

Mounting Google Drive

```
%cd ..  
from google.colab import drive  
drive.mount('/content/gdrive')  
  
# Linking folder  
!ln -s /content/gdrive/My\ Drive/ /mydrive
```

Cloning Darknet Git Repository

```
!git clone https://github.com/AlexeyAB/darknet
```

```
# Enabling OPENCV and GPU  
%cd darknet/  
!sed -i 's/OPENCV=0/OPENCV=1/' Makefile  
!sed -i 's/GPU=0/GPU=1/' Makefile  
!sed -i 's/CUDNN=0/CUDNN=1/' Makefile  
!sed -i 's/CUDNN_HALF=0/CUDNN_HALF=1/' Makefile  
!sed -i 's/LIBSO=0/LIBSO=1/' Makefile  
  
/darknet
```

```
# building darknet  
!make
```

```
%cd data/  
!find -maxdepth 1 -type f -exec rm -rf {} \;  
%cd ..  
%rm -rf cfg/  
%mkdir cfg  
  
/darknet/data  
/darknet
```

```
# Unzip the obj.zip dataset and its contents into darknet/data  
!unzip /mydrive/yolov4/obj.zip -d data/
```

```
!cp /mydrive/yolov4/yolov4-custom.cfg cfg
```

```
!cp /mydrive/yolov4/obj.names data  
!cp /mydrive/yolov4/obj.data data
```

```
!cp /mydrive/yolov4/process.py .
```

```
# partitions dataset for training and testing
!python process.py

/darknet

!ls data/
    labels  obj  obj.data  obj.names  test.txt  train.txt

# Downloading the pre-trained YOLOv4 weights
!wget https://github.com/AlexeyAB/darknet/releases/download/darknet_yolo_v3_optimal/yolov4.weights
```

Model Training

```
!./darknet detector train data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolov4.weights
```

Helper Functions to show results

```
# function to show images

def imshow(path):
    import cv2
    import matplotlib.pyplot as plt
    %matplotlib inline
    image = cv2.imread(path)
    height, width = image.shape[:2]
    resized_image = cv2.resize(image,(3*width, 3*height), interpolation = cv2.INTER_CUBIC)
    fig = plt.gcf()
    fig.set_size_inches(18, 10)
    plt.axis("off")
    plt.imshow(cv2.cvtColor(resized_image, cv2.COLOR_BGR2RGB))
    plt.show()
```

Checking MAP (Mean Average Precision)

```
!./darknet detector map data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolov4.weights

!./darknet detector map data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolov4.weights

!./darknet detector map data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolov4.weights

!./darknet detector map data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolov4.weights
```

```
!./darknet detector map data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolov
```

```
77 conv    256      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
78 conv    256      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
80 conv    256      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
81 conv    256      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
83 conv    256      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
84 route   83 56                -> 38 x 38 x 512
85 conv    512      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
86 conv    1024     3 x 3/ 2      38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
87 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
88 route   86                -> 19 x 19 x 1024
89 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
90 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
91 conv    512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
93 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
94 conv    512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
96 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
97 conv    512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
99 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
100 conv   512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
102 conv   512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
103 route  102 87                -> 19 x 19 x 1024
104 conv   1024     1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
105 conv   512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
106 conv   1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
107 conv   512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
108 max    5x 5/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
109 route  107                -> 19 x 19 x 512
110 max    9x 9/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.015 BF
111 route  107                -> 19 x 19 x 512
112 max    13x13/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.031 BF
113 route  112 110 108 107          -> 19 x 19 x 2048
114 conv   512      1 x 1/ 1      19 x 19 x 2048 -> 19 x 19 x 512 0.757 BF
115 conv   1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
116 conv   512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
117 conv   256      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 256 0.095 BF
118 upsample          2x      19 x 19 x 256 -> 38 x 38 x 256
119 route  85                -> 38 x 38 x 512
120 conv   256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
121 route  120 118          -> 38 x 38 x 512
122 conv   256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
123 conv   512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
124 conv   256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
125 conv   512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
126 conv   256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
127 conv   128      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 128 0.095 BF
128 upsample          2x      38 x 38 x 128 -> 76 x 76 x 128
129 route  54                -> 76 x 76 x 256
130 conv   128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
131 route  130 128          -> 76 x 76 x 256
132 conv   128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
133 conv   256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
```

```
!./darknet detector map data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolov4-custom_last.weights  
137 conv    256      3 x 3/ 1      76 x   76 x 128 -> 76 x   76 x 256 3.407 BF  
138 conv     24       1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x   24 0.071 BF  
139 yolo  
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00,  
nms_kind: greedy_nms (1), beta = 0.600000  
140 route   136                          -> 76 x   76 x 128  
141 conv    256      3 x 3/ 2      76 x   76 x 128 -> 38 x   38 x 256 0.852 BF  
142 route   141 126                      -> 38 x   38 x 512  
143 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF  
144 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF  
145 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF  
146 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF  
147 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF  
148 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF  
149 conv    24       1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x   24 0.035 BF  
150 yolo  
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00,  
nms_kind: greedy_nms (1), beta = 0.600000  
151 route   147                          -> 38 x   38 x 256  
152 conv    512      3 x 3/ 2      38 x   38 x 256 -> 19 x   19 x 512 0.852 BF  
153 route   152 116                      -> 19 x   19 x 1024  
154 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF  
155 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF  
156 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF  
157 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF  
158 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF  
159 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF  
160 conv    24       1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x   24 0.018 BF  
161 yolo  
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00,  
nms_kind: greedy_nms (1), beta = 0.600000  
Total BFLOPS 127.263  
avg_outputs = 1046775  
Allocate additional workspace_size = 6.65 MB  
Loading weights from /mydrive/yolov4/training/yolov4-custom_last.weights...  
seen 64, trained: 147 K-images (2 Kilo-batches_64)  
Done! Loaded 162 layers from weights-file  
  
calculation mAP (mean average precision)...  
Detection layer: 139 - type = 28  
Detection layer: 150 - type = 28  
Detection layer: 161 - type = 28  
164  
detections_count = 344, unique_truth_count = 147  
class_id = 0, name = Visible change without cavitation, ap = 75.76%      (TP = 47,  
class_id = 1, name = Visible change with microcavitation, ap = 66.81%      (  
class_id = 2, name = Visible change with cavitation, ap = 51.84%      (TP = 18,  
  
for conf_thresh = 0.25, precision = 0.75, recall = 0.78, F1-score = 0.77  
for conf_thresh = 0.25, TP = 115, FP = 38, FN = 32, average IoU = 55.08 %  
  
IoU threshold = 50 %, used Area-Under-Curve for each unique Recall  
mean average precision (mAP@0.50) = 0.648020, or 64.80 %  
Total Detection Time: 20 Seconds  
  
Set -points flag:  
`-points 101` for MS COCO
```

```
points 101 for RS COCO
```

```
# Setting up for test mode
%cd cfg
!sed -i 's/batch=64/batch=1/' yolov4-custom.cfg
!sed -i 's/subdivisions=16/subdivisions=1/' yolov4-custom.cfg
%cd ..

/darknet/cfg
/darknet

!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc
imShow('predictions.jpg')

#import matplotlib.pyplot as plt
#import cv2

import os, sys
Pixel_3_dirs = os.listdir('/content/gdrive/MyDrive/tooth/Processed images/Google Pixel 3/')
Iphone_6_dirs = os.listdir('/content/gdrive/MyDrive/tooth/Processed images/Iphone 6s/')
S_A12 = os.listdir('/content/gdrive/MyDrive/tooth/Processed images/Samsung A12/')
S_A31 = os.listdir('/content/gdrive/MyDrive/tooth/Processed images/Samsung A31/')
S_S10 = os.listdir('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10/')
S_S10_5G = os.listdir('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10 5G/')
S_S10e = os.listdir('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10e/')
S_S20 = os.listdir('/content/gdrive/MyDrive/tooth/Processed images/Samsung S20/')

Pixel_3_dirs

['3. Secondary caries 2nd Premolar, Pixel 3.png',
 '5. Pulp Necrosis lower 1st molar, Pixel 3.png',
 '1. Root Caries 1st Molar, Pixel 3.png',
 '2. Pulp Necrosis 2nd Molar, Pixel 3.png',
 '6. root caries 2nd Molar, Pixel 3.png',
 '4. Pulp Necrosis 3rd Molar, Pixel 3.png']

import matplotlib.pyplot as plt
import numpy as np

!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc
plt.subplot(1, 6, 1)
imShow('predictions.jpg')

!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc
plt.subplot(1, 6, 2)
imShow('predictions.jpg')

!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc
plt.subplot(1, 6, 3)
imShow('predictions.jpg')

!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc
plt.subplot(1, 6, 4)
```

```
-----, , ,  
imShow('predictions.jpg')  
  
!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc  
plt.subplot(1, 6, 5)  
imShow('predictions.jpg')  
  
!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc  
plt.subplot(1, 6, 6)  
imShow('predictions.jpg')
```

```

CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
    layer   filters   size/strd(dil)      input           output
    0 Create CUDA-stream - 0
Create cudnn-handle 0
conv    32      3 x 3/ 1     608 x 608 x   3 -> 608 x 608 x   32 0.639 BF
1 conv    64      3 x 3/ 2     608 x 608 x   32 -> 304 x 304 x   64 3.407 BF
2 conv    64      1 x 1/ 1     304 x 304 x   64 -> 304 x 304 x   64 0.757 BF
3 route   1                  -> 304 x 304 x   64
4 conv    64      1 x 1/ 1     304 x 304 x   64 -> 304 x 304 x   64 0.757 BF
5 conv    32      1 x 1/ 1     304 x 304 x   64 -> 304 x 304 x   32 0.379 BF
6 conv    64      3 x 3/ 1     304 x 304 x   32 -> 304 x 304 x   64 3.407 BF
7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x   64 0.006 BF
8 conv    64      1 x 1/ 1     304 x 304 x   64 -> 304 x 304 x   64 0.757 BF
9 route   8 2                  -> 304 x 304 x 128
10 conv   64      1 x 1/ 1     304 x 304 x 128 -> 304 x 304 x   64 1.514 BF
11 conv   128     3 x 3/ 2     304 x 304 x   64 -> 152 x 152 x 128 3.407 BF
12 conv   64      1 x 1/ 1     152 x 152 x 128 -> 152 x 152 x   64 0.379 BF
13 route   11                 -> 152 x 152 x 128
14 conv   64      1 x 1/ 1     152 x 152 x 128 -> 152 x 152 x   64 0.379 BF
15 conv   64      1 x 1/ 1     152 x 152 x   64 -> 152 x 152 x   64 0.189 BF
16 conv   64      3 x 3/ 1     152 x 152 x   64 -> 152 x 152 x   64 1.703 BF
17 Shortcut Layer: 14, wt = 0, wn = 0, outputs: 152 x 152 x   64 0.001 BF
18 conv   64      1 x 1/ 1     152 x 152 x   64 -> 152 x 152 x   64 0.189 BF
19 conv   64      3 x 3/ 1     152 x 152 x   64 -> 152 x 152 x   64 1.703 BF
20 Shortcut Layer: 17, wt = 0, wn = 0, outputs: 152 x 152 x   64 0.001 BF
21 conv   64      1 x 1/ 1     152 x 152 x   64 -> 152 x 152 x   64 0.189 BF
22 route  21 12                 -> 152 x 152 x 128
23 conv   128     1 x 1/ 1     152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
24 conv   256     3 x 3/ 2     152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
25 conv   128     1 x 1/ 1     76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
26 route   24                 -> 76 x 76 x 256
27 conv   128     1 x 1/ 1     76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
28 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
29 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
31 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
32 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
34 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
35 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
37 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
38 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
40 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
41 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
43 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
44 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
46 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
47 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
49 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
50 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF

```

51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 53 route 52 25 -> 76 x 76 x 256
 54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
 55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
 56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 57 route 55 -> 38 x 38 x 512
 58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 106 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 107 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 108 max 5x 5/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
 109 route 107 -> 19 x 19 x 512
 110 max 9x 9/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.015 BF

```

111 route 107
112 max           13x13/ 1      19 x   19 x 512 -> 19 x   19 x 512 0.031 BF
113 route 112 110 108 107
114 conv    512      1 x 1/ 1      19 x   19 x 2048 -> 19 x   19 x 512 0.757 BF
115 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
116 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
117 conv    256      1 x 1/ 1      19 x   19 x 512 -> 19 x   19 x 256 0.095 BF
118 upsample
119 route 85
120 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
121 route 120 118
122 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
123 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
124 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
125 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
126 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
127 conv    128      1 x 1/ 1      38 x   38 x 256 -> 38 x   38 x 128 0.095 BF
128 upsample
129 route 54
130 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
131 route 130 128
132 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
133 conv    256      3 x 3/ 1      76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
134 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
135 conv    256      3 x 3/ 1      76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
136 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
137 conv    256      3 x 3/ 1      76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
138 conv    24       1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 24 0.071 BF
139 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route 136
141 conv    256      3 x 3/ 2      76 x   76 x 128 -> 38 x   38 x 256 0.852 BF
142 route 141 126
143 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
144 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
145 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
146 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 24 0.035 BF
150 yolo

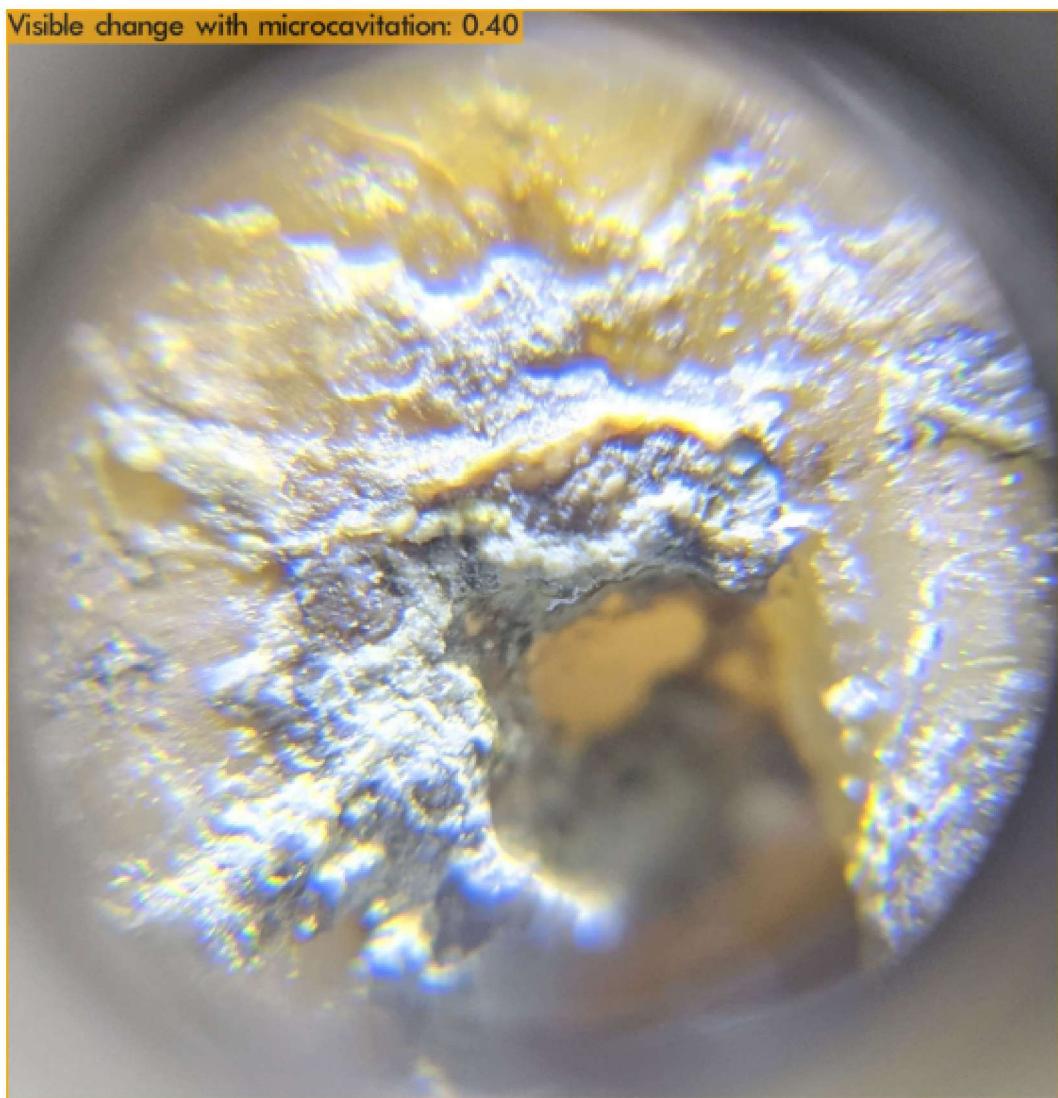
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route 147
152 conv    512      3 x 3/ 2      38 x   38 x 256 -> 19 x   19 x 512 0.852 BF
153 route 152 116
154 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB

```

```
Loading weights from /myarive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Google Pixel 3/1. Root Caries 1st Mol
Visible change with microcavitation: 40%
Unable to init server: Could not connect: Connection refused
```

(predictions:2139): Gtk-WARNING **: 11:53:00.514: cannot open display:



```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer    filters   size/strd(dil)      input           output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv      32        3 x 3/ 1      608 x 608 x     3 -> 608 x 608 x   32 0.639 BF
1 conv      64        3 x 3/ 2      608 x 608 x    32 -> 304 x 304 x   64 3.407 BF
2 conv      64        1 x 1/ 1      304 x 304 x    64 -> 304 x 304 x   64 0.757 BF
3 route     1          -> 304 x 304 x   64
4 conv      64        1 x 1/ 1      304 x 304 x    64 -> 304 x 304 x   64 0.757 BF
5 conv      32        1 x 1/ 1      304 x 304 x    64 -> 304 x 304 x   32 0.379 BF
6 conv      64        3 x 3/ 1      304 x 304 x    32 -> 304 x 304 x   64 3.407 BF
7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x   64 0.006 BF
8 conv      64        1 x 1/ 1      304 x 304 x    64 -> 304 x 304 x   64 0.757 BF
```

