375","Status":"1"}
18 {"Time":1595227516975,"Topic":"tvt/full/375","Status":"4"}
19 {"Time":1595227516975,"Topic":"tvt/region/376","Status":"MED:Qiblatain, ID:376"}
20 {"Time":1595227516975,"Topic":"tvt/empty/376","Status":"7"}
21 {"Time":1595227516975,"Topic":"tvt/full/376","Status":"1"}
22

```

	A	B	C
1	Time	Topic	Status
2	1.5952E+12	tvt/region/370	MED:Qiblatain, ID:370
3	1.5952E+12	tvt/empty/370	3
4	1.5952E+12	tvt/full/370	4
5	1.5952E+12	tvt/region/371	MED:Qiblatain, ID:371
6	1.5952E+12	tvt/empty/371	5
7	1.5952E+12	tvt/full/371	0
8	1.5952E+12	tvt/region/372	MED:Qiblatain, ID:372
9	1.5952E+12	tvt/empty/372	0
10	1.5952E+12	tvt/full/372	2
11	1.5952E+12	tvt/region/373	MED:Qiblatain, ID:373
12	1.5952E+12	tvt/empty/373	0
13	1.5952E+12	tvt/full/373	2
14	1.5952E+12	tvt/region/374	MED:Qiblatain, ID:374
15	1.5952E+12	tvt/empty/374	3
16	1.5952E+12	tvt/full/374	3
17	1.5952E+12	tvt/region/375	MED:Qiblatain, ID:375
18	1.5952E+12	tvt/empty/375	1
19	1.5952E+12	tvt/full/375	4
20	1.5952E+12	tvt/region/376	MED:Qiblatain, ID:376
21	1.5952E+12	tvt/empty/376	7
22	1.5952E+12	tvt/full/376	1



خطة الاستدامة - تحت التطوير

تكلفة تطوير
رخيصة

Open-Source
platforms

نظام سهل وغير
معقد

Friendly
interface

موثوقية ودقة
عالية
Reliability

Accuracy of
86% "first
prototype"

مرونة كبيرة
Scalability

Different
applications
and fields