op	conv	04	\downarrow	x	$\downarrow/$	\downarrow	304	x	304	x	304	->	304	x	304	x	304	0.1/2/	304
9	route	8 2																	
10	conv	64	1	x	1/	1	304	x	304	x	128	->	304	x	304	x	64	1.514	BF
11	conv	128	3	x	3/	2	304	x	304	x	64	->	152	x	152	x	128	3.407	BF
12	conv	64	1	x	1/	1	152	x	152	x	128	->	152	x	152	x	64	0.379	BF
13	route	11																	
14	conv	64	1	x	1/	1	152	x	152	x	128	->	152	x	152	x	64	0.379	BF
15	conv	64	1	x	1/	1	152	x	152	x	64	->	152	x	152	x	64	0.189	BF
16	conv	64	3	x	3/	1	152	x	152	x	64	->	152	x	152	x	64	1.703	BF
17	Shortcut Layer:	14,	wt = 0,	wn = 0,	outputs:	152	x	152	x	64	0.001	BF							
18	conv	64	1	x	1/	1	152	x	152	x	64	->	152	x	152	x	64	0.189	BF
19	conv	64	3	x	3/	1	152	x	152	x	64	->	152	x	152	x	64	1.703	BF
20	Shortcut Layer:	17,	wt = 0,	wn = 0,	outputs:	152	x	152	x	64	0.001	BF							
21	conv	64	1	x	1/	1	152	x	152	x	64	->	152	x	152	x	64	0.189	BF
22	route	21 12																	
23	conv	128	1	x	1/	1	152	x	152	x	128	->	152	x	152	x	128	0.757	BF
24	conv	256	3	x	3/	2	152	x	152	x	128	->	76	x	76	x	256	3.407	BF
25	conv	128	1	x	1/	1	76	x	76	x	256	->	76	x	76	x	128	0.379	BF
26	route	24																	
27	conv	128	1	x	1/	1	76	x	76	x	256	->	76	x	76	x	128	0.379	BF
28	conv	128	1	x	1/	1	76	x	76	x	128	->	76	x	76	x	128	0.189	BF
29	conv	128	3	x	3/	1	76	x	76	x	128	->	76	x	76	x	128	1.703	BF
30	Shortcut Layer:	27,	wt = 0,	wn = 0,	outputs:	76	x	76	x	128	0.001	BF							
31	conv	128	1	x	1/	1	76	x	76	x	128	->	76	x	76	x	128	0.189	BF
32	conv	128	3	x	3/	1	76	x	76	x	128	->	76	x	76	x	128	1.703	BF
33	Shortcut Layer:	30,	wt = 0,	wn = 0,	outputs:	76	x	76	x	128	0.001	BF							
34	conv	128	1	x	1/	1	76	x	76	x	128	->	76	x	76	x	128	0.189	BF
35	conv	128	3	x	3/	1	76	x	76	x	128	->	76	x	76	x	128	1.703	BF
36	Shortcut Layer:	33,	wt = 0,	wn = 0,	outputs:	76	x	76	x	128	0.001	BF							
37	conv	128	1	x	1/	1	76	x	76	x	128	->	76	x	76	x	128	0.189	BF
38	conv	128	3	x	3/	1	76	x	76	x	128	->	76	x	76	x	128	1.703	BF
39	Shortcut Layer:	36,	wt = 0,	wn = 0,	outputs:	76	x	76	x	128	0.001	BF							
40	conv	128	1	x	1/	1	76	x	76	x	128	->	76	x	76	x	128	0.189	BF
41	conv	128	3	x	3/	1	76	x	76	x	128	->	76	x	76	x	128	1.703	BF
42	Shortcut Layer:	39,	wt = 0,	wn = 0,	outputs:	76	x	76	x	128	0.001	BF							
43	conv	128	1	x	1/	1	76	x	76	x	128	->	76	x	76	x	128	0.189	BF
44	conv	128	3	x	3/	1	76	x	76	x	128	->	76	x	76	x	128	1.703	BF
45	Shortcut Layer:	42,	wt = 0,	wn = 0,	outputs:	76	x	76	x	128	0.001	BF							
46	conv	128	1	x	1/	1	76	x	76	x	128	->	76	x	76	x	128	0.189	BF
47	conv	128	3	x	3/	1	76	x	76	x	128	->	76	x	76	x	128	1.703	BF
48	Shortcut Layer:	45,	wt = 0,	wn = 0,	outputs:	76	x	76	x	128	0.001	BF							
49	conv	128	1	x	1/	1	76	x	76	x	128	->	76	x	76	x	128	0.189	BF
50	conv	128	3	x	3/	1	76	x	76	x	128	->	76	x	76	x	128	1.703	BF
51	Shortcut Layer:	48,	wt = 0,	wn = 0,	outputs:	76	x	76	x	128	0.001	BF							
52	conv	128	1	x	1/	1	76	x	76	x	128	->	76	x	76	x	128	0.189	BF
53	route	52 25																	
54	conv	256	1	x	1/	1	76	x	76	x	256	->	76	x	76	x	256	0.757	BF
55	conv	512	3	x	3/	2	76	x	76	x	256	->	38	x	38	x	512	3.407	BF
56	conv	256	1	x	1/	1	38	x	38	x	512	->	38	x	38	x	256	0.379	BF
57	route	55																	
58	conv	256	1	x	1/	1	38	x	38	x	512	->	38	x	38	x	256	0.379	BF
59	conv	256	1	x	1/	1	38	x	38	x	256	->	38	x	38	x	256	0.189	BF
60	conv	256	3	x	3/	1	38	x	38	x	256	->	38	x	38	x	256	1.703	BF
61	Shortcut Layer:	58,	wt = 0,	wn = 0,	outputs:	38	x	38	x	256	0.000	BF							
62	conv	256	1	x	1/	1	38	x	38	x	256	->	38	x	38	x	256	0.189	BF
63	conv	256	3	x	3/	1	38	x	38	x	256	->	38	x	38	x	256	1.703	BF
64	Shortcut Layer:	61,	wt = 0,	wn = 0,	outputs:	38	x	38	x	256	0.000	BF							
65	conv	256	1	x	1/	1	38	x	38	x	256	->	38	x	38	x	256	0.189	BF
66	conv	256	3	x	3/	1	38	x	38	x	256	->	38	x	38	x	256	1.703	BF
67	Shortcut Layer:	64,	wt = 0,	wn = 0,	outputs:	38	x	38	x	256	0.000	BF							
68	conv	256	1	x	1/	1	38	x	38	x	256	->	38	x	38	x	256	0.189	BF

```

69 conv    256      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
71 conv    256      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
72 conv    256      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
74 conv    256      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
75 conv    256      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
77 conv    256      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
78 conv    256      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
80 conv    256      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
81 conv    256      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
83 conv    256      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
84 route   83 56          -> 38 x 38 x 512
85 conv    512      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
86 conv    1024     3 x 3/ 2      38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
87 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
88 route   86          -> 19 x 19 x 1024
89 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
90 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
91 conv    512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
93 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
94 conv    512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
96 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
97 conv    512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
99 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
100 conv   512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
102 conv   512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
103 route   102 87          -> 19 x 19 x 1024
104 conv   1024     1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
105 conv   512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
106 conv   1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
107 conv   512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
108 max        5x 5/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
109 route   107          -> 19 x 19 x 512
110 max        9x 9/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.015 BF
111 route   107          -> 19 x 19 x 512
112 max        13x13/ 1     19 x 19 x 512 -> 19 x 19 x 512 0.031 BF
113 route   112 110 108 107          -> 19 x 19 x 2048
114 conv   512      1 x 1/ 1      19 x 19 x 2048 -> 19 x 19 x 512 0.757 BF
115 conv   1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
116 conv   512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
117 conv   256      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 256 0.095 BF
118 upsample          2x      19 x 19 x 256 -> 38 x 38 x 256
119 route   85          -> 38 x 38 x 512
120 conv   256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
121 route   120 118          -> 38 x 38 x 512
122 conv   256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
123 conv   512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
124 conv   256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
125 conv   512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
126 conv   256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
127 conv   128      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 128 0.095 BF
128 upsample          2x      38 x 38 x 128 -> 76 x 76 x 128

```

```

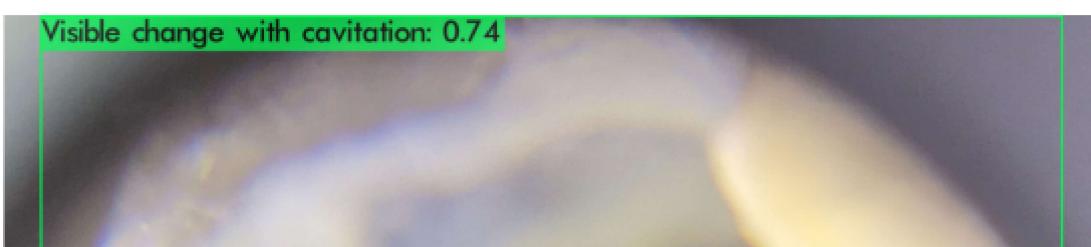
129 route 54                                     -> 76 x 76 x 256
130 conv 128          1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
131 route 130 128                                -> 76 x 76 x 256
132 conv 128          1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
133 conv 256          3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
134 conv 128          1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
135 conv 256          3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
136 conv 128          1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
137 conv 256          3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
138 conv 24           1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 24 0.071 BF
139 yolo

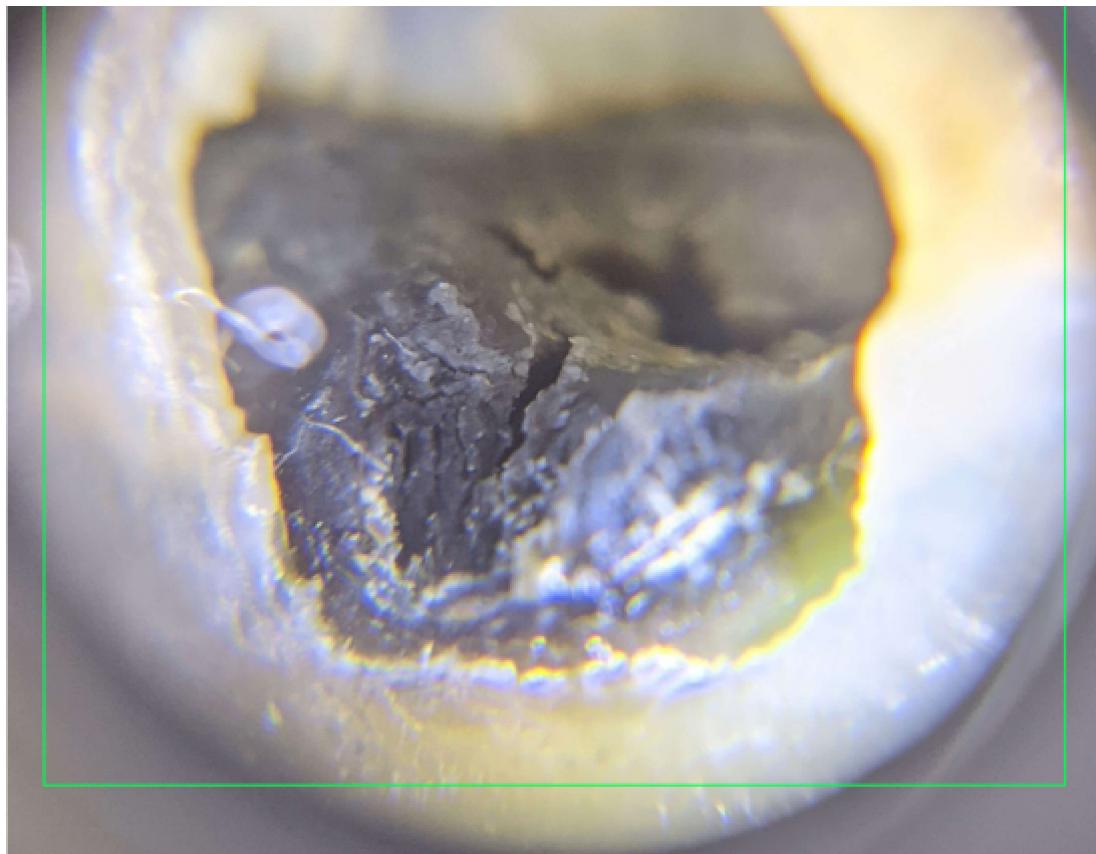
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route 136                                     -> 76 x 76 x 128
141 conv 256          3 x 3/ 2      76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route 141 126                                -> 38 x 38 x 512
143 conv 256          1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv 512          3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv 256          1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv 512          3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv 256          1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv 512          3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv 24           1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route 147                                     -> 38 x 38 x 256
152 conv 512          3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route 152 116                                -> 19 x 19 x 1024
154 conv 512          1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
155 conv 1024         3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
156 conv 512          1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
157 conv 1024         3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
158 conv 512          1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
159 conv 1024         3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
160 conv 24           1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Google Pixel 3/2. Pulp Necrosis 2nd M
Visible change with cavitation: 74%
Unable to init server: Could not connect: Connection refused

(predictions:2154): Gtk-WARNING **: 11:53:08.106: cannot open display:
```





```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer    filters   size/strd(dil)      input           output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv      32       3 x 3/ 1      608 x 608 x     3 -> 608 x 608 x  32 0.639 BF
  1 conv     64       3 x 3/ 2      608 x 608 x    32 -> 304 x 304 x  64 3.407 BF
  2 conv     64       1 x 1/ 1      304 x 304 x    64 -> 304 x 304 x  64 0.757 BF
  3 route    1          1 x 1/ 1      304 x 304 x    64 -> 304 x 304 x  64
  4 conv     64       1 x 1/ 1      304 x 304 x    64 -> 304 x 304 x  64 0.757 BF
  5 conv     32       1 x 1/ 1      304 x 304 x    64 -> 304 x 304 x  32 0.379 BF
  6 conv     64       3 x 3/ 1      304 x 304 x    32 -> 304 x 304 x  64 3.407 BF
  7 Shortcut Layer: 4,  wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
  8 conv     64       1 x 1/ 1      304 x 304 x    64 -> 304 x 304 x  64 0.757 BF
  9 route    8 2          1 x 1/ 1      304 x 304 x    64 -> 304 x 304 x 128
 10 conv    64       1 x 1/ 1      304 x 304 x 128 -> 304 x 304 x  64 1.514 BF
 11 conv    128      3 x 3/ 2      304 x 304 x    64 -> 152 x 152 x 128 3.407 BF
 12 conv    64       1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
 13 route   11          1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x 128
 14 conv    64       1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
 15 conv    64       1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
 16 conv    64       3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
 17 Shortcut Layer: 14,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
 18 conv    64       1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
 19 conv    64       3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
 20 Shortcut Layer: 17,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
 21 conv    64       1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
 22 route   21 12          1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x 128
 23 conv    128      1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
 24 conv    256      3 x 3/ 2      152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
 25 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
...
```

```

26 route 24
27 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
28 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
29 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
31 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
32 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
34 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
35 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
37 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
38 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
40 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
41 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
43 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
44 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
46 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
47 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
49 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
50 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
53 route 52 25 -> 76 x 76 x 256
54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
57 route 55 -> 38 x 38 x 512
58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
84 route 83 56 -> 38 x 38 x 512
85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 RF

```

Op	OpID	Input	Output	Op	OpID	Input	Output	Op	OpID	Input	Output	Op	OpID	Input	Output
conv	87	512	1 x 1/ 1	conv	88	19 x 19 x1024	->	conv	89	19 x 19 x1024	->	conv	90	19 x 19 x 512	0.379 BF
route	86														
conv	91	512	3 x 3/ 1	conv	92	19 x 19 x 512	->	conv	93	19 x 19 x 512	0.379 BF				
				Shortcut Layer: 89, wt = 0, wn = 0, outputs:	92	19 x 19 x 512	0.000 BF	conv	94	19 x 19 x 512	0.189 BF				
conv	95	512	1 x 1/ 1					conv	96	19 x 19 x 512	1.703 BF				
				Shortcut Layer: 92, wt = 0, wn = 0, outputs:	95	19 x 19 x 512	0.000 BF	conv	97	19 x 19 x 512	0.189 BF				
conv	98	512	3 x 3/ 1					conv	99	19 x 19 x 512	1.703 BF				
				Shortcut Layer: 95, wt = 0, wn = 0, outputs:	100	19 x 19 x 512	0.000 BF	conv	101	19 x 19 x 512	0.189 BF				
conv	102	512	1 x 1/ 1					conv	102	19 x 19 x 512	0.189 BF				
route	103	102 87						route	103	19 x 19 x1024	->				
conv	104	1024	1 x 1/ 1	conv	105	19 x 19 x1024	->	conv	106	19 x 19 x1024	0.757 BF				
				conv	107	19 x 19 x 512	->	conv	108	19 x 19 x 512	0.379 BF				
max	108		5x 5/ 1					max	109	19 x 19 x 512	0.005 BF				
route	109	107						route	110	19 x 19 x 512	->				
max	110		9x 9/ 1	max	111	19 x 19 x 512	->	max	112	19 x 19 x 512	0.015 BF				
route	111	107						route	113	19 x 19 x 512	->				
max	112		13x13/ 1	max	114	19 x 19 x2048	->	conv	115	19 x 19 x1024	0.031 BF				
route	113	112 110 108 107						conv	116	19 x 19 x 512	3.407 BF				
max	114	512	1 x 1/ 1	conv	117	19 x 19 x 512	->	conv	118	19 x 19 x 256	0.379 BF				
route	115	120 118		conv	119	19 x 19 x 256	->	upsample	119	38 x 38 x 256	0.095 BF				
conv	116	256	1 x 1/ 1	conv	120	38 x 38 x 512	->	route	120	38 x 38 x 512	->				
				conv	121	38 x 38 x 512	->	conv	122	38 x 38 x 256	0.379 BF				
conv	122	256	1 x 1/ 1	conv	123	38 x 38 x 512	->	conv	123	38 x 38 x 256	0.379 BF				
				conv	124	38 x 38 x 512	->	conv	124	38 x 38 x 256	0.379 BF				
conv	124	256	1 x 1/ 1	conv	125	38 x 38 x 512	->	conv	125	38 x 38 x 256	0.379 BF				
				conv	126	38 x 38 x 512	->	conv	126	38 x 38 x 256	0.379 BF				
conv	126	256	1 x 1/ 1	conv	127	38 x 38 x 512	->	conv	127	38 x 38 x 128	0.379 BF				
				conv	128	38 x 38 x 128	->	upsample	128	76 x 76 x 128	0.095 BF				
conv	128	128	1 x 1/ 1	route	129	76 x 76 x 128	->	route	129	76 x 76 x 256	->				
				conv	130	76 x 76 x 256	->	conv	130	76 x 76 x 128	0.379 BF				
route	130	130 128		conv	131	76 x 76 x 256	->	conv	131	76 x 76 x 128	0.379 BF				
conv	131	128	1 x 1/ 1	conv	132	76 x 76 x 256	->	conv	132	76 x 76 x 128	0.379 BF				
				conv	133	76 x 76 x 128	->	conv	133	76 x 76 x 256	0.379 BF				
conv	133	256	3 x 3/ 1	conv	134	76 x 76 x 256	->	conv	134	76 x 76 x 128	0.379 BF				
				conv	135	76 x 76 x 128	->	conv	135	76 x 76 x 256	0.379 BF				
conv	135	256	3 x 3/ 1	conv	136	76 x 76 x 256	->	conv	136	76 x 76 x 128	0.379 BF				
				conv	136	76 x 76 x 128	->	conv	137	76 x 76 x 256	0.379 BF				
conv	136	128	1 x 1/ 1	conv	137	76 x 76 x 128	->	conv	138	76 x 76 x 256	0.379 BF				
				conv	138	76 x 76 x 256	->	conv	139	76 x 76 x 24	0.071 BF				
yolo	139														
[yolo]	params:	iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d	nms_kind: greedy nms (1), beta = 0.600000												
route	140	136													
conv	141	256	3 x 3/ 2	conv	142	76 x 76 x 128	->	conv	143	76 x 76 x 256	0.852 BF				
route	142	141 126						route	142	76 x 76 x 256	->				
conv	143	256	1 x 1/ 1	conv	144	76 x 76 x 256	->	conv	144	76 x 76 x 512	3.407 BF				

```

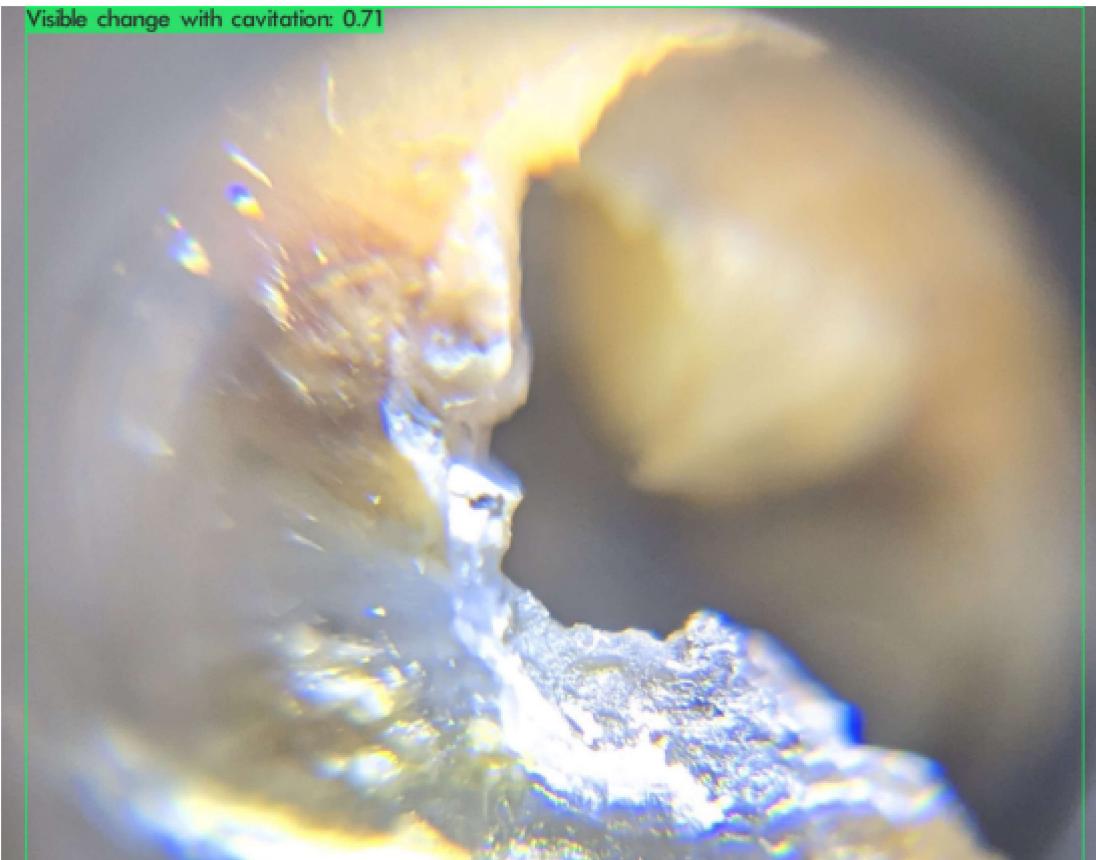
145 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo

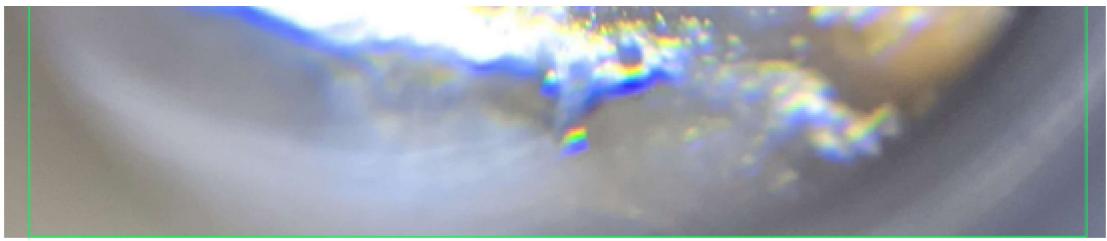
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route 147                                     -> 38 x 38 x 256
152 conv    512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route 152 116                                -> 19 x 19 x1024
154 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Google Pixel 3/3. Secondary caries 2n
Visible change with cavitation: 71%
Unable to init server: Could not connect: Connection refused

```

(predictions:2171): Gtk-WARNING **: 11:53:15.690: cannot open display:





```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer    filters   size/strd(dil)      input           output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv      32       3 x 3/ 1      608 x 608 x     3 -> 608 x 608 x   32 0.639 BF
  1 conv      64       3 x 3/ 2      608 x 608 x   32 -> 304 x 304 x   64 3.407 BF
  2 conv      64       1 x 1/ 1      304 x 304 x   64 -> 304 x 304 x   64 0.757 BF
  3 route     1          -> 304 x 304 x   64
  4 conv      64       1 x 1/ 1      304 x 304 x   64 -> 304 x 304 x   64 0.757 BF
  5 conv      32       1 x 1/ 1      304 x 304 x   64 -> 304 x 304 x   32 0.379 BF
  6 conv      64       3 x 3/ 1      304 x 304 x   32 -> 304 x 304 x   64 3.407 BF
  7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x   64 0.006 BF
  8 conv      64       1 x 1/ 1      304 x 304 x   64 -> 304 x 304 x   64 0.757 BF
  9 route     8 2          -> 304 x 304 x 128
 10 conv     64       1 x 1/ 1      304 x 304 x 128 -> 304 x 304 x   64 1.514 BF
 11 conv     128      3 x 3/ 2      304 x 304 x   64 -> 152 x 152 x 128 3.407 BF
 12 conv     64       1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x   64 0.379 BF
 13 route     11          -> 152 x 152 x 128
 14 conv     64       1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x   64 0.379 BF
 15 conv     64       1 x 1/ 1      152 x 152 x   64 -> 152 x 152 x   64 0.189 BF
 16 conv     64       3 x 3/ 1      152 x 152 x   64 -> 152 x 152 x   64 1.703 BF
 17 Shortcut Layer: 14, wt = 0, wn = 0, outputs: 152 x 152 x   64 0.001 BF
 18 conv     64       1 x 1/ 1      152 x 152 x   64 -> 152 x 152 x   64 0.189 BF
 19 conv     64       3 x 3/ 1      152 x 152 x   64 -> 152 x 152 x   64 1.703 BF
 20 Shortcut Layer: 17, wt = 0, wn = 0, outputs: 152 x 152 x   64 0.001 BF
 21 conv     64       1 x 1/ 1      152 x 152 x   64 -> 152 x 152 x   64 0.189 BF
 22 route    21 12          -> 152 x 152 x 128
 23 conv     128      1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
 24 conv     256      3 x 3/ 2      152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
 25 conv     128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 26 route    24          -> 76 x 76 x 256
 27 conv     128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 28 conv     128      1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 29 conv     128      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 31 conv     128      1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 32 conv     128      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 34 conv     128      1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 35 conv     128      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 37 conv     128      1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 38 conv     128      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 40 conv     128      1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 41 conv     128      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 43 conv     128      1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
```

```

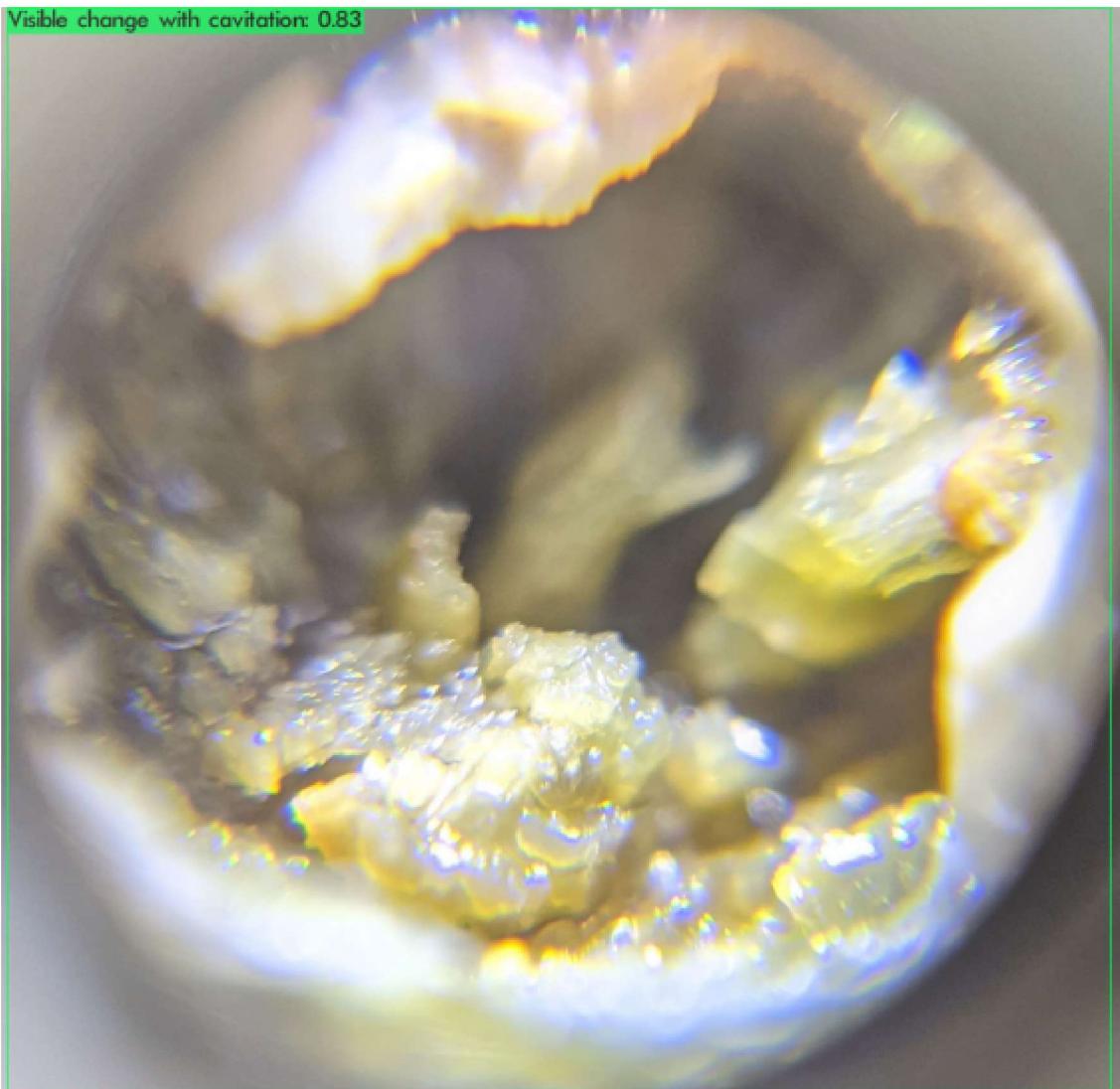
44 conv    128      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
46 conv    128      1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
47 conv    128      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
49 conv    128      1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
50 conv    128      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
52 conv    128      1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
53 route   52 25                               -> 76 x 76 x 256
54 conv    256      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
55 conv    512      3 x 3/ 2      76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
56 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
57 route   55                               -> 38 x 38 x 512
58 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
59 conv    256      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
60 conv    256      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
62 conv    256      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
63 conv    256      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
65 conv    256      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
66 conv    256      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
68 conv    256      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
69 conv    256      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
71 conv    256      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
72 conv    256      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
74 conv    256      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
75 conv    256      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
77 conv    256      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
78 conv    256      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
80 conv    256      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
81 conv    256      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
83 conv    256      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
84 route   83 56                               -> 38 x 38 x 512
85 conv    512      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
86 conv    1024     3 x 3/ 2      38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
87 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
88 route   86                               -> 19 x 19 x 1024
89 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
90 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
91 conv    512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
93 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
94 conv    512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
96 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
97 conv    512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
99 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
100 conv   512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
102 conv   512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
103 route  102 87                               -> 19 x 19 x 1024
104 conv   1024     1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF

```

104	conv	1024	1 x 1/ 1	19 x 19 x1024 ->	19 x 19 x1024 0.1/ 0.1
105	conv	512	1 x 1/ 1	19 x 19 x1024 ->	19 x 19 x 512 0.379 BF
106	conv	1024	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x1024 3.407 BF
107	conv	512	1 x 1/ 1	19 x 19 x1024 ->	19 x 19 x 512 0.379 BF
108	max		5x 5/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.005 BF
109	route	107			-> 19 x 19 x 512
110	max		9x 9/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.015 BF
111	route	107			-> 19 x 19 x 512
112	max		13x13/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.031 BF
113	route	112 110 108 107			-> 19 x 19 x2048
114	conv	512	1 x 1/ 1	19 x 19 x2048 ->	19 x 19 x 512 0.757 BF
115	conv	1024	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x1024 3.407 BF
116	conv	512	1 x 1/ 1	19 x 19 x1024 ->	19 x 19 x 512 0.379 BF
117	conv	256	1 x 1/ 1	19 x 19 x 512 ->	19 x 19 x 256 0.095 BF
118	upsample		2x	19 x 19 x 256 ->	38 x 38 x 256
119	route	85			-> 38 x 38 x 512
120	conv	256	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
121	route	120 118			-> 38 x 38 x 512
122	conv	256	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
123	conv	512	3 x 3/ 1	38 x 38 x 256 ->	38 x 38 x 512 3.407 BF
124	conv	256	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
125	conv	512	3 x 3/ 1	38 x 38 x 256 ->	38 x 38 x 512 3.407 BF
126	conv	256	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
127	conv	128	1 x 1/ 1	38 x 38 x 256 ->	38 x 38 x 128 0.095 BF
128	upsample		2x	38 x 38 x 128 ->	76 x 76 x 128
129	route	54			-> 76 x 76 x 256
130	conv	128	1 x 1/ 1	76 x 76 x 256 ->	76 x 76 x 128 0.379 BF
131	route	130 128			-> 76 x 76 x 256
132	conv	128	1 x 1/ 1	76 x 76 x 256 ->	76 x 76 x 128 0.379 BF
133	conv	256	3 x 3/ 1	76 x 76 x 128 ->	76 x 76 x 256 3.407 BF
134	conv	128	1 x 1/ 1	76 x 76 x 256 ->	76 x 76 x 128 0.379 BF
135	conv	256	3 x 3/ 1	76 x 76 x 128 ->	76 x 76 x 256 3.407 BF
136	conv	128	1 x 1/ 1	76 x 76 x 256 ->	76 x 76 x 128 0.379 BF
137	conv	256	3 x 3/ 1	76 x 76 x 128 ->	76 x 76 x 256 3.407 BF
138	conv	24	1 x 1/ 1	76 x 76 x 256 ->	76 x 76 x 24 0.071 BF
139	yolo				
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedyrnms (1), beta = 0.600000					
140	route	136			-> 76 x 76 x 128
141	conv	256	3 x 3/ 2	76 x 76 x 128 ->	38 x 38 x 256 0.852 BF
142	route	141 126			-> 38 x 38 x 512
143	conv	256	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
144	conv	512	3 x 3/ 1	38 x 38 x 256 ->	38 x 38 x 512 3.407 BF
145	conv	256	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
146	conv	512	3 x 3/ 1	38 x 38 x 256 ->	38 x 38 x 512 3.407 BF
147	conv	256	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
148	conv	512	3 x 3/ 1	38 x 38 x 256 ->	38 x 38 x 512 3.407 BF
149	conv	24	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 24 0.035 BF
150	yolo				
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedyrnms (1), beta = 0.600000					
151	route	147			-> 38 x 38 x 256
152	conv	512	3 x 3/ 2	38 x 38 x 256 ->	19 x 19 x 512 0.852 BF
153	route	152 116			-> 19 x 19 x1024
154	conv	512	1 x 1/ 1	19 x 19 x1024 ->	19 x 19 x 512 0.379 BF
155	conv	1024	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x1024 3.407 BF
156	conv	512	1 x 1/ 1	19 x 19 x1024 ->	19 x 19 x 512 0.379 BF
157	conv	1024	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x1024 3.407 BF
158	conv	512	1 x 1/ 1	19 x 19 x1024 ->	19 x 19 x 512 0.379 BF
159	conv	1024	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x1024 3.407 BF
160	conv	24	1 x 1/ 1	19 x 19 x1024 ->	19 x 19 x 24 0.018 BF

```
161 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Google Pixel 3/4. Pulp Necrosis 3rd M
Visible change with cavitation: 83%
Unable to init server: Could not connect: Connection refused
```

(predictions:2187): Gtk-WARNING **: 11:53:23.077: cannot open display:



```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
    layer   filters  size/strd(dil)      input           output
    0 Create CUDA-stream - 0
Create cudnn-handle 0
conv      32        3 x 3/ 1     608 x 608 x  3 ->  608 x 608 x  32 0.639 BF
    1 conv       64        3 x 3/ 2     608 x 608 x  32 ->  304 x 304 x  64 3.407 BF
```

2 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
 3 route 1
 4 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
 5 conv 32 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 32 0.379 BF
 6 conv 64 3 x 3/ 1 304 x 304 x 32 -> 304 x 304 x 64 3.407 BF
 7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x 64 0.006 BF
 8 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
 9 route 8 2 -> 304 x 304 x 128
 10 conv 64 1 x 1/ 1 304 x 304 x 128 -> 304 x 304 x 64 1.514 BF
 11 conv 128 3 x 3/ 2 304 x 304 x 64 -> 152 x 152 x 128 3.407 BF
 12 conv 64 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 64 0.379 BF
 13 route 11 -> 152 x 152 x 128
 14 conv 64 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 64 0.379 BF
 15 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 16 conv 64 3 x 3/ 1 152 x 152 x 64 -> 152 x 152 x 64 1.703 BF
 17 Shortcut Layer: 14, wt = 0, wn = 0, outputs: 152 x 152 x 64 0.001 BF
 18 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 19 conv 64 3 x 3/ 1 152 x 152 x 64 -> 152 x 152 x 64 1.703 BF
 20 Shortcut Layer: 17, wt = 0, wn = 0, outputs: 152 x 152 x 64 0.001 BF
 21 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 22 route 21 12 -> 152 x 152 x 128
 23 conv 128 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
 24 conv 256 3 x 3/ 2 152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
 25 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 26 route 24 -> 76 x 76 x 256
 27 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 28 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 29 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 31 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 32 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 34 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 35 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 37 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 38 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 40 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 41 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 43 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 44 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 46 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 47 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 49 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 50 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 53 route 52 25 -> 76 x 76 x 256
 54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
 55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
 56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 57 route 55 -> 38 x 38 x 512
 58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF

62	conv	256	1 x 1/ 1	38 x 38 x 256 ->	38 x 38 x 256 0.189 BF
63	conv	256	3 x 3/ 1	38 x 38 x 256 ->	38 x 38 x 256 1.703 BF
64	Shortcut Layer:	61, wt = 0, wn = 0, outputs:	38 x 38 x 256 0.000 BF		
65	conv	256	1 x 1/ 1	38 x 38 x 256 ->	38 x 38 x 256 0.189 BF
66	conv	256	3 x 3/ 1	38 x 38 x 256 ->	38 x 38 x 256 1.703 BF
67	Shortcut Layer:	64, wt = 0, wn = 0, outputs:	38 x 38 x 256 0.000 BF		
68	conv	256	1 x 1/ 1	38 x 38 x 256 ->	38 x 38 x 256 0.189 BF
69	conv	256	3 x 3/ 1	38 x 38 x 256 ->	38 x 38 x 256 1.703 BF
70	Shortcut Layer:	67, wt = 0, wn = 0, outputs:	38 x 38 x 256 0.000 BF		
71	conv	256	1 x 1/ 1	38 x 38 x 256 ->	38 x 38 x 256 0.189 BF
72	conv	256	3 x 3/ 1	38 x 38 x 256 ->	38 x 38 x 256 1.703 BF
73	Shortcut Layer:	70, wt = 0, wn = 0, outputs:	38 x 38 x 256 0.000 BF		
74	conv	256	1 x 1/ 1	38 x 38 x 256 ->	38 x 38 x 256 0.189 BF
75	conv	256	3 x 3/ 1	38 x 38 x 256 ->	38 x 38 x 256 1.703 BF
76	Shortcut Layer:	73, wt = 0, wn = 0, outputs:	38 x 38 x 256 0.000 BF		
77	conv	256	1 x 1/ 1	38 x 38 x 256 ->	38 x 38 x 256 0.189 BF
78	conv	256	3 x 3/ 1	38 x 38 x 256 ->	38 x 38 x 256 1.703 BF
79	Shortcut Layer:	76, wt = 0, wn = 0, outputs:	38 x 38 x 256 0.000 BF		
80	conv	256	1 x 1/ 1	38 x 38 x 256 ->	38 x 38 x 256 0.189 BF
81	conv	256	3 x 3/ 1	38 x 38 x 256 ->	38 x 38 x 256 1.703 BF
82	Shortcut Layer:	79, wt = 0, wn = 0, outputs:	38 x 38 x 256 0.000 BF		
83	conv	256	1 x 1/ 1	38 x 38 x 256 ->	38 x 38 x 256 0.189 BF
84	route	83 56		->	38 x 38 x 512
85	conv	512	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 512 0.757 BF
86	conv	1024	3 x 3/ 2	38 x 38 x 512 ->	19 x 19 x1024 3.407 BF
87	conv	512	1 x 1/ 1	19 x 19 x1024 ->	19 x 19 x 512 0.379 BF
88	route	86		->	19 x 19 x1024
89	conv	512	1 x 1/ 1	19 x 19 x1024 ->	19 x 19 x 512 0.379 BF
90	conv	512	1 x 1/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
91	conv	512	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x 512 1.703 BF
92	Shortcut Layer:	89, wt = 0, wn = 0, outputs:	19 x 19 x 512 0.000 BF		
93	conv	512	1 x 1/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
94	conv	512	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x 512 1.703 BF
95	Shortcut Layer:	92, wt = 0, wn = 0, outputs:	19 x 19 x 512 0.000 BF		
96	conv	512	1 x 1/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
97	conv	512	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x 512 1.703 BF
98	Shortcut Layer:	95, wt = 0, wn = 0, outputs:	19 x 19 x 512 0.000 BF		
99	conv	512	1 x 1/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
100	conv	512	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x 512 1.703 BF
101	Shortcut Layer:	98, wt = 0, wn = 0, outputs:	19 x 19 x 512 0.000 BF		
102	conv	512	1 x 1/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
103	route	102 87		->	19 x 19 x1024
104	conv	1024	1 x 1/ 1	19 x 19 x1024 ->	19 x 19 x1024 0.757 BF
105	conv	512	1 x 1/ 1	19 x 19 x1024 ->	19 x 19 x 512 0.379 BF
106	conv	1024	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x1024 3.407 BF
107	conv	512	1 x 1/ 1	19 x 19 x1024 ->	19 x 19 x 512 0.379 BF
108	max		5x 5/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.005 BF
109	route	107		->	19 x 19 x 512
110	max		9x 9/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.015 BF
111	route	107		->	19 x 19 x 512
112	max		13x13/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.031 BF
113	route	112 110 108 107		->	19 x 19 x2048
114	conv	512	1 x 1/ 1	19 x 19 x2048 ->	19 x 19 x 512 0.757 BF
115	conv	1024	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x1024 3.407 BF
116	conv	512	1 x 1/ 1	19 x 19 x1024 ->	19 x 19 x 512 0.379 BF
117	conv	256	1 x 1/ 1	19 x 19 x 512 ->	19 x 19 x 256 0.095 BF
118	upsample		2x	19 x 19 x 256 ->	38 x 38 x 256
119	route	85		->	38 x 38 x 512
120	conv	256	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
121	route	120 118		->	38 x 38 x 512
122	route	122 118		->	38 x 38 x 512

```

122 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
123 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
124 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
125 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
126 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
127 conv    128      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 128 0.095 BF
128 upsample           2x      38 x 38 x 128 -> 76 x 76 x 128
129 route   54          -> 76 x 76 x 256
130 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
131 route   130 128          -> 76 x 76 x 256
132 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
133 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
134 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
135 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
136 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
137 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
138 conv    24       1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 24 0.071 BF
139 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route   136          -> 76 x 76 x 128
141 conv    256      3 x 3/ 2      76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route   141 126          -> 38 x 38 x 512
143 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo

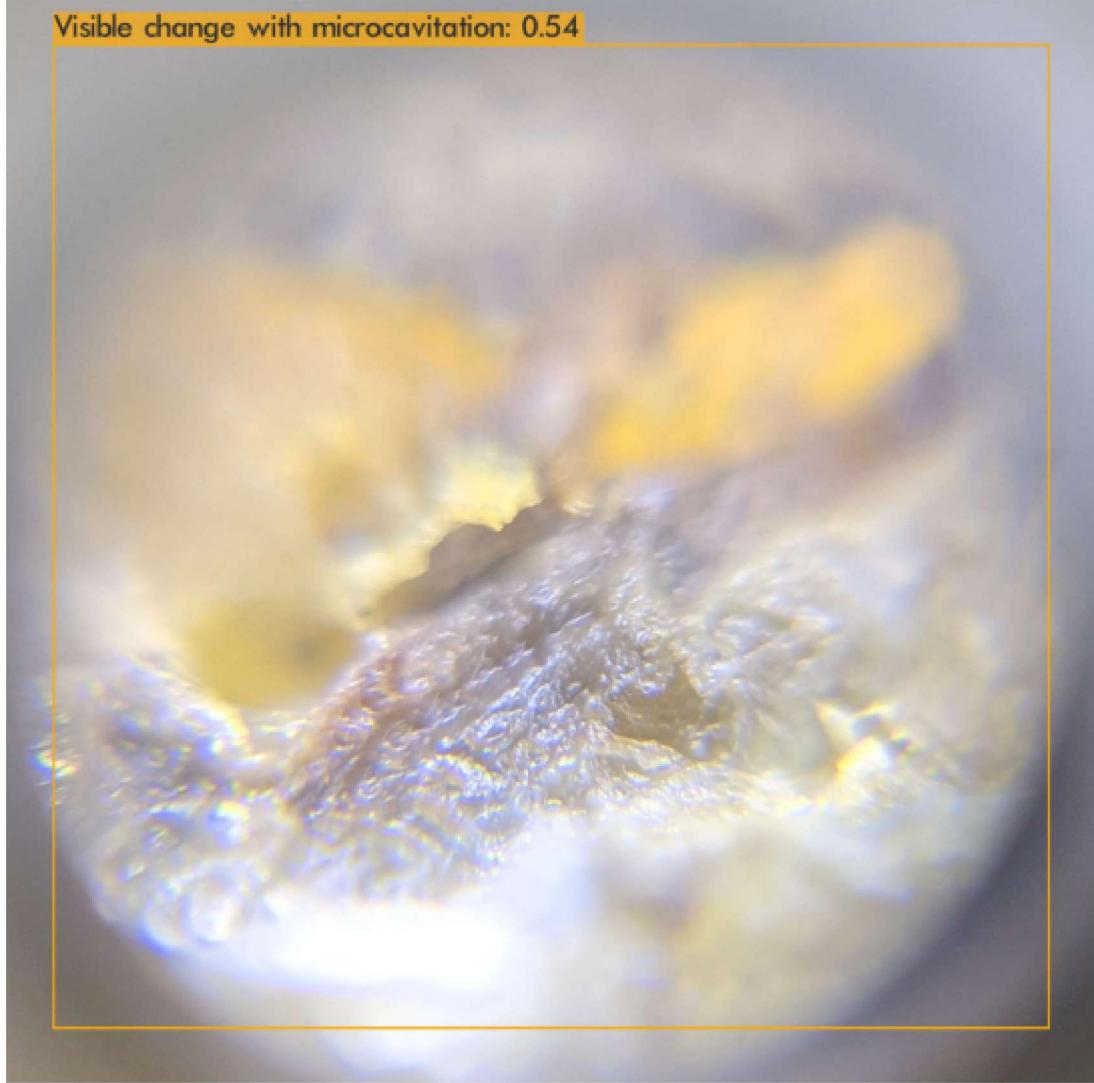
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route   147          -> 38 x 38 x 256
152 conv    512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route   152 116          -> 19 x 19 x 1024
154 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Google Pixel 3/5. Pulp Necrosis lower
Visible change with microcavitation: 54%
Unable to init server: Could not connect: Connection refused

(predictions:2199): Gtk-WARNING **: 11:53:30.662: cannot open display:

```

Visible change with microcavitation: 0.54



```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer    filters   size/strd(dil)      input           output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv      32       3 x 3/ 1      608 x 608 x  3 -> 608 x 608 x  32 0.639 BF
1 conv      64       3 x 3/ 2      608 x 608 x  32 -> 304 x 304 x  64 3.407 BF
2 conv      64       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
3 route    1          -> 304 x 304 x  64
4 conv      64       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
5 conv      32       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  32 0.379 BF
6 conv      64       3 x 3/ 1      304 x 304 x  32 -> 304 x 304 x  64 3.407 BF
7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
8 conv      64       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
9 route    8 2          -> 304 x 304 x 128
10 conv     64       1 x 1/ 1      304 x 304 x 128 -> 304 x 304 x  64 1.514 BF
11 conv     128      3 x 3/ 2      304 x 304 x  64 -> 152 x 152 x 128 3.407 BF
12 conv     64       1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
13 route    11          -> 152 x 152 x 128
14 conv     64       1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
15 conv     64       1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
16 conv     64       3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
17 Shortcut Layer: 14, wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
18 conv     64       1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
19 conv     64       3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
```

20 Shortcut Layer: 17, wt = 0, wn = 0, outputs: 152 x 152 x 64 0.001 BF
21 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
22 route 21 12 -> 152 x 152 x 128
23 conv 128 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
24 conv 256 3 x 3/ 2 152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
25 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
26 route 24 -> 76 x 76 x 256
27 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
28 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
29 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
31 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
32 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
34 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
35 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
37 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
38 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
40 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
41 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
43 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
44 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
46 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
47 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
49 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
50 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
53 route 52 25 -> 76 x 76 x 256
54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
57 route 55 -> 38 x 38 x 512
58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF

80	conv	256	$1 \times 1 / 1$	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
81	conv	256	$3 \times 3 / 1$	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
82	Shortcut Layer:	79,	wt = 0, wn = 0, outputs:	38 x 38 x 256	0.000	BF		
83	conv	256	$1 \times 1 / 1$	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
84	route	83 56			->	38 x 38 x 512		
85	conv	512	$1 \times 1 / 1$	38 x 38 x 512	->	38 x 38 x 512	0.757	BF
86	conv	1024	$3 \times 3 / 2$	38 x 38 x 512	->	19 x 19 x 1024	3.407	BF
87	conv	512	$1 \times 1 / 1$	19 x 19 x 1024	->	19 x 19 x 512	0.379	BF
88	route	86			->	19 x 19 x 1024		
89	conv	512	$1 \times 1 / 1$	19 x 19 x 1024	->	19 x 19 x 512	0.379	BF
90	conv	512	$1 \times 1 / 1$	19 x 19 x 512	->	19 x 19 x 512	0.189	BF
91	conv	512	$3 \times 3 / 1$	19 x 19 x 512	->	19 x 19 x 512	1.703	BF
92	Shortcut Layer:	89,	wt = 0, wn = 0, outputs:	19 x 19 x 512	0.000	BF		
93	conv	512	$1 \times 1 / 1$	19 x 19 x 512	->	19 x 19 x 512	0.189	BF
94	conv	512	$3 \times 3 / 1$	19 x 19 x 512	->	19 x 19 x 512	1.703	BF
95	Shortcut Layer:	92,	wt = 0, wn = 0, outputs:	19 x 19 x 512	0.000	BF		
96	conv	512	$1 \times 1 / 1$	19 x 19 x 512	->	19 x 19 x 512	0.189	BF
97	conv	512	$3 \times 3 / 1$	19 x 19 x 512	->	19 x 19 x 512	1.703	BF
98	Shortcut Layer:	95,	wt = 0, wn = 0, outputs:	19 x 19 x 512	0.000	BF		
99	conv	512	$1 \times 1 / 1$	19 x 19 x 512	->	19 x 19 x 512	0.189	BF
100	conv	512	$3 \times 3 / 1$	19 x 19 x 512	->	19 x 19 x 512	1.703	BF
101	Shortcut Layer:	98,	wt = 0, wn = 0, outputs:	19 x 19 x 512	0.000	BF		
102	conv	512	$1 \times 1 / 1$	19 x 19 x 512	->	19 x 19 x 512	0.189	BF
103	route	102 87			->	19 x 19 x 1024		
104	conv	1024	$1 \times 1 / 1$	19 x 19 x 1024	->	19 x 19 x 1024	0.757	BF
105	conv	512	$1 \times 1 / 1$	19 x 19 x 1024	->	19 x 19 x 512	0.379	BF
106	conv	1024	$3 \times 3 / 1$	19 x 19 x 512	->	19 x 19 x 1024	3.407	BF
107	conv	512	$1 \times 1 / 1$	19 x 19 x 1024	->	19 x 19 x 512	0.379	BF
108	max		$5 \times 5 / 1$	19 x 19 x 512	->	19 x 19 x 512	0.005	BF
109	route	107			->	19 x 19 x 512		
110	max		$9 \times 9 / 1$	19 x 19 x 512	->	19 x 19 x 512	0.015	BF
111	route	107			->	19 x 19 x 512		
112	max		$13 \times 13 / 1$	19 x 19 x 512	->	19 x 19 x 512	0.031	BF
113	route	112 110 108 107			->	19 x 19 x 2048		
114	conv	512	$1 \times 1 / 1$	19 x 19 x 2048	->	19 x 19 x 512	0.757	BF
115	conv	1024	$3 \times 3 / 1$	19 x 19 x 512	->	19 x 19 x 1024	3.407	BF
116	conv	512	$1 \times 1 / 1$	19 x 19 x 1024	->	19 x 19 x 512	0.379	BF
117	conv	256	$1 \times 1 / 1$	19 x 19 x 512	->	19 x 19 x 256	0.095	BF
118	upsample		2x	19 x 19 x 256	->	38 x 38 x 256		
119	route	85			->	38 x 38 x 512		
120	conv	256	$1 \times 1 / 1$	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
121	route	120 118			->	38 x 38 x 512		
122	conv	256	$1 \times 1 / 1$	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
123	conv	512	$3 \times 3 / 1$	38 x 38 x 256	->	38 x 38 x 512	3.407	BF
124	conv	256	$1 \times 1 / 1$	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
125	conv	512	$3 \times 3 / 1$	38 x 38 x 256	->	38 x 38 x 512	3.407	BF
126	conv	256	$1 \times 1 / 1$	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
127	conv	128	$1 \times 1 / 1$	38 x 38 x 256	->	38 x 38 x 128	0.095	BF
128	upsample		2x	38 x 38 x 128	->	76 x 76 x 128		
129	route	54			->	76 x 76 x 256		
130	conv	128	$1 \times 1 / 1$	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
131	route	130 128			->	76 x 76 x 256		
132	conv	128	$1 \times 1 / 1$	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
133	conv	256	$3 \times 3 / 1$	76 x 76 x 128	->	76 x 76 x 256	3.407	BF
134	conv	128	$1 \times 1 / 1$	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
135	conv	256	$3 \times 3 / 1$	76 x 76 x 128	->	76 x 76 x 256	3.407	BF
136	conv	128	$1 \times 1 / 1$	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
137	conv	256	$3 \times 3 / 1$	76 x 76 x 128	->	76 x 76 x 256	3.407	BF
138	conv	24	$1 \times 1 / 1$	76 x 76 x 256	->	76 x 76 x 24	0.071	BF
139	yolo							

```

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyNMS (1), beta = 0.600000
    140 route 136                                     -> 76 x 76 x 128
    141 conv   256      3 x 3/ 2       76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
    142 route 141 126                                -> 38 x 38 x 512
    143 conv   256      1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
    144 conv   512      3 x 3/ 1       38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
    145 conv   256      1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
    146 conv   512      3 x 3/ 1       38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
    147 conv   256      1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
    148 conv   512      3 x 3/ 1       38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
    149 conv   24       1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
    150 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyNMS (1), beta = 0.600000
    151 route 147                                     -> 38 x 38 x 256
    152 conv   512      3 x 3/ 2       38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
    153 route 152 116                                -> 19 x 19 x 1024
    154 conv   512      1 x 1/ 1       19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
    155 conv   1024     3 x 3/ 1       19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
    156 conv   512      1 x 1/ 1       19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
    157 conv   1024     3 x 3/ 1       19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
    158 conv   512      1 x 1/ 1       19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
    159 conv   1024     3 x 3/ 1       19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
    160 conv   24       1 x 1/ 1       19 x 19 x 1024 -> 19 x 19 x 24 0.018 BF
    161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyNMS (1), beta = 0.600000
Total BFLOPS 127.263

```

```
!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc
imShow('predictions.jpg')
```

```
!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc
imShow('predictions.jpg')
```

```
!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc
imShow('predictions.jpg')
```

```
!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc
imShow('predictions.jpg')
```

```
!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc
imShow('predictions.jpg')
```

```
!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc
imShow('predictions.jpg')
```

CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0

layer	filters	size/strd(dil)	input	output
0	Create CUDA-stream - 0			
	Create cudnn-handle 0			
conv	32	3 x 3/ 1	608 x 608 x 3 -> 608 x 608 x 32	0.639 BF
1 conv	64	3 x 3/ 2	608 x 608 x 32 -> 304 x 304 x 64	3.407 BF
2 conv	64	1 x 1/ 1	304 x 304 x 64 -> 304 x 304 x 64	0.757 BF
3 route	1		-> 304 x 304 x 64	
4 conv	64	1 x 1/ 1	304 x 304 x 64 -> 304 x 304 x 64	0.757 BF
5 conv	32	1 x 1/ 1	304 x 304 x 64 -> 304 x 304 x 32	0.379 BF
6 conv	64	3 x 3/ 1	304 x 304 x 32 -> 304 x 304 x 64	3.407 BF
7 Shortcut Layer: 4,	wt = 0, wn = 0, outputs:	304 x 304 x 64	0.006 BF	
8 conv	64	1 x 1/ 1	304 x 304 x 64 -> 304 x 304 x 64	0.757 BF
9 route	8 2		-> 304 x 304 x 128	
10 conv	64	1 x 1/ 1	304 x 304 x 128 -> 304 x 304 x 64	1.514 BF
11 conv	128	3 x 3/ 2	304 x 304 x 64 -> 152 x 152 x 128	3.407 BF
12 conv	64	1 x 1/ 1	152 x 152 x 128 -> 152 x 152 x 64	0.379 BF
13 route	11		-> 152 x 152 x 128	
14 conv	64	1 x 1/ 1	152 x 152 x 128 -> 152 x 152 x 64	0.379 BF
15 conv	64	1 x 1/ 1	152 x 152 x 64 -> 152 x 152 x 64	0.189 BF
16 conv	64	3 x 3/ 1	152 x 152 x 64 -> 152 x 152 x 64	1.703 BF
17 Shortcut Layer: 14,	wt = 0, wn = 0, outputs:	152 x 152 x 64	0.001 BF	
18 conv	64	1 x 1/ 1	152 x 152 x 64 -> 152 x 152 x 64	0.189 BF
19 conv	64	3 x 3/ 1	152 x 152 x 64 -> 152 x 152 x 64	1.703 BF
20 Shortcut Layer: 17,	wt = 0, wn = 0, outputs:	152 x 152 x 64	0.001 BF	
21 conv	64	1 x 1/ 1	152 x 152 x 64 -> 152 x 152 x 64	0.189 BF
22 route	21 12		-> 152 x 152 x 128	
23 conv	128	1 x 1/ 1	152 x 152 x 128 -> 152 x 152 x 128	0.757 BF
24 conv	256	3 x 3/ 2	152 x 152 x 128 -> 76 x 76 x 256	3.407 BF
25 conv	128	1 x 1/ 1	76 x 76 x 256 -> 76 x 76 x 128	0.379 BF
26 route	24		-> 76 x 76 x 256	
27 conv	128	1 x 1/ 1	76 x 76 x 256 -> 76 x 76 x 128	0.379 BF
28 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
29 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
30 Shortcut Layer: 27,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF	
31 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
32 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
33 Shortcut Layer: 30,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF	
34 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
35 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
36 Shortcut Layer: 33,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF	
37 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
38 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
39 Shortcut Layer: 36,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF	
40 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
41 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
42 Shortcut Layer: 39,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF	
43 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
44 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
45 Shortcut Layer: 42,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF	
46 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
47 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
48 Shortcut Layer: 45,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF	
49 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
50 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF

51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 53 route 52 25 -> 76 x 76 x 256
 54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
 55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
 56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 57 route 55 -> 38 x 38 x 512
 58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 106 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 107 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 108 max 5x 5/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
 109 route 107 -> 19 x 19 x 512
 110 max 9x 9/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.015 BF

```

111 route 107
112 max           13x13/ 1      19 x   19 x 512 -> 19 x   19 x 512 0.031 BF
113 route 112 110 108 107
114 conv    512      1 x 1/ 1      19 x   19 x 2048 -> 19 x   19 x 512 0.757 BF
115 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
116 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
117 conv    256      1 x 1/ 1      19 x   19 x 512 -> 19 x   19 x 256 0.095 BF
118 upsample
119 route 85
120 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
121 route 120 118
122 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
123 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
124 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
125 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
126 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
127 conv    128      1 x 1/ 1      38 x   38 x 256 -> 38 x   38 x 128 0.095 BF
128 upsample
129 route 54
130 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
131 route 130 128
132 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
133 conv    256      3 x 3/ 1      76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
134 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
135 conv    256      3 x 3/ 1      76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
136 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
137 conv    256      3 x 3/ 1      76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
138 conv    24       1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 24 0.071 BF
139 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route 136
141 conv    256      3 x 3/ 2      76 x   76 x 128 -> 38 x   38 x 256 0.852 BF
142 route 141 126
143 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
144 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
145 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
146 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 24 0.035 BF
150 yolo

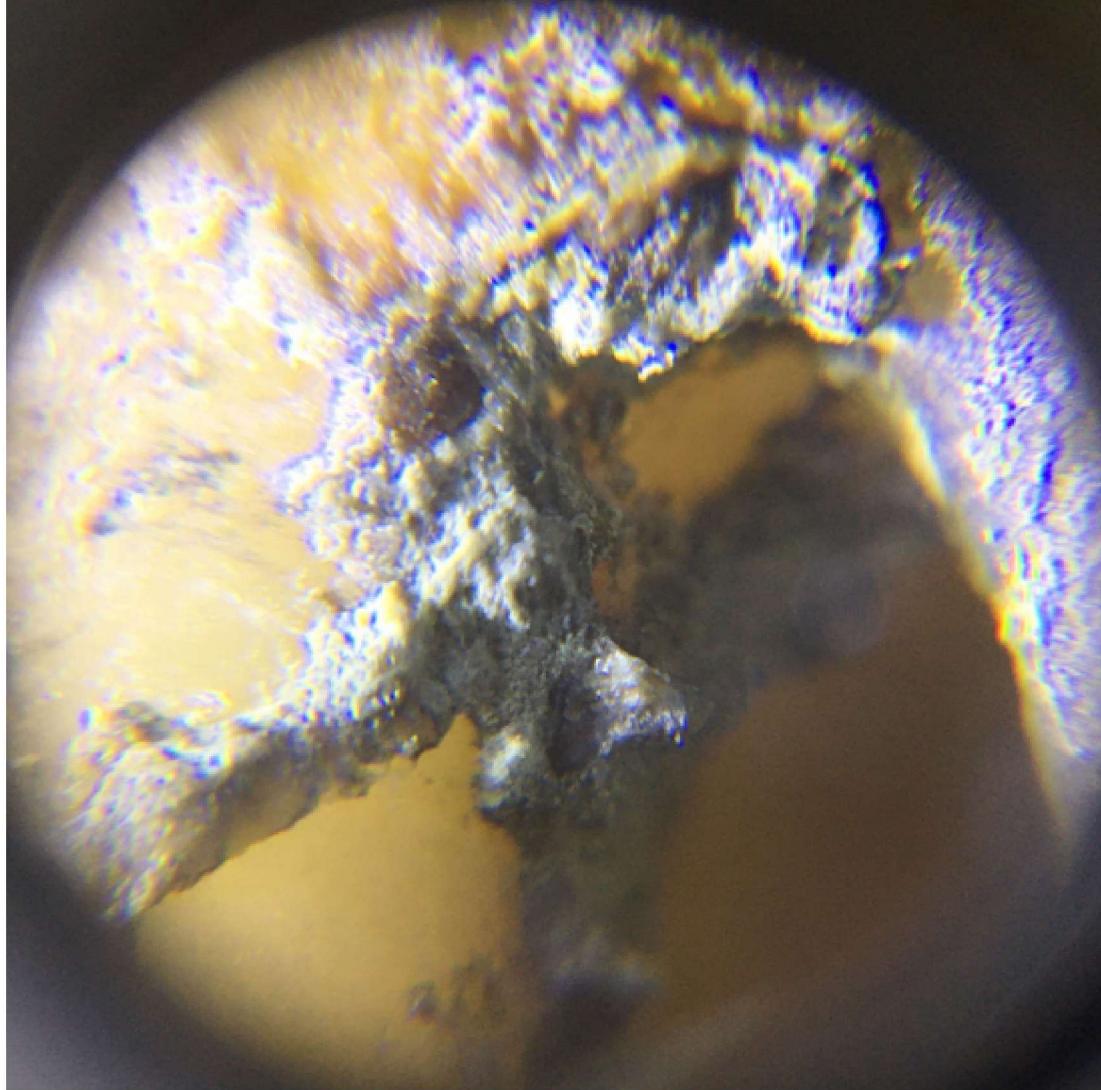
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route 147
152 conv    512      3 x 3/ 2      38 x   38 x 256 -> 19 x   19 x 512 0.852 BF
153 route 152 116
154 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB

```

```
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Iphone 6s/Figure 1.png: Predicted in
Unable to init server: Could not connect: Connection refused
```

(predictions:6779): Gtk-WARNING **: 10:09:23.716: cannot open display:



```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer filters size/strd(dil)      input           output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv    32      3 x 3/ 1      608 x 608 x   3 ->  608 x 608 x  32 0.639 BF
1 conv    64      3 x 3/ 2      608 x 608 x  32 ->  304 x 304 x  64 3.407 BF
2 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
3 route  1                  ->  304 x 304 x  64
4 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
5 conv    32      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  32 0.379 BF
6 conv    64      3 x 3/ 1      304 x 304 x  32 ->  304 x 304 x  64 3.407 BF
7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
8 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
9 route  0 2                  ->  304 x 304 x 120
```

#	route	o	z		->	c ₀	c ₁	c ₂	c ₃	c ₄	
10	conv	64		1 x 1/ 1	304 x 304 x 128	->	304	x 304	x 64	1.514	BF
11	conv	128		3 x 3/ 2	304 x 304 x 64	->	152	x 152	x 128	3.407	BF
12	conv	64		1 x 1/ 1	152 x 152 x 128	->	152	x 152	x 64	0.379	BF
13	route	11				->	152	x 152	x 128		
14	conv	64		1 x 1/ 1	152 x 152 x 128	->	152	x 152	x 64	0.379	BF
15	conv	64		1 x 1/ 1	152 x 152 x 64	->	152	x 152	x 64	0.189	BF
16	conv	64		3 x 3/ 1	152 x 152 x 64	->	152	x 152	x 64	1.703	BF
17	Shortcut Layer:	14,	wt = 0,	wn = 0,	outputs: 152 x 152 x 64	0.001	BF				
18	conv	64		1 x 1/ 1	152 x 152 x 64	->	152	x 152	x 64	0.189	BF
19	conv	64		3 x 3/ 1	152 x 152 x 64	->	152	x 152	x 64	1.703	BF
20	Shortcut Layer:	17,	wt = 0,	wn = 0,	outputs: 152 x 152 x 64	0.001	BF				
21	conv	64		1 x 1/ 1	152 x 152 x 64	->	152	x 152	x 64	0.189	BF
22	route	21 12				->	152	x 152	x 128		
23	conv	128		1 x 1/ 1	152 x 152 x 128	->	152	x 152	x 128	0.757	BF
24	conv	256		3 x 3/ 2	152 x 152 x 128	->	76	x 76	x 256	3.407	BF
25	conv	128		1 x 1/ 1	76 x 76 x 256	->	76	x 76	x 128	0.379	BF
26	route	24				->	76	x 76	x 256		
27	conv	128		1 x 1/ 1	76 x 76 x 256	->	76	x 76	x 128	0.379	BF
28	conv	128		1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189	BF
29	conv	128		3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703	BF
30	Shortcut Layer:	27,	wt = 0,	wn = 0,	outputs: 76 x 76 x 128	0.001	BF				
31	conv	128		1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189	BF
32	conv	128		3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703	BF
33	Shortcut Layer:	30,	wt = 0,	wn = 0,	outputs: 76 x 76 x 128	0.001	BF				
34	conv	128		1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189	BF
35	conv	128		3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703	BF
36	Shortcut Layer:	33,	wt = 0,	wn = 0,	outputs: 76 x 76 x 128	0.001	BF				
37	conv	128		1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189	BF
38	conv	128		3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703	BF
39	Shortcut Layer:	36,	wt = 0,	wn = 0,	outputs: 76 x 76 x 128	0.001	BF				
40	conv	128		1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189	BF
41	conv	128		3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703	BF
42	Shortcut Layer:	39,	wt = 0,	wn = 0,	outputs: 76 x 76 x 128	0.001	BF				
43	conv	128		1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189	BF
44	conv	128		3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703	BF
45	Shortcut Layer:	42,	wt = 0,	wn = 0,	outputs: 76 x 76 x 128	0.001	BF				
46	conv	128		1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189	BF
47	conv	128		3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703	BF
48	Shortcut Layer:	45,	wt = 0,	wn = 0,	outputs: 76 x 76 x 128	0.001	BF				
49	conv	128		1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189	BF
50	conv	128		3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703	BF
51	Shortcut Layer:	48,	wt = 0,	wn = 0,	outputs: 76 x 76 x 128	0.001	BF				
52	conv	128		1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189	BF
53	route	52 25				->	76	x 76	x 256		
54	conv	256		1 x 1/ 1	76 x 76 x 256	->	76	x 76	x 256	0.757	BF
55	conv	512		3 x 3/ 2	76 x 76 x 256	->	38	x 38	x 512	3.407	BF
56	conv	256		1 x 1/ 1	38 x 38 x 512	->	38	x 38	x 256	0.379	BF
57	route	55				->	38	x 38	x 512		
58	conv	256		1 x 1/ 1	38 x 38 x 512	->	38	x 38	x 256	0.379	BF
59	conv	256		1 x 1/ 1	38 x 38 x 256	->	38	x 38	x 256	0.189	BF
60	conv	256		3 x 3/ 1	38 x 38 x 256	->	38	x 38	x 256	1.703	BF
61	Shortcut Layer:	58,	wt = 0,	wn = 0,	outputs: 38 x 38 x 256	0.000	BF				
62	conv	256		1 x 1/ 1	38 x 38 x 256	->	38	x 38	x 256	0.189	BF
63	conv	256		3 x 3/ 1	38 x 38 x 256	->	38	x 38	x 256	1.703	BF
64	Shortcut Layer:	61,	wt = 0,	wn = 0,	outputs: 38 x 38 x 256	0.000	BF				
65	conv	256		1 x 1/ 1	38 x 38 x 256	->	38	x 38	x 256	0.189	BF
66	conv	256		3 x 3/ 1	38 x 38 x 256	->	38	x 38	x 256	1.703	BF
67	Shortcut Layer:	64,	wt = 0,	wn = 0,	outputs: 38 x 38 x 256	0.000	BF				
68	conv	256		1 x 1/ 1	38 x 38 x 256	->	38	x 38	x 256	0.189	BF
69	conv	256		3 x 3/ 1	38 x 38 x 256	->	38	x 38	x 256	1.703	BF

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70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
84 route 83 56 -> 38 x 38 x 512
85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x1024 3.407 BF
87 conv 512 1 x 1/ 1 19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
88 route 86 -> 19 x 19 x1024
89 conv 512 1 x 1/ 1 19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
103 route 102 87 -> 19 x 19 x1024
104 conv 1024 1 x 1/ 1 19 x 19 x1024 -> 19 x 19 x1024 0.757 BF
105 conv 512 1 x 1/ 1 19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
106 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
107 conv 512 1 x 1/ 1 19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
108 max 5x 5/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
109 route 107 -> 19 x 19 x 512
110 max 9x 9/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.015 BF
111 route 107 -> 19 x 19 x 512
112 max 13x13/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.031 BF
113 route 112 110 108 107 -> 19 x 19 x2048
114 conv 512 1 x 1/ 1 19 x 19 x2048 -> 19 x 19 x 512 0.757 BF
115 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
116 conv 512 1 x 1/ 1 19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
117 conv 256 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 256 0.095 BF
118 upsample 2x 19 x 19 x 256 -> 38 x 38 x 256
119 route 85 -> 38 x 38 x 512
120 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
121 route 120 118 -> 38 x 38 x 512
122 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
123 conv 512 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
124 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
125 conv 512 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
126 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
127 conv 128 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 128 0.095 BF
128 upsample 2x 38 x 38 x 128 -> 76 x 76 x 128
129 route 54 -> 76 x 76 x 256

```

```

130 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
131 route   130 128
132 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
133 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
134 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
135 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
136 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
137 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
138 conv    24       1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 24 0.071 BF
139 yolo

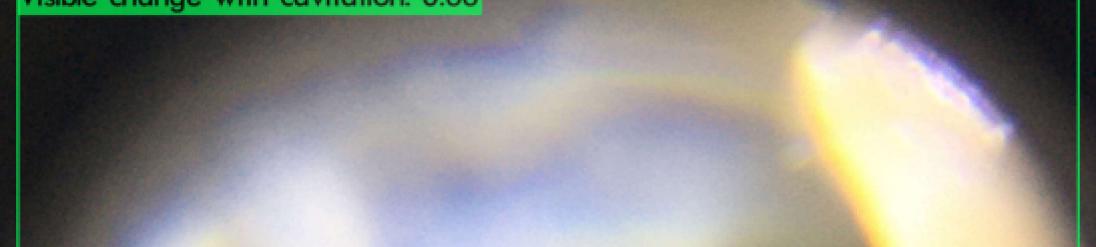
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route   136
141 conv    256      3 x 3/ 2      76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route   141 126
143 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo

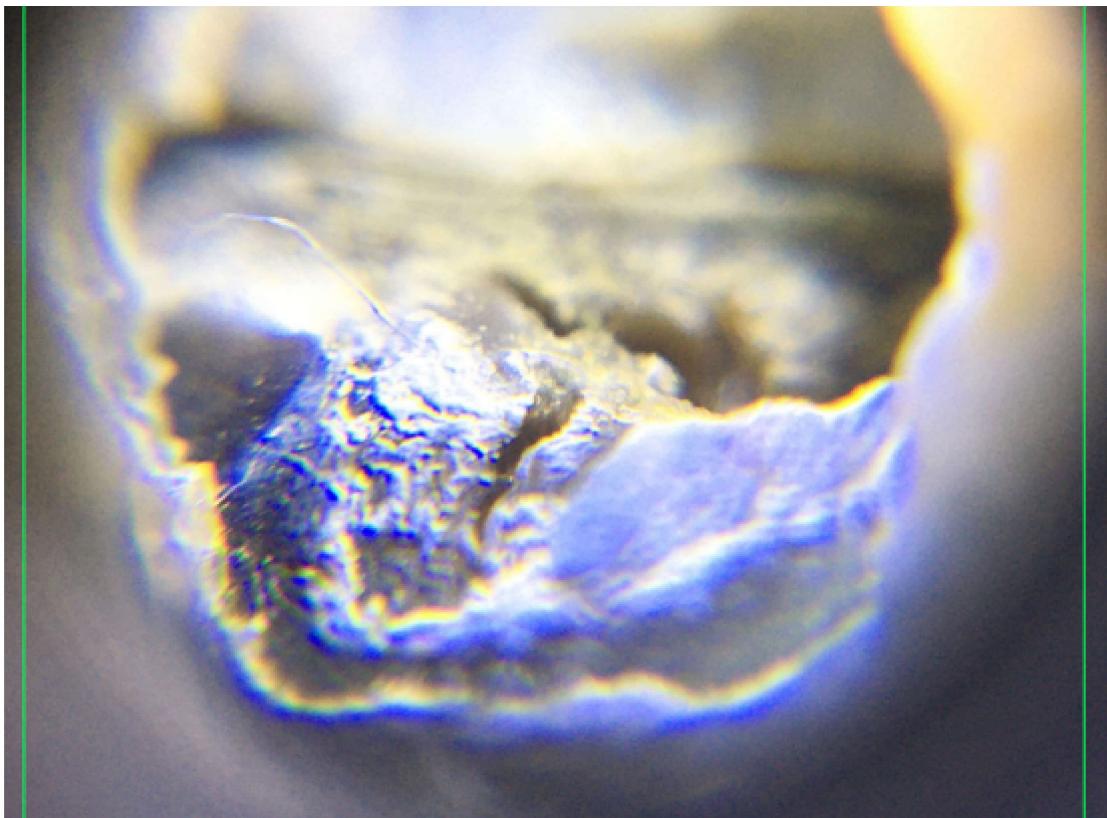
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route   147
152 conv    512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route   152 116
154 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Iphone 6s/Figure 2.png: Predicted in
Visible change with cavitation: 66%
Unable to init server: Could not connect: Connection refused

(predictions:6793): Gtk-WARNING **: 10:09:31.665: cannot open display:
```

Visible change with cavitation: 0.66





```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
 0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer   filters   size/strd(dil)      input           output
 0 Create CUDA-stream - 0
Create cudnn-handle 0
conv     32       3 x 3/ 1      608 x 608 x    3 -> 608 x 608 x  32 0.639 BF
  1 conv     64       3 x 3/ 2      608 x 608 x  32 -> 304 x 304 x  64 3.407 BF
  2 conv     64       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
  3 route    1                   -> 304 x 304 x  64
  4 conv     64       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
  5 conv     32       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  32 0.379 BF
  6 conv     64       3 x 3/ 1      304 x 304 x  32 -> 304 x 304 x  64 3.407 BF
  7 Shortcut Layer: 4,  wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
  8 conv     64       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
  9 route    8 2                   -> 304 x 304 x 128
 10 conv    64       1 x 1/ 1      304 x 304 x 128 -> 304 x 304 x  64 1.514 BF
 11 conv    128      3 x 3/ 2      304 x 304 x  64 -> 152 x 152 x 128 3.407 BF
 12 conv    64       1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
 13 route   11                  -> 152 x 152 x 128
 14 conv    64       1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
 15 conv    64       1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
 16 conv    64       3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
 17 Shortcut Layer: 14,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
 18 conv    64       1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
 19 conv    64       3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
 20 Shortcut Layer: 17,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
 21 conv    64       1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
 22 route   21 12                 -> 152 x 152 x 128
 23 conv    128      1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
 24 conv    256      3 x 3/ 2      152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
 25 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 26 route   24                  -> 76 x 76 x 256
 27          100      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 100 0.379 BF
```

```

27 conv    128      1 x 1/ 1      /6 x   /6 x 256 ->   /6 x   /6 x 128 0.3/9 BF
28 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
29 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
31 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
32 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
34 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
35 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
37 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
38 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
40 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
41 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
43 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
44 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
46 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
47 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
49 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
50 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
52 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
53 route   52 25                               ->   76 x 76 x 256
54 conv    256      1 x 1/ 1      76 x   76 x 256 ->   76 x   76 x 256 0.757 BF
55 conv    512      3 x 3/ 2      76 x   76 x 256 ->   38 x   38 x 512 3.407 BF
56 conv    256      1 x 1/ 1      38 x   38 x 512 ->   38 x   38 x 256 0.379 BF
57 route   55                               ->   38 x 38 x 512
58 conv    256      1 x 1/ 1      38 x   38 x 512 ->   38 x   38 x 256 0.379 BF
59 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
60 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
62 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
63 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
65 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
66 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
68 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
69 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
71 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
72 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
74 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
75 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
77 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
78 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
80 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
81 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
83 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
84 route   83 56                               ->   38 x 38 x 512
85 conv    512      1 x 1/ 1      38 x   38 x 512 ->   38 x   38 x 512 0.757 BF
86 conv    1024     3 x 3/ 2      38 x   38 x 512 ->   19 x   19 x 1024 3.407 BF
87 conv    512      1 x 1/ 1      19 x   19 x 1024 ->   19 x   19 x 512 0.379 RF

```

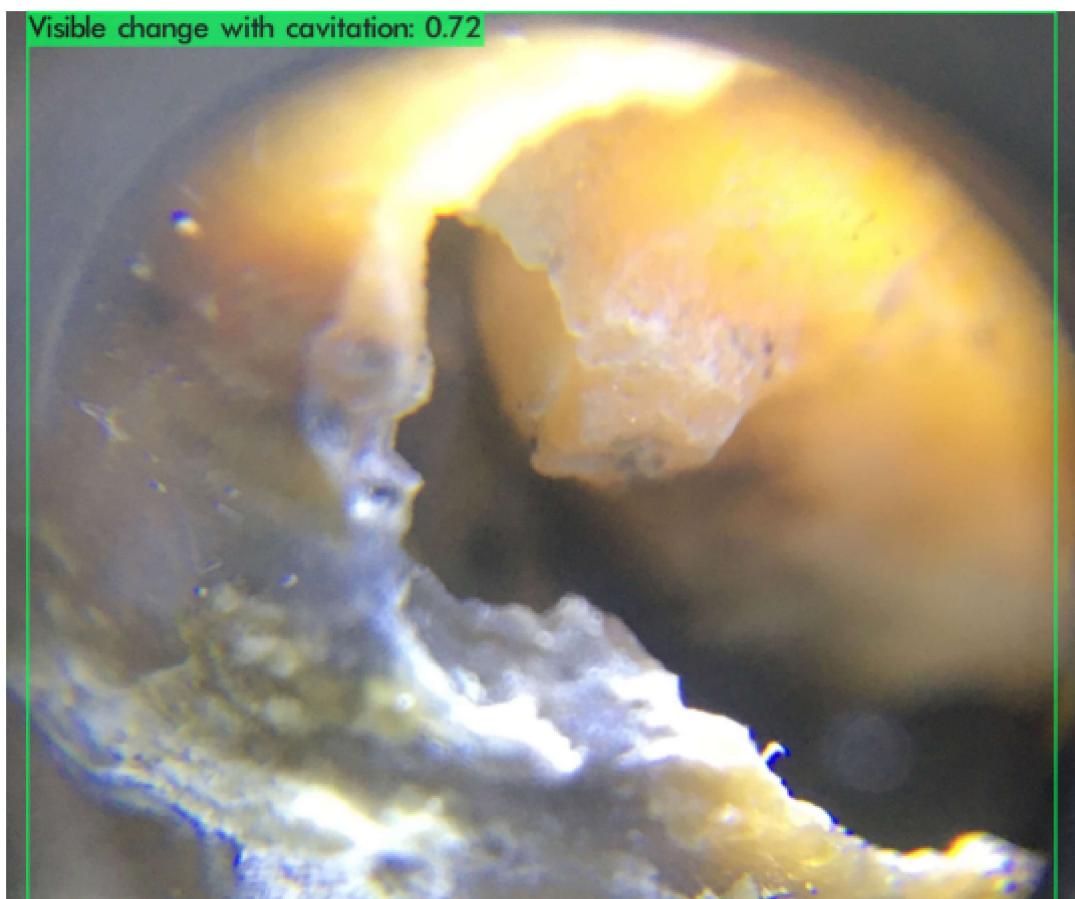
Op	Conv	Route	Input	Output	Size	Stride	Kernel	Weights	Biases	Activations	Operations	Memory	Time
88	route	86											
89	conv	512	1 x 1/ 1	19 x 19 x 1024	->	19 x 19 x 512	0.379	BF					
90	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512	0.189	BF					
91	conv	512	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 512	1.703	BF					
92	Shortcut Layer:	89, wt = 0, wn = 0, outputs:	19 x 19 x 512	0.000	BF								
93	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512	0.189	BF					
94	conv	512	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 512	1.703	BF					
95	Shortcut Layer:	92, wt = 0, wn = 0, outputs:	19 x 19 x 512	0.000	BF								
96	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512	0.189	BF					
97	conv	512	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 512	1.703	BF					
98	Shortcut Layer:	95, wt = 0, wn = 0, outputs:	19 x 19 x 512	0.000	BF								
99	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512	0.189	BF					
100	conv	512	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 512	1.703	BF					
101	Shortcut Layer:	98, wt = 0, wn = 0, outputs:	19 x 19 x 512	0.000	BF								
102	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512	0.189	BF					
103	route	102 87											
104	conv	1024	1 x 1/ 1	19 x 19 x 1024	->	19 x 19 x 1024	0.757	BF					
105	conv	512	1 x 1/ 1	19 x 19 x 1024	->	19 x 19 x 512	0.379	BF					
106	conv	1024	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 1024	3.407	BF					
107	conv	512	1 x 1/ 1	19 x 19 x 1024	->	19 x 19 x 512	0.379	BF					
108	max		5x 5/ 1	19 x 19 x 512	->	19 x 19 x 512	0.005	BF					
109	route	107											
110	max		9x 9/ 1	19 x 19 x 512	->	19 x 19 x 512	0.015	BF					
111	route	107											
112	max		13x13/ 1	19 x 19 x 512	->	19 x 19 x 512	0.031	BF					
113	route	112 110 108 107											
114	conv	512	1 x 1/ 1	19 x 19 x 2048	->	19 x 19 x 512	0.757	BF					
115	conv	1024	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 1024	3.407	BF					
116	conv	512	1 x 1/ 1	19 x 19 x 1024	->	19 x 19 x 512	0.379	BF					
117	conv	256	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 256	0.095	BF					
118	upsample		2x	19 x 19 x 256	->	38 x 38 x 256							
119	route	85											
120	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF					
121	route	120 118											
122	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF					
123	conv	512	3 x 3/ 1	38 x 38 x 256	->	38 x 38 x 512	3.407	BF					
124	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF					
125	conv	512	3 x 3/ 1	38 x 38 x 256	->	38 x 38 x 512	3.407	BF					
126	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF					
127	conv	128	1 x 1/ 1	38 x 38 x 256	->	38 x 38 x 128	0.095	BF					
128	upsample		2x	38 x 38 x 128	->	76 x 76 x 128							
129	route	54											
130	conv	128	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF					
131	route	130 128											
132	conv	128	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF					
133	conv	256	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 256	3.407	BF					
134	conv	128	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF					
135	conv	256	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 256	3.407	BF					
136	conv	128	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF					
137	conv	256	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 256	3.407	BF					
138	conv	24	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 24	0.071	BF					
139	yolo												
[yolo]	params:	iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedy nms (1), beta = 0.600000											
140	route	136											
141	conv	256	3 x 3/ 2	76 x 76 x 128	->	38 x 38 x 256	0.852	BF					
142	route	141 126											
143	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF					
144	conv	512	3 x 3/ 1	38 x 38 x 256	->	38 x 38 x 512	3.407	BF					
145	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF					

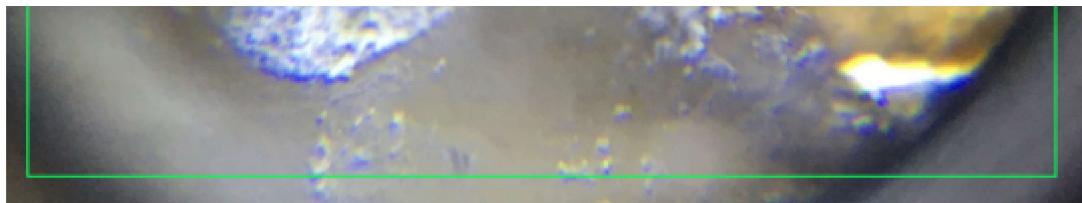
```

146 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route   147                               -> 38 x 38 x 256
152 conv    512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route   152 116                           -> 19 x 19 x1024
154 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 24 0.018 BF
161 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Iphone 6s/Figure 3.png: Predicted in
Visible change with cavitation: 72%
Unable to init server: Could not connect: Connection refused

```

(predictions:6807): Gtk-WARNING **: 10:09:39.815: cannot open display:





CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0

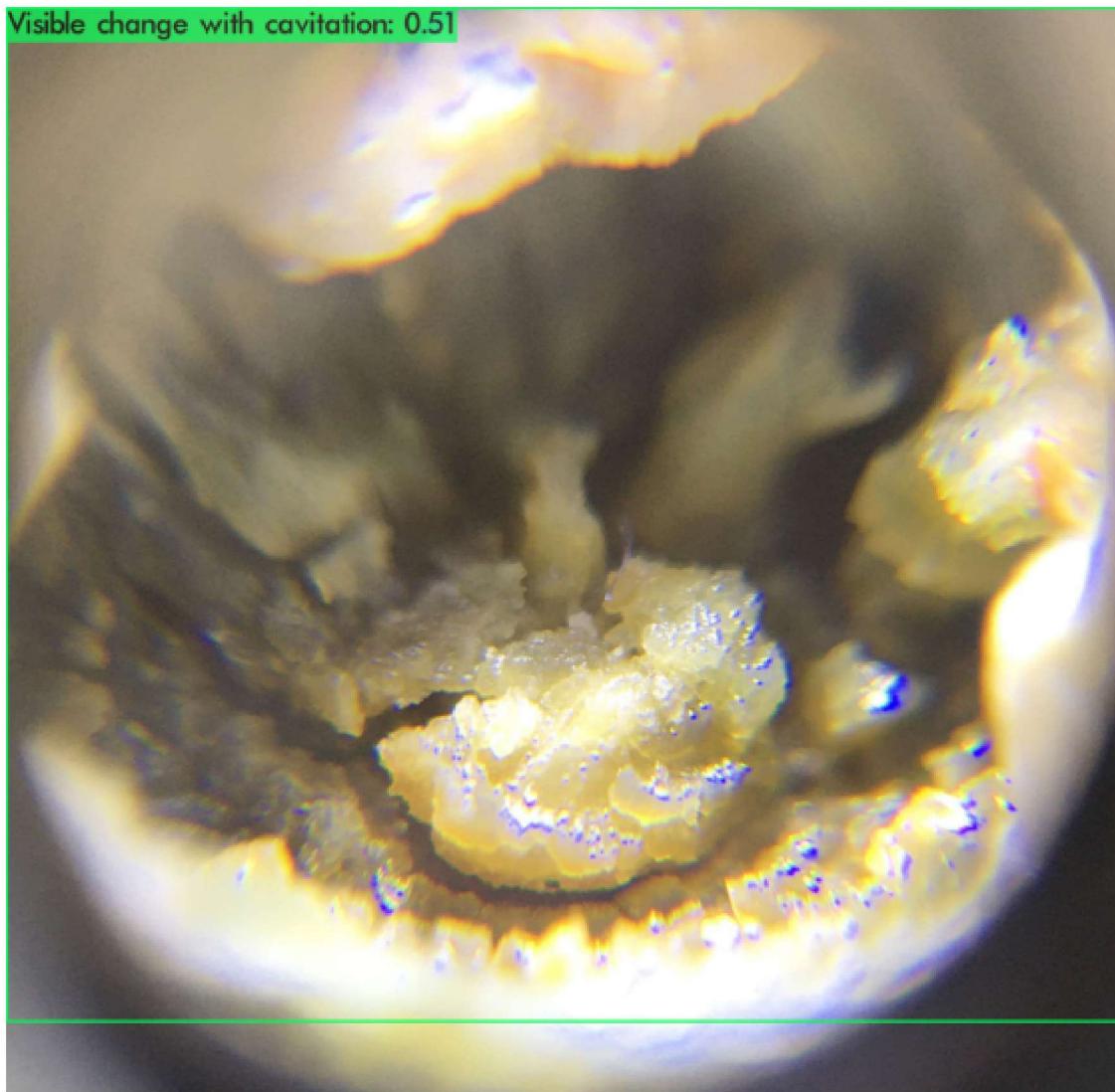
layer	filters	size/strd(dil)	input	output
0	Create CUDA-stream - 0			
	Create cudnn-handle 0			
conv	32	3 x 3/ 1	608 x 608 x 3 -> 608 x 608 x 32	0.639 BF
1 conv	64	3 x 3/ 2	608 x 608 x 32 -> 304 x 304 x 64	3.407 BF
2 conv	64	1 x 1/ 1	304 x 304 x 64 -> 304 x 304 x 64	0.757 BF
3 route	1		-> 304 x 304 x 64	
4 conv	64	1 x 1/ 1	304 x 304 x 64 -> 304 x 304 x 64	0.757 BF
5 conv	32	1 x 1/ 1	304 x 304 x 64 -> 304 x 304 x 32	0.379 BF
6 conv	64	3 x 3/ 1	304 x 304 x 32 -> 304 x 304 x 64	3.407 BF
7 Shortcut Layer: 4,	wt = 0, wn = 0, outputs:	304 x 304 x 64	0.006 BF	
8 conv	64	1 x 1/ 1	304 x 304 x 64 -> 304 x 304 x 64	0.757 BF
9 route	8 2		-> 304 x 304 x 128	
10 conv	64	1 x 1/ 1	304 x 304 x 128 -> 304 x 304 x 64	1.514 BF
11 conv	128	3 x 3/ 2	304 x 304 x 64 -> 152 x 152 x 128	3.407 BF
12 conv	64	1 x 1/ 1	152 x 152 x 128 -> 152 x 152 x 64	0.379 BF
13 route	11		-> 152 x 152 x 128	
14 conv	64	1 x 1/ 1	152 x 152 x 128 -> 152 x 152 x 64	0.379 BF
15 conv	64	1 x 1/ 1	152 x 152 x 64 -> 152 x 152 x 64	0.189 BF
16 conv	64	3 x 3/ 1	152 x 152 x 64 -> 152 x 152 x 64	1.703 BF
17 Shortcut Layer: 14,	wt = 0, wn = 0, outputs:	152 x 152 x 64	0.001 BF	
18 conv	64	1 x 1/ 1	152 x 152 x 64 -> 152 x 152 x 64	0.189 BF
19 conv	64	3 x 3/ 1	152 x 152 x 64 -> 152 x 152 x 64	1.703 BF
20 Shortcut Layer: 17,	wt = 0, wn = 0, outputs:	152 x 152 x 64	0.001 BF	
21 conv	64	1 x 1/ 1	152 x 152 x 64 -> 152 x 152 x 64	0.189 BF
22 route	21 12		-> 152 x 152 x 128	
23 conv	128	1 x 1/ 1	152 x 152 x 128 -> 152 x 152 x 128	0.757 BF
24 conv	256	3 x 3/ 2	152 x 152 x 128 -> 76 x 76 x 256	3.407 BF
25 conv	128	1 x 1/ 1	76 x 76 x 256 -> 76 x 76 x 128	0.379 BF
26 route	24		-> 76 x 76 x 256	
27 conv	128	1 x 1/ 1	76 x 76 x 256 -> 76 x 76 x 128	0.379 BF
28 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
29 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
30 Shortcut Layer: 27,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF	
31 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
32 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
33 Shortcut Layer: 30,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF	
34 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
35 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
36 Shortcut Layer: 33,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF	
37 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
38 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
39 Shortcut Layer: 36,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF	
40 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
41 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
42 Shortcut Layer: 39,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF	
43 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
44 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF

45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 46 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 47 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 49 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 50 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 53 route 52 25 -> 76 x 76 x 256
 54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
 55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
 56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 57 route 55 -> 38 x 38 x 512
 58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF

layer	name	type	input	output	operations	parameters	memory
106	conv	1024	3 x 3 / 1	19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
107	conv	512	1 x 1 / 1	19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
108	max		5x 5 / 1	19 x 19 x 512	->	19 x 19 x 512	0.005 BF
109	route	107			->	19 x 19 x 512	
110	max		9x 9 / 1	19 x 19 x 512	->	19 x 19 x 512	0.015 BF
111	route	107			->	19 x 19 x 512	
112	max		13x13 / 1	19 x 19 x 512	->	19 x 19 x 512	0.031 BF
113	route	112 110 108 107			->	19 x 19 x 2048	
114	conv	512	1 x 1 / 1	19 x 19 x 2048	->	19 x 19 x 512	0.757 BF
115	conv	1024	3 x 3 / 1	19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
116	conv	512	1 x 1 / 1	19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
117	conv	256	1 x 1 / 1	19 x 19 x 512	->	19 x 19 x 256	0.095 BF
118	upsample		2x	19 x 19 x 256	->	38 x 38 x 256	
119	route	85			->	38 x 38 x 512	
120	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379 BF
121	route	120 118			->	38 x 38 x 512	
122	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379 BF
123	conv	512	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 512	3.407 BF
124	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379 BF
125	conv	512	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 512	3.407 BF
126	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379 BF
127	conv	128	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 128	0.095 BF
128	upsample		2x	38 x 38 x 128	->	76 x 76 x 128	
129	route	54			->	76 x 76 x 256	
130	conv	128	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 128	0.379 BF
131	route	130 128			->	76 x 76 x 256	
132	conv	128	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 128	0.379 BF
133	conv	256	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 256	3.407 BF
134	conv	128	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 128	0.379 BF
135	conv	256	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 256	3.407 BF
136	conv	128	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 128	0.379 BF
137	conv	256	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 256	3.407 BF
138	conv	24	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 24	0.071 BF
139	yolo						
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedy_nms (1), beta = 0.600000							
140	route	136			->	76 x 76 x 128	
141	conv	256	3 x 3 / 2	76 x 76 x 128	->	38 x 38 x 256	0.852 BF
142	route	141 126			->	38 x 38 x 512	
143	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379 BF
144	conv	512	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 512	3.407 BF
145	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379 BF
146	conv	512	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 512	3.407 BF
147	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379 BF
148	conv	512	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 512	3.407 BF
149	conv	24	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 24	0.035 BF
150	yolo						
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedy_nms (1), beta = 0.600000							
151	route	147			->	38 x 38 x 256	
152	conv	512	3 x 3 / 2	38 x 38 x 256	->	19 x 19 x 512	0.852 BF
153	route	152 116			->	19 x 19 x 1024	
154	conv	512	1 x 1 / 1	19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
155	conv	1024	3 x 3 / 1	19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
156	conv	512	1 x 1 / 1	19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
157	conv	1024	3 x 3 / 1	19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
158	conv	512	1 x 1 / 1	19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
159	conv	1024	3 x 3 / 1	19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
160	conv	24	1 x 1 / 1	19 x 19 x 1024	->	19 x 19 x 24	0.018 BF
161	volo						

```
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d  
nms_kind: greedyNMS (1), beta = 0.600000  
Total BFLOPS 127.263  
avg_outputs = 1046775  
Allocate additional workspace_size = 6.65 MB  
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...  
seen 64, trained: 139 K-images (2 Kilo-batches_64)  
Done! Loaded 162 layers from weights-file  
Detection layer: 139 - type = 28  
Detection layer: 150 - type = 28  
Detection layer: 161 - type = 28  
/content/gdrive/MyDrive/tooth/Processed images/Iphone 6s/Figure 4.png: Predicted in  
Visible change with cavitation: 51%  
Unable to init server: Could not connect: Connection refused
```

(predictions:6821): Gtk-WARNING **: 10:09:48.243: cannot open display:



```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1  
CUDNN_HALF=1  
OpenCV version: 3.2.0  
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80  
net.optimized_memory = 0  
mini_batch = 1, batch = 32, time_steps = 1, train = 0  
layer filters size/strd(dil) input output  
0 Create CUDA-stream - 0  
Create cudnn-handle 0  
conv 32 3 x 3/ 1 608 x 608 x 3 -> 608 x 608 x 32 0.639 BF  
1 conv 64 3 x 3/ 2 608 x 608 x 32 -> 304 x 304 x 64 3.407 BF  
2 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
```

3 route 1 -> 304 x 304 x 64
 4 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
 5 conv 32 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 32 0.379 BF
 6 conv 64 3 x 3/ 1 304 x 304 x 32 -> 304 x 304 x 64 3.407 BF
 7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x 64 0.006 BF
 8 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
 9 route 8 2 -> 304 x 304 x 128
 10 conv 64 1 x 1/ 1 304 x 304 x 128 -> 304 x 304 x 64 1.514 BF
 11 conv 128 3 x 3/ 2 304 x 304 x 64 -> 152 x 152 x 128 3.407 BF
 12 conv 64 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 64 0.379 BF
 13 route 11 -> 152 x 152 x 128
 14 conv 64 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 64 0.379 BF
 15 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 16 conv 64 3 x 3/ 1 152 x 152 x 64 -> 152 x 152 x 64 1.703 BF
 17 Shortcut Layer: 14, wt = 0, wn = 0, outputs: 152 x 152 x 64 0.001 BF
 18 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 19 conv 64 3 x 3/ 1 152 x 152 x 64 -> 152 x 152 x 64 1.703 BF
 20 Shortcut Layer: 17, wt = 0, wn = 0, outputs: 152 x 152 x 64 0.001 BF
 21 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 22 route 21 12 -> 152 x 152 x 128
 23 conv 128 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
 24 conv 256 3 x 3/ 2 152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
 25 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 26 route 24 -> 76 x 76 x 256
 27 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 28 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 29 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 31 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 32 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 34 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 35 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 37 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 38 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 40 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 41 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 43 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 44 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 46 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 47 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 49 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 50 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 53 route 52 25 -> 76 x 76 x 256
 54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
 55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
 56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 57 route 55 -> 38 x 38 x 512
 58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF

63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 106 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 107 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 108 max 5x 5/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
 109 route 107 -> 19 x 19 x 512
 110 max 9x 9/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.015 BF
 111 route 107 -> 19 x 19 x 512
 112 max 13x13/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.031 BF
 113 route 112 110 108 107 -> 19 x 19 x 2048
 114 conv 512 1 x 1/ 1 19 x 19 x 2048 -> 19 x 19 x 512 0.757 BF
 115 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 116 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 117 conv 256 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 256 0.095 BF
 118 upsample 2x 19 x 19 x 256 -> 38 x 38 x 256
 119 route 85 -> 38 x 38 x 512
 120 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 121 route 120 118 -> 38 x 38 x 512
 122 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 123 -> 38 x 38 x 512 0.379 BF

```

123 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.40/ BF
124 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
125 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
126 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
127 conv    128      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 128 0.095 BF
128 upsample          2x      38 x 38 x 128 -> 76 x 76 x 128
129 route   54                  -> 76 x 76 x 256
130 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
131 route   130 128          -> 76 x 76 x 256
132 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
133 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
134 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
135 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
136 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
137 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
138 conv    24       1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 24 0.071 BF
139 yolo

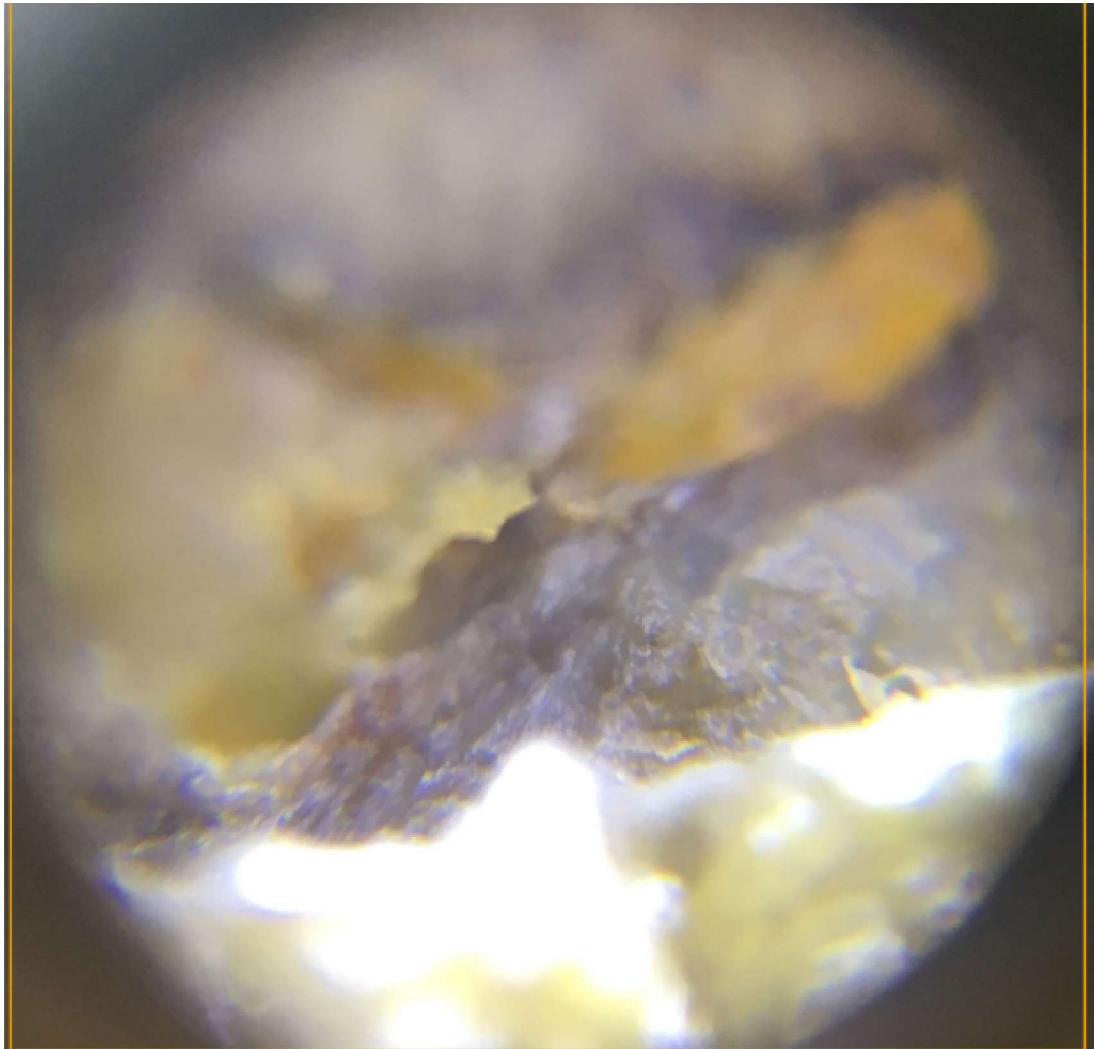
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route   136          -> 76 x 76 x 128
141 conv    256      3 x 3/ 2      76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route   141 126          -> 38 x 38 x 512
143 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route   147          -> 38 x 38 x 256
152 conv    512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route   152 116          -> 19 x 19 x1024
154 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Iphone 6s/Figure 5.png: Predicted in
Visible change with microcavitation: 70%
Unable to init server: Could not connect: Connection refused

(predictions:6835): Gtk-WARNING **: 10:09:56.497: cannot open display:
Visible change with microcavitation: 0.70

```



```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer filters size/strd(dil)      input                  output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv    32      3 x 3/ 1      608 x 608 x   3 ->  608 x 608 x  32 0.639 BF
1 conv    64      3 x 3/ 2      608 x 608 x  32 ->  304 x 304 x  64 3.407 BF
2 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
3 route   1                   ->  304 x 304 x  64
4 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
5 conv    32      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  32 0.379 BF
6 conv    64      3 x 3/ 1      304 x 304 x  32 ->  304 x 304 x  64 3.407 BF
7 Shortcut Layer: 4,  wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
8 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
9 route   8 2                   ->  304 x 304 x 128
10 conv   64      1 x 1/ 1      304 x 304 x 128 ->  304 x 304 x  64 1.514 BF
11 conv   128     3 x 3/ 2      304 x 304 x  64 ->  152 x 152 x 128 3.407 BF
12 conv   64      1 x 1/ 1      152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
13 route  11                   ->  152 x 152 x 128
14 conv   64      1 x 1/ 1      152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
15 conv   64      1 x 1/ 1      152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
16 conv   64      3 x 3/ 1      152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
17 Shortcut Layer: 14,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
18 conv   64      1 x 1/ 1      152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
19 conv   64      3 x 3/ 1      152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
20 Shortcut Layer: 17.  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
```

21	conv	64	1 x 1 / 1	152 x 152 x 64	->	152 x 152 x 64	0.189	BF
22	route	21 12			->	152 x 152 x 128		
23	conv	128	1 x 1 / 1	152 x 152 x 128	->	152 x 152 x 128	0.757	BF
24	conv	256	3 x 3 / 2	152 x 152 x 128	->	76 x 76 x 256	3.407	BF
25	conv	128	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
26	route	24			->	76 x 76 x 256		
27	conv	128	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
28	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
29	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
30	Shortcut Layer:	27, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
31	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
32	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
33	Shortcut Layer:	30, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
34	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
35	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
36	Shortcut Layer:	33, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
37	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
38	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
39	Shortcut Layer:	36, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
40	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
41	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
42	Shortcut Layer:	39, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
43	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
44	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
45	Shortcut Layer:	42, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
46	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
47	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
48	Shortcut Layer:	45, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
49	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
50	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
51	Shortcut Layer:	48, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
52	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
53	route	52 25			->	76 x 76 x 256		
54	conv	256	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 256	0.757	BF
55	conv	512	3 x 3 / 2	76 x 76 x 256	->	38 x 38 x 512	3.407	BF
56	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
57	route	55			->	38 x 38 x 512		
58	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
59	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
60	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
61	Shortcut Layer:	58, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
62	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
63	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
64	Shortcut Layer:	61, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
65	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
66	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
67	Shortcut Layer:	64, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
68	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
69	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
70	Shortcut Layer:	67, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
71	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
72	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
73	Shortcut Layer:	70, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
74	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
75	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
76	Shortcut Layer:	73, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
77	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
78	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
79	Shortcut Layer:	76, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
80	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF

81	conv	256	3 x 3/ 1	38 x 38 x 256 ->	38 x 38 x 256 1.703 BF
82	Shortcut Layer:	79,	wt = 0, wn = 0, outputs:	38 x 38 x 256 0.000 BF	
83	conv	256	1 x 1/ 1	38 x 38 x 256 ->	38 x 38 x 256 0.189 BF
84	route	83 56		->	38 x 38 x 512
85	conv	512	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 512 0.757 BF
86	conv	1024	3 x 3/ 2	38 x 38 x 512 ->	19 x 19 x 1024 3.407 BF
87	conv	512	1 x 1/ 1	19 x 19 x 1024 ->	19 x 19 x 512 0.379 BF
88	route	86		->	19 x 19 x 1024
89	conv	512	1 x 1/ 1	19 x 19 x 1024 ->	19 x 19 x 512 0.379 BF
90	conv	512	1 x 1/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
91	conv	512	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x 512 1.703 BF
92	Shortcut Layer:	89,	wt = 0, wn = 0, outputs:	19 x 19 x 512 0.000 BF	
93	conv	512	1 x 1/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
94	conv	512	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x 512 1.703 BF
95	Shortcut Layer:	92,	wt = 0, wn = 0, outputs:	19 x 19 x 512 0.000 BF	
96	conv	512	1 x 1/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
97	conv	512	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x 512 1.703 BF
98	Shortcut Layer:	95,	wt = 0, wn = 0, outputs:	19 x 19 x 512 0.000 BF	
99	conv	512	1 x 1/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
100	conv	512	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x 512 1.703 BF
101	Shortcut Layer:	98,	wt = 0, wn = 0, outputs:	19 x 19 x 512 0.000 BF	
102	conv	512	1 x 1/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
103	route	102 87		->	19 x 19 x 1024
104	conv	1024	1 x 1/ 1	19 x 19 x 1024 ->	19 x 19 x 1024 0.757 BF
105	conv	512	1 x 1/ 1	19 x 19 x 1024 ->	19 x 19 x 512 0.379 BF
106	conv	1024	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x 1024 3.407 BF
107	conv	512	1 x 1/ 1	19 x 19 x 1024 ->	19 x 19 x 512 0.379 BF
108	max		5x 5/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.005 BF
109	route	107		->	19 x 19 x 512
110	max		9x 9/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.015 BF
111	route	107		->	19 x 19 x 512
112	max		13x13/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.031 BF
113	route	112 110 108 107		->	19 x 19 x 2048
114	conv	512	1 x 1/ 1	19 x 19 x 2048 ->	19 x 19 x 512 0.757 BF
115	conv	1024	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x 1024 3.407 BF
116	conv	512	1 x 1/ 1	19 x 19 x 1024 ->	19 x 19 x 512 0.379 BF
117	conv	256	1 x 1/ 1	19 x 19 x 512 ->	19 x 19 x 256 0.095 BF
118	upsample		2x	19 x 19 x 256 ->	38 x 38 x 256
119	route	85		->	38 x 38 x 512
120	conv	256	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
121	route	120 118		->	38 x 38 x 512
122	conv	256	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
123	conv	512	3 x 3/ 1	38 x 38 x 256 ->	38 x 38 x 512 3.407 BF
124	conv	256	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
125	conv	512	3 x 3/ 1	38 x 38 x 256 ->	38 x 38 x 512 3.407 BF
126	conv	256	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
127	conv	128	1 x 1/ 1	38 x 38 x 256 ->	38 x 38 x 128 0.095 BF
128	upsample		2x	38 x 38 x 128 ->	76 x 76 x 128
129	route	54		->	76 x 76 x 256
130	conv	128	1 x 1/ 1	76 x 76 x 256 ->	76 x 76 x 128 0.379 BF
131	route	130 128		->	76 x 76 x 256
132	conv	128	1 x 1/ 1	76 x 76 x 256 ->	76 x 76 x 128 0.379 BF
133	conv	256	3 x 3/ 1	76 x 76 x 128 ->	76 x 76 x 256 3.407 BF
134	conv	128	1 x 1/ 1	76 x 76 x 256 ->	76 x 76 x 128 0.379 BF
135	conv	256	3 x 3/ 1	76 x 76 x 128 ->	76 x 76 x 256 3.407 BF
136	conv	128	1 x 1/ 1	76 x 76 x 256 ->	76 x 76 x 128 0.379 BF
137	conv	256	3 x 3/ 1	76 x 76 x 128 ->	76 x 76 x 256 3.407 BF
138	conv	24	1 x 1/ 1	76 x 76 x 256 ->	76 x 76 x 24 0.071 BF
139	yolo				

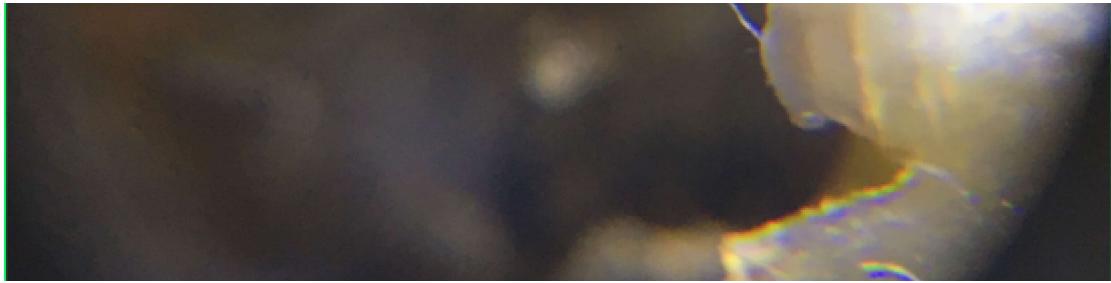
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d

```

nms_kind: greedy_nms (1), beta = 0.600000
140 route 136                                     -> 76 x 76 x 128
141 conv 256      3 x 3/ 2      76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route 141 126                                -> 38 x 38 x 512
143 conv 256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv 512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv 256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv 512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv 256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv 512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv 24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedy_nms (1), beta = 0.600000
151 route 147                                     -> 38 x 38 x 256
152 conv 512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route 152 116                                -> 19 x 19 x 1024
154 conv 512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
155 conv 1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
156 conv 512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
157 conv 1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
158 conv 512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
159 conv 1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
160 conv 24       1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 24 0.018 BF
161 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedy_nms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Iphone 6s/Figure 6.png: Predicted in
Visible change with cavitation: 83%
Unable to init server: Could not connect: Connection refused

(predictions:6849): Gtk-WARNING **: 10:10:05.488: cannot open display:
```





```
!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc  
imShow('predictions.jpg')  
  
!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc  
imShow('predictions.jpg')
```

CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0

layer	filters	size/strd(dil)	input	output
0	Create CUDA-stream - 0			
	Create cudnn-handle 0			
conv	32	3 x 3/ 1	608 x 608 x 3 -> 608 x 608 x 32	0.639 BF
1 conv	64	3 x 3/ 2	608 x 608 x 32 -> 304 x 304 x 64	3.407 BF
2 conv	64	1 x 1/ 1	304 x 304 x 64 -> 304 x 304 x 64	0.757 BF
3 route	1		-> 304 x 304 x 64	
4 conv	64	1 x 1/ 1	304 x 304 x 64 -> 304 x 304 x 64	0.757 BF
5 conv	32	1 x 1/ 1	304 x 304 x 64 -> 304 x 304 x 32	0.379 BF
6 conv	64	3 x 3/ 1	304 x 304 x 32 -> 304 x 304 x 64	3.407 BF
7 Shortcut Layer: 4,	wt = 0, wn = 0,	outputs: 304 x 304 x 64	0.006 BF	
8 conv	64	1 x 1/ 1	304 x 304 x 64 -> 304 x 304 x 64	0.757 BF
9 route	8 2		-> 304 x 304 x 128	
10 conv	64	1 x 1/ 1	304 x 304 x 128 -> 304 x 304 x 64	1.514 BF
11 conv	128	3 x 3/ 2	304 x 304 x 64 -> 152 x 152 x 128	3.407 BF
12 conv	64	1 x 1/ 1	152 x 152 x 128 -> 152 x 152 x 64	0.379 BF
13 route	11		-> 152 x 152 x 128	
14 conv	64	1 x 1/ 1	152 x 152 x 128 -> 152 x 152 x 64	0.379 BF
15 conv	64	1 x 1/ 1	152 x 152 x 64 -> 152 x 152 x 64	0.189 BF
16 conv	64	3 x 3/ 1	152 x 152 x 64 -> 152 x 152 x 64	1.703 BF
17 Shortcut Layer: 14,	wt = 0, wn = 0,	outputs: 152 x 152 x 64	0.001 BF	
18 conv	64	1 x 1/ 1	152 x 152 x 64 -> 152 x 152 x 64	0.189 BF
19 conv	64	3 x 3/ 1	152 x 152 x 64 -> 152 x 152 x 64	1.703 BF
20 Shortcut Layer: 17,	wt = 0, wn = 0,	outputs: 152 x 152 x 64	0.001 BF	
21 conv	64	1 x 1/ 1	152 x 152 x 64 -> 152 x 152 x 64	0.189 BF
22 route	21 12		-> 152 x 152 x 128	
23 conv	128	1 x 1/ 1	152 x 152 x 128 -> 152 x 152 x 128	0.757 BF
24 conv	256	3 x 3/ 2	152 x 152 x 128 -> 76 x 76 x 256	3.407 BF
25 conv	128	1 x 1/ 1	76 x 76 x 256 -> 76 x 76 x 128	0.379 BF
26 route	24		-> 76 x 76 x 256	
27 conv	128	1 x 1/ 1	76 x 76 x 256 -> 76 x 76 x 128	0.379 BF
28 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
29 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
30 Shortcut Layer: 27,	wt = 0, wn = 0,	outputs: 76 x 76 x 128	0.001 BF	
31 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
32 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
33 Shortcut Layer: 30,	wt = 0, wn = 0,	outputs: 76 x 76 x 128	0.001 BF	
34 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
35 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
36 Shortcut Layer: 33,	wt = 0, wn = 0,	outputs: 76 x 76 x 128	0.001 BF	
37 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
38 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
39 Shortcut Layer: 36,	wt = 0, wn = 0,	outputs: 76 x 76 x 128	0.001 BF	
40 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
41 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
42 Shortcut Layer: 39,	wt = 0, wn = 0,	outputs: 76 x 76 x 128	0.001 BF	
43 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
44 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
45 Shortcut Layer: 42,	wt = 0, wn = 0,	outputs: 76 x 76 x 128	0.001 BF	
46 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
47 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
48 Shortcut Layer: 45,	wt = 0, wn = 0,	outputs: 76 x 76 x 128	0.001 BF	
49 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
50 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF

51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 53 route 52 25 -> 76 x 76 x 256
 54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
 55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
 56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 57 route 55 -> 38 x 38 x 512
 58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 106 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 107 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 108 max 5x 5/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
 109 route 107 -> 19 x 19 x 512
 110 max 9x 9/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.015 BF

```

111 route 107
112 max           13x13/ 1    19 x   19 x 512 -> 19 x   19 x 512 0.031 BF
113 route 112 110 108 107
114 conv   512      1 x 1/ 1    19 x   19 x 2048 -> 19 x   19 x 512 0.757 BF
115 conv   1024     3 x 3/ 1    19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
116 conv   512      1 x 1/ 1    19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
117 conv   256      1 x 1/ 1    19 x   19 x 512 -> 19 x   19 x 256 0.095 BF
118 upsample
119 route 85
120 conv   256      1 x 1/ 1    38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
121 route 120 118
122 conv   256      1 x 1/ 1    38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
123 conv   512      3 x 3/ 1    38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
124 conv   256      1 x 1/ 1    38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
125 conv   512      3 x 3/ 1    38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
126 conv   256      1 x 1/ 1    38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
127 conv   128      1 x 1/ 1    38 x   38 x 256 -> 38 x   38 x 128 0.095 BF
128 upsample
129 route 54
130 conv   128      1 x 1/ 1    76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
131 route 130 128
132 conv   128      1 x 1/ 1    76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
133 conv   256      3 x 3/ 1    76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
134 conv   128      1 x 1/ 1    76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
135 conv   256      3 x 3/ 1    76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
136 conv   128      1 x 1/ 1    76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
137 conv   256      3 x 3/ 1    76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
138 conv   24       1 x 1/ 1    76 x   76 x 256 -> 76 x   76 x 24 0.071 BF
139 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route 136
141 conv   256      3 x 3/ 2    76 x   76 x 128 -> 38 x   38 x 256 0.852 BF
142 route 141 126
143 conv   256      1 x 1/ 1    38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
144 conv   512      3 x 3/ 1    38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
145 conv   256      1 x 1/ 1    38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
146 conv   512      3 x 3/ 1    38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
147 conv   256      1 x 1/ 1    38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
148 conv   512      3 x 3/ 1    38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
149 conv   24       1 x 1/ 1    38 x   38 x 512 -> 38 x   38 x 24 0.035 BF
150 yolo

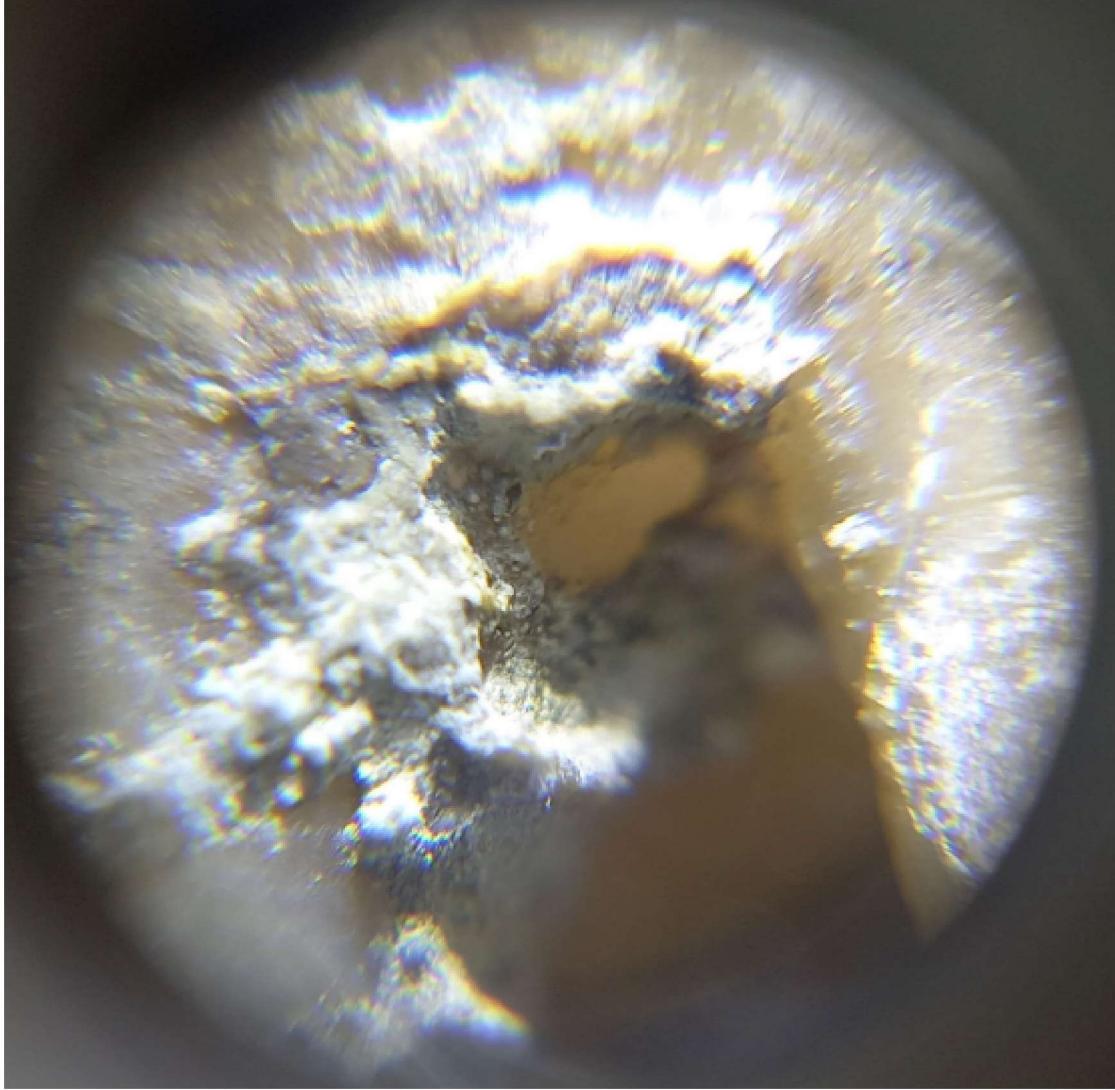
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route 147
152 conv   512      3 x 3/ 2    38 x   38 x 256 -> 19 x   19 x 512 0.852 BF
153 route 152 116
154 conv   512      1 x 1/ 1    19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
155 conv   1024     3 x 3/ 1    19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
156 conv   512      1 x 1/ 1    19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
157 conv   1024     3 x 3/ 1    19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
158 conv   512      1 x 1/ 1    19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
159 conv   1024     3 x 3/ 1    19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
160 conv   24       1 x 1/ 1    19 x   19 x 1024 -> 19 x   19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB

```

```
Loading weights from /myarive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung A31/Figure 1.png: Predicted i
Unable to init server: Could not connect: Connection refused
```

```
(predictions:7115): Gtk-WARNING **: 10:18:06.233: cannot open display:
```



```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer filters size/strd(dil)      input           output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv    32      3 x 3/ 1      608 x 608 x   3 ->  608 x 608 x  32 0.639 BF
1 conv    64      3 x 3/ 2      608 x 608 x  32 ->  304 x 304 x  64 3.407 BF
2 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
3 route  1                  ->  304 x 304 x  64
4 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
5 conv    32      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  32 0.379 BF
6 conv    64      3 x 3/ 1      304 x 304 x  32 ->  304 x 304 x  64 3.407 BF
7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
8 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
9 route  0 2                  ->  304 x 304 x 128
```

#	route	o	z			->	c ₀	c ₁	c ₂	c ₃	c ₄		
10	conv	64		1 x 1/ 1	304 x 304 x 128	->	304	x	304	x	64	1.514	BF
11	conv	128		3 x 3/ 2	304 x 304 x 64	->	152	x	152	x	128	3.407	BF
12	conv	64		1 x 1/ 1	152 x 152 x 128	->	152	x	152	x	64	0.379	BF
13	route	11				->	152	x	152	x	128		
14	conv	64		1 x 1/ 1	152 x 152 x 128	->	152	x	152	x	64	0.379	BF
15	conv	64		1 x 1/ 1	152 x 152 x 64	->	152	x	152	x	64	0.189	BF
16	conv	64		3 x 3/ 1	152 x 152 x 64	->	152	x	152	x	64	1.703	BF
17	Shortcut Layer:	14,	wt = 0,	wn = 0,	outputs: 152 x 152 x 64	0.001	BF						
18	conv	64		1 x 1/ 1	152 x 152 x 64	->	152	x	152	x	64	0.189	BF
19	conv	64		3 x 3/ 1	152 x 152 x 64	->	152	x	152	x	64	1.703	BF
20	Shortcut Layer:	17,	wt = 0,	wn = 0,	outputs: 152 x 152 x 64	0.001	BF						
21	conv	64		1 x 1/ 1	152 x 152 x 64	->	152	x	152	x	64	0.189	BF
22	route	21 12				->	152	x	152	x	128		
23	conv	128		1 x 1/ 1	152 x 152 x 128	->	152	x	152	x	128	0.757	BF
24	conv	256		3 x 3/ 2	152 x 152 x 128	->	76	x	76	x	256	3.407	BF
25	conv	128		1 x 1/ 1	76 x 76 x 256	->	76	x	76	x	128	0.379	BF
26	route	24				->	76	x	76	x	256		
27	conv	128		1 x 1/ 1	76 x 76 x 256	->	76	x	76	x	128	0.379	BF
28	conv	128		1 x 1/ 1	76 x 76 x 128	->	76	x	76	x	128	0.189	BF
29	conv	128		3 x 3/ 1	76 x 76 x 128	->	76	x	76	x	128	1.703	BF
30	Shortcut Layer:	27,	wt = 0,	wn = 0,	outputs: 76 x 76 x 128	0.001	BF						
31	conv	128		1 x 1/ 1	76 x 76 x 128	->	76	x	76	x	128	0.189	BF
32	conv	128		3 x 3/ 1	76 x 76 x 128	->	76	x	76	x	128	1.703	BF
33	Shortcut Layer:	30,	wt = 0,	wn = 0,	outputs: 76 x 76 x 128	0.001	BF						
34	conv	128		1 x 1/ 1	76 x 76 x 128	->	76	x	76	x	128	0.189	BF
35	conv	128		3 x 3/ 1	76 x 76 x 128	->	76	x	76	x	128	1.703	BF
36	Shortcut Layer:	33,	wt = 0,	wn = 0,	outputs: 76 x 76 x 128	0.001	BF						
37	conv	128		1 x 1/ 1	76 x 76 x 128	->	76	x	76	x	128	0.189	BF
38	conv	128		3 x 3/ 1	76 x 76 x 128	->	76	x	76	x	128	1.703	BF
39	Shortcut Layer:	36,	wt = 0,	wn = 0,	outputs: 76 x 76 x 128	0.001	BF						
40	conv	128		1 x 1/ 1	76 x 76 x 128	->	76	x	76	x	128	0.189	BF
41	conv	128		3 x 3/ 1	76 x 76 x 128	->	76	x	76	x	128	1.703	BF
42	Shortcut Layer:	39,	wt = 0,	wn = 0,	outputs: 76 x 76 x 128	0.001	BF						
43	conv	128		1 x 1/ 1	76 x 76 x 128	->	76	x	76	x	128	0.189	BF
44	conv	128		3 x 3/ 1	76 x 76 x 128	->	76	x	76	x	128	1.703	BF
45	Shortcut Layer:	42,	wt = 0,	wn = 0,	outputs: 76 x 76 x 128	0.001	BF						
46	conv	128		1 x 1/ 1	76 x 76 x 128	->	76	x	76	x	128	0.189	BF
47	conv	128		3 x 3/ 1	76 x 76 x 128	->	76	x	76	x	128	1.703	BF
48	Shortcut Layer:	45,	wt = 0,	wn = 0,	outputs: 76 x 76 x 128	0.001	BF						
49	conv	128		1 x 1/ 1	76 x 76 x 128	->	76	x	76	x	128	0.189	BF
50	conv	128		3 x 3/ 1	76 x 76 x 128	->	76	x	76	x	128	1.703	BF
51	Shortcut Layer:	48,	wt = 0,	wn = 0,	outputs: 76 x 76 x 128	0.001	BF						
52	conv	128		1 x 1/ 1	76 x 76 x 128	->	76	x	76	x	128	0.189	BF
53	route	52 25				->	76	x	76	x	256		
54	conv	256		1 x 1/ 1	76 x 76 x 256	->	76	x	76	x	256	0.757	BF
55	conv	512		3 x 3/ 2	76 x 76 x 256	->	38	x	38	x	512	3.407	BF
56	conv	256		1 x 1/ 1	38 x 38 x 512	->	38	x	38	x	256	0.379	BF
57	route	55				->	38	x	38	x	512		
58	conv	256		1 x 1/ 1	38 x 38 x 512	->	38	x	38	x	256	0.379	BF
59	conv	256		1 x 1/ 1	38 x 38 x 256	->	38	x	38	x	256	0.189	BF
60	conv	256		3 x 3/ 1	38 x 38 x 256	->	38	x	38	x	256	1.703	BF
61	Shortcut Layer:	58,	wt = 0,	wn = 0,	outputs: 38 x 38 x 256	0.000	BF						
62	conv	256		1 x 1/ 1	38 x 38 x 256	->	38	x	38	x	256	0.189	BF
63	conv	256		3 x 3/ 1	38 x 38 x 256	->	38	x	38	x	256	1.703	BF
64	Shortcut Layer:	61,	wt = 0,	wn = 0,	outputs: 38 x 38 x 256	0.000	BF						
65	conv	256		1 x 1/ 1	38 x 38 x 256	->	38	x	38	x	256	0.189	BF
66	conv	256		3 x 3/ 1	38 x 38 x 256	->	38	x	38	x	256	1.703	BF
67	Shortcut Layer:	64,	wt = 0,	wn = 0,	outputs: 38 x 38 x 256	0.000	BF						
68	conv	256		1 x 1/ 1	38 x 38 x 256	->	38	x	38	x	256	0.189	BF
69	conv	256		3 x 3/ 1	38 x 38 x 256	->	38	x	38	x	256	1.703	BF

70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 106 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 107 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 108 max 5x 5/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
 109 route 107 -> 19 x 19 x 512
 110 max 9x 9/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.015 BF
 111 route 107 -> 19 x 19 x 512
 112 max 13x13/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.031 BF
 113 route 112 110 108 107 -> 19 x 19 x 2048
 114 conv 512 1 x 1/ 1 19 x 19 x 2048 -> 19 x 19 x 512 0.757 BF
 115 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 116 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 117 conv 256 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 256 0.095 BF
 118 upsample 2x 19 x 19 x 256 -> 38 x 38 x 256
 119 route 85 -> 38 x 38 x 512
 120 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 121 route 120 118 -> 38 x 38 x 512
 122 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 123 conv 512 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
 124 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 125 conv 512 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
 126 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 127 conv 128 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 128 0.095 BF
 128 upsample 2x 38 x 38 x 128 -> 76 x 76 x 128
 129 route 54 -> 76 x 76 x 256

```

130 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
131 route   130 128
132 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
133 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
134 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
135 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
136 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
137 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
138 conv    24       1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 24 0.071 BF
139 yolo

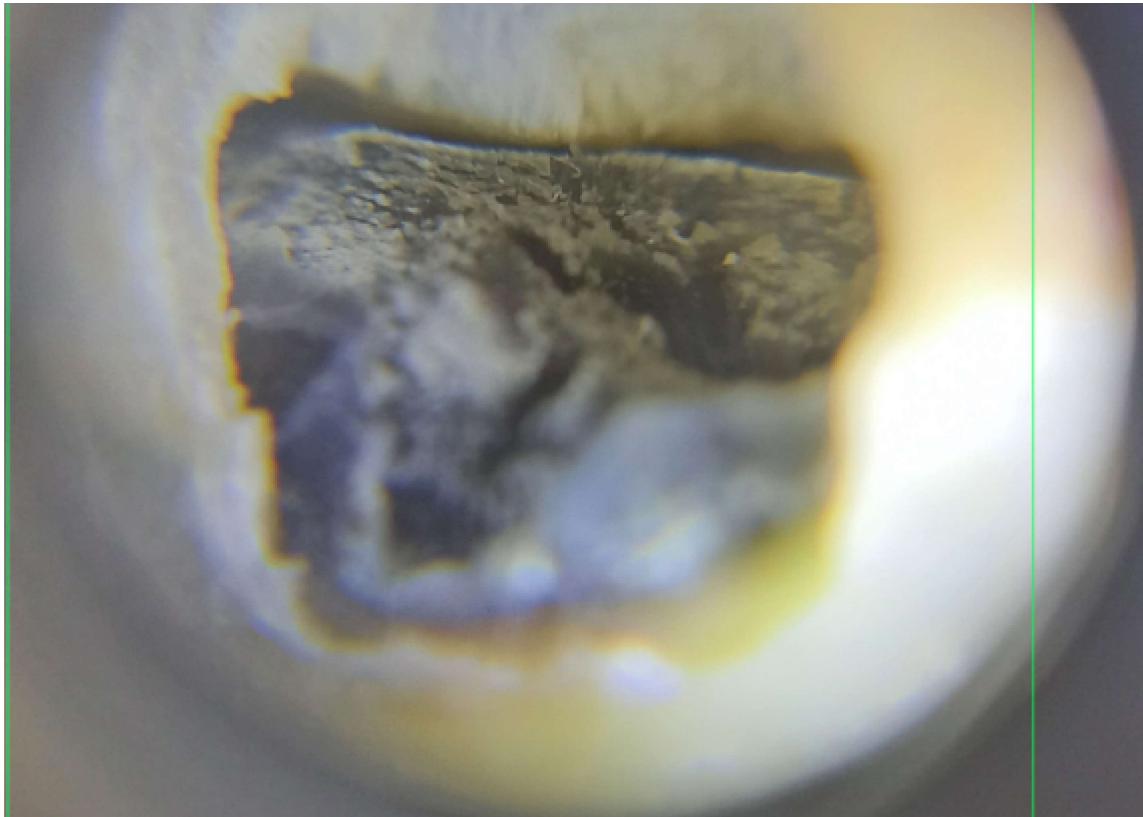
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route   136
141 conv    256      3 x 3/ 2      76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route   141 126
143 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route   147
152 conv    512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route   152 116
154 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung A31/Figure 2.png: Predicted i
Visible change with cavitation: 41%
Unable to init server: Could not connect: Connection refused

(predictions:7127): Gtk-WARNING **: 10:18:13.222: cannot open display:
```





```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
 0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer   filters   size/strd(dil)      input           output
 0 Create CUDA-stream - 0
Create cudnn-handle 0
conv     32       3 x 3/ 1      608 x 608 x    3 -> 608 x 608 x  32 0.639 BF
  1 conv     64       3 x 3/ 2      608 x 608 x  32 -> 304 x 304 x  64 3.407 BF
  2 conv     64       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
  3 route    1                   -> 304 x 304 x  64
  4 conv     64       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
  5 conv     32       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  32 0.379 BF
  6 conv     64       3 x 3/ 1      304 x 304 x  32 -> 304 x 304 x  64 3.407 BF
  7 Shortcut Layer: 4,  wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
  8 conv     64       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
  9 route    8 2                   -> 304 x 304 x 128
 10 conv    64       1 x 1/ 1      304 x 304 x 128 -> 304 x 304 x  64 1.514 BF
 11 conv    128      3 x 3/ 2      304 x 304 x  64 -> 152 x 152 x 128 3.407 BF
 12 conv    64       1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
 13 route   11                  -> 152 x 152 x 128
 14 conv    64       1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
 15 conv    64       1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
 16 conv    64       3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
 17 Shortcut Layer: 14,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
 18 conv    64       1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
 19 conv    64       3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
 20 Shortcut Layer: 17,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
 21 conv    64       1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
 22 route   21 12                 -> 152 x 152 x 128
 23 conv    128      1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
 24 conv    256      3 x 3/ 2      152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
 25 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 26 route   24                  -> 76 x 76 x 256
 27          100      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 100 0.379 BF
```

```

27 conv    128      1 x 1/ 1      /6 x   /6 x 256 ->   /6 x   /6 x 128 0.3/9 BF
28 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
29 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
31 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
32 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
34 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
35 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
37 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
38 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
40 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
41 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
43 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
44 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
46 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
47 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
49 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
50 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
52 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
53 route   52 25                               ->   76 x 76 x 256
54 conv    256      1 x 1/ 1      76 x   76 x 256 ->   76 x   76 x 256 0.757 BF
55 conv    512      3 x 3/ 2      76 x   76 x 256 ->   38 x   38 x 512 3.407 BF
56 conv    256      1 x 1/ 1      38 x   38 x 512 ->   38 x   38 x 256 0.379 BF
57 route   55                               ->   38 x 38 x 512
58 conv    256      1 x 1/ 1      38 x   38 x 512 ->   38 x   38 x 256 0.379 BF
59 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
60 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
62 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
63 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
65 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
66 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
68 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
69 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
71 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
72 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
74 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
75 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
77 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
78 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
80 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
81 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
83 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
84 route   83 56                               ->   38 x 38 x 512
85 conv    512      1 x 1/ 1      38 x   38 x 512 ->   38 x   38 x 512 0.757 BF
86 conv    1024     3 x 3/ 2      38 x   38 x 512 ->   19 x   19 x 1024 3.407 BF
87 conv    512      1 x 1/ 1      19 x   19 x 1024 ->   19 x   19 x 512 0.379 RF

```

Op	Conv	Route	Input	Kernel	Stride	Output	Operations	Memory	Time
88	route	86					->	19 x 19 x 512 0.000 BF	
89	conv	512	1 x 1/ 1	19 x 19 x 1024	->	19 x 19 x 512 0.379 BF			
90	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512 0.189 BF			
91	conv	512	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 512 1.703 BF			
92	Shortcut Layer:	89, wt = 0, wn = 0, outputs: 98		19 x 19 x 512	0.000 BF				
93	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512 0.189 BF			
94	conv	512	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 512 1.703 BF			
95	Shortcut Layer:	92, wt = 0, wn = 0, outputs: 95		19 x 19 x 512	0.000 BF				
96	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512 0.189 BF			
97	conv	512	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 512 1.703 BF			
98	Shortcut Layer:	95, wt = 0, wn = 0, outputs: 101		19 x 19 x 512	0.000 BF				
99	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512 0.189 BF			
100	conv	512	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 512 1.703 BF			
101	Shortcut Layer:	98, wt = 0, wn = 0, outputs: 102		19 x 19 x 512	0.000 BF				
102	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512 0.189 BF			
103	route	102 87					->	19 x 19 x 1024	
104	conv	1024	1 x 1/ 1	19 x 19 x 1024	->	19 x 19 x 1024 0.757 BF			
105	conv	512	1 x 1/ 1	19 x 19 x 1024	->	19 x 19 x 512 0.379 BF			
106	conv	1024	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 1024 3.407 BF			
107	conv	512	1 x 1/ 1	19 x 19 x 1024	->	19 x 19 x 512 0.379 BF			
108	max		5x 5/ 1	19 x 19 x 512	->	19 x 19 x 512 0.005 BF			
109	route	107					->	19 x 19 x 512	
110	max		9x 9/ 1	19 x 19 x 512	->	19 x 19 x 512 0.015 BF			
111	route	107					->	19 x 19 x 512	
112	max		13x13/ 1	19 x 19 x 512	->	19 x 19 x 512 0.031 BF			
113	route	112 110 108 107					->	19 x 19 x 2048	
114	conv	512	1 x 1/ 1	19 x 19 x 2048	->	19 x 19 x 512 0.757 BF			
115	conv	1024	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 1024 3.407 BF			
116	conv	512	1 x 1/ 1	19 x 19 x 1024	->	19 x 19 x 512 0.379 BF			
117	conv	256	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 256 0.095 BF			
118	upsample		2x	19 x 19 x 256	->	38 x 38 x 256			
119	route	85					->	38 x 38 x 512	
120	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256 0.379 BF			
121	route	120 118					->	38 x 38 x 512	
122	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256 0.379 BF			
123	conv	512	3 x 3/ 1	38 x 38 x 256	->	38 x 38 x 512 3.407 BF			
124	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256 0.379 BF			
125	conv	512	3 x 3/ 1	38 x 38 x 256	->	38 x 38 x 512 3.407 BF			
126	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256 0.379 BF			
127	conv	128	1 x 1/ 1	38 x 38 x 256	->	38 x 38 x 128 0.095 BF			
128	upsample		2x	38 x 38 x 128	->	76 x 76 x 128			
129	route	54					->	76 x 76 x 256	
130	conv	128	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 128 0.379 BF			
131	route	130 128					->	76 x 76 x 256	
132	conv	128	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 128 0.379 BF			
133	conv	256	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 256 3.407 BF			
134	conv	128	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 128 0.379 BF			
135	conv	256	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 256 3.407 BF			
136	conv	128	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 128 0.379 BF			
137	conv	256	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 256 3.407 BF			
138	conv	24	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 24 0.071 BF			
139	yolo								
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedyrnms (1), beta = 0.600000									
140	route	136					->	76 x 76 x 128	
141	conv	256	3 x 3/ 2	76 x 76 x 128	->	38 x 38 x 256 0.852 BF			
142	route	141 126					->	38 x 38 x 512	
143	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256 0.379 BF			
144	conv	512	3 x 3/ 1	38 x 38 x 256	->	38 x 38 x 512 3.407 BF			
145	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256 0.379 BF			

```

146 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route   147
152 conv    512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route   152 116
154 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 24 0.018 BF
161 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung A31/Figure 3.png: Predicted i
Visible change with cavitation: 73%
Unable to init server: Could not connect: Connection refused

```

(predictions:7141): Gtk-WARNING **: 10:18:20.163: cannot open display:





```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer filters size/strd(dil)      input           output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv    32      3 x 3/ 1      608 x 608 x   3 -> 608 x 608 x  32 0.639 BF
1 conv    64      3 x 3/ 2      608 x 608 x  32 -> 304 x 304 x  64 3.407 BF
2 conv    64      1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
3 route   1                  -> 304 x 304 x  64
4 conv    64      1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
5 conv    32      1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  32 0.379 BF
6 conv    64      3 x 3/ 1      304 x 304 x  32 -> 304 x 304 x  64 3.407 BF
7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
8 conv    64      1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
9 route   8 2                  -> 304 x 304 x 128
10 conv   64      1 x 1/ 1      304 x 304 x 128 -> 304 x 304 x  64 1.514 BF
11 conv   128     3 x 3/ 2      304 x 304 x  64 -> 152 x 152 x 128 3.407 BF
12 conv   64      1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
13 route   11                 -> 152 x 152 x 128
14 conv    64      1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
15 conv    64      1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
16 conv    64      3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
17 Shortcut Layer: 14, wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
18 conv    64      1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
19 conv    64      3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
20 Shortcut Layer: 17, wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
21 conv    64      1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
22 route   21 12                 -> 152 x 152 x 128
23 conv    128     1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
24 conv    256     3 x 3/ 2      152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
25 conv    128     1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
26 route   24                 -> 76 x 76 x 256
27 conv    128     1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
28 conv    128     1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
29 conv    128     3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
31 conv    128     1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
32 conv    128     3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
34 conv    128     1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
35 conv    128     3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
37 conv    128     1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
38 conv    128     3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
40 conv    128     1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
41 conv    128     3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
43 conv    128     1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
44 conv    128     3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
```

45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 46 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 47 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 49 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 50 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 53 route 52 25 -> 76 x 76 x 256
 54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
 55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
 56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 57 route 55 -> 38 x 38 x 512
 58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF

layer	name	type	input	output	operations	parameters	memory
106	conv	1024	3 x 3 / 1	19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
107	conv	512	1 x 1 / 1	19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
108	max		5x 5 / 1	19 x 19 x 512	->	19 x 19 x 512	0.005 BF
109	route	107			->	19 x 19 x 512	
110	max		9x 9 / 1	19 x 19 x 512	->	19 x 19 x 512	0.015 BF
111	route	107			->	19 x 19 x 512	
112	max		13x13 / 1	19 x 19 x 512	->	19 x 19 x 512	0.031 BF
113	route	112 110 108 107			->	19 x 19 x 2048	
114	conv	512	1 x 1 / 1	19 x 19 x 2048	->	19 x 19 x 512	0.757 BF
115	conv	1024	3 x 3 / 1	19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
116	conv	512	1 x 1 / 1	19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
117	conv	256	1 x 1 / 1	19 x 19 x 512	->	19 x 19 x 256	0.095 BF
118	upsample		2x	19 x 19 x 256	->	38 x 38 x 256	
119	route	85			->	38 x 38 x 512	
120	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379 BF
121	route	120 118			->	38 x 38 x 512	
122	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379 BF
123	conv	512	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 512	3.407 BF
124	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379 BF
125	conv	512	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 512	3.407 BF
126	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379 BF
127	conv	128	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 128	0.095 BF
128	upsample		2x	38 x 38 x 128	->	76 x 76 x 128	
129	route	54			->	76 x 76 x 256	
130	conv	128	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 128	0.379 BF
131	route	130 128			->	76 x 76 x 256	
132	conv	128	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 128	0.379 BF
133	conv	256	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 256	3.407 BF
134	conv	128	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 128	0.379 BF
135	conv	256	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 256	3.407 BF
136	conv	128	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 128	0.379 BF
137	conv	256	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 256	3.407 BF
138	conv	24	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 24	0.071 BF
139	yolo						
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedy_nms (1), beta = 0.600000							
140	route	136			->	76 x 76 x 128	
141	conv	256	3 x 3 / 2	76 x 76 x 128	->	38 x 38 x 256	0.852 BF
142	route	141 126			->	38 x 38 x 512	
143	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379 BF
144	conv	512	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 512	3.407 BF
145	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379 BF
146	conv	512	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 512	3.407 BF
147	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379 BF
148	conv	512	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 512	3.407 BF
149	conv	24	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 24	0.035 BF
150	yolo						
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedy_nms (1), beta = 0.600000							
151	route	147			->	38 x 38 x 256	
152	conv	512	3 x 3 / 2	38 x 38 x 256	->	19 x 19 x 512	0.852 BF
153	route	152 116			->	19 x 19 x 1024	
154	conv	512	1 x 1 / 1	19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
155	conv	1024	3 x 3 / 1	19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
156	conv	512	1 x 1 / 1	19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
157	conv	1024	3 x 3 / 1	19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
158	conv	512	1 x 1 / 1	19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
159	conv	1024	3 x 3 / 1	19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
160	conv	24	1 x 1 / 1	19 x 19 x 1024	->	19 x 19 x 24	0.018 BF
161	volo						

```

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyNMS (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung A31/Figure 4.png: Predicted i
Visible change with cavitation: 61%
Unable to init server: Could not connect: Connection refused

```

(predictions:7155): Gtk-WARNING **: 10:18:26.949: cannot open display:



```

CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer filters size/strd(dil) input output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv 32 3 x 3/ 1 608 x 608 x 3 -> 608 x 608 x 32 0.639 BF
1 conv 64 3 x 3/ 2 608 x 608 x 32 -> 304 x 304 x 64 3.407 BF
2 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF

```

3 route 1 -> 304 x 304 x 64
 4 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
 5 conv 32 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 32 0.379 BF
 6 conv 64 3 x 3/ 1 304 x 304 x 32 -> 304 x 304 x 64 3.407 BF
 7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x 64 0.006 BF
 8 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
 9 route 8 2 -> 304 x 304 x 128
 10 conv 64 1 x 1/ 1 304 x 304 x 128 -> 304 x 304 x 64 1.514 BF
 11 conv 128 3 x 3/ 2 304 x 304 x 64 -> 152 x 152 x 128 3.407 BF
 12 conv 64 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 64 0.379 BF
 13 route 11 -> 152 x 152 x 128
 14 conv 64 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 64 0.379 BF
 15 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 16 conv 64 3 x 3/ 1 152 x 152 x 64 -> 152 x 152 x 64 1.703 BF
 17 Shortcut Layer: 14, wt = 0, wn = 0, outputs: 152 x 152 x 64 0.001 BF
 18 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 19 conv 64 3 x 3/ 1 152 x 152 x 64 -> 152 x 152 x 64 1.703 BF
 20 Shortcut Layer: 17, wt = 0, wn = 0, outputs: 152 x 152 x 64 0.001 BF
 21 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 22 route 21 12 -> 152 x 152 x 128
 23 conv 128 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
 24 conv 256 3 x 3/ 2 152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
 25 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 26 route 24 -> 76 x 76 x 256
 27 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 28 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 29 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 31 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 32 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 34 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 35 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 37 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 38 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 40 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 41 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 43 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 44 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 46 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 47 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 49 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 50 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 53 route 52 25 -> 76 x 76 x 256
 54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
 55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
 56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 57 route 55 -> 38 x 38 x 512
 58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF

63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 106 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 107 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 108 max 5x 5/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
 109 route 107 -> 19 x 19 x 512
 110 max 9x 9/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.015 BF
 111 route 107 -> 19 x 19 x 512
 112 max 13x13/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.031 BF
 113 route 112 110 108 107 -> 19 x 19 x 2048
 114 conv 512 1 x 1/ 1 19 x 19 x 2048 -> 19 x 19 x 512 0.757 BF
 115 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 116 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 117 conv 256 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 256 0.095 BF
 118 upsample 2x 19 x 19 x 256 -> 38 x 38 x 256
 119 route 85 -> 38 x 38 x 512
 120 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 121 route 120 118 -> 38 x 38 x 512
 122 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 123 -> 38 x 38 x 512 0.379 BF

```

123 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.40/ BF
124 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
125 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
126 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
127 conv    128      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 128 0.095 BF
128 upsample          2x      38 x 38 x 128 -> 76 x 76 x 128
129 route   54                  -> 76 x 76 x 256
130 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
131 route   130 128          -> 76 x 76 x 256
132 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
133 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
134 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
135 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
136 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
137 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
138 conv    24       1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 24 0.071 BF
139 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route   136          -> 76 x 76 x 128
141 conv    256      3 x 3/ 2      76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route   141 126          -> 38 x 38 x 512
143 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route   147          -> 38 x 38 x 256
152 conv    512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route   152 116          -> 19 x 19 x1024
154 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung A31/Figure 5.png: Predicted i
Visible change with cavitation: 72%
Unable to init server: Could not connect: Connection refused

(predictions:7167): Gtk-WARNING **: 10:18:33.774: cannot open display:
Visible change with cavitation: 0.72

```



```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer    filters   size/strd(dil)      input                  output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv      32       3 x 3/ 1      608 x 608 x     3 -> 608 x 608 x  32 0.639 BF
1 conv      64       3 x 3/ 2      608 x 608 x  32 -> 304 x 304 x  64 3.407 BF
2 conv      64       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
3 route    1          -> 304 x 304 x  64
4 conv      64       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
5 conv      32       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  32 0.379 BF
6 conv      64       3 x 3/ 1      304 x 304 x  32 -> 304 x 304 x  64 3.407 BF
7 Shortcut Layer: 4,  wt = 0,  wn = 0,  outputs: 304 x 304 x  64 0.006 BF
8 conv      64       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
9 route    8 2          -> 304 x 304 x 128
10 conv     64       1 x 1/ 1      304 x 304 x 128 -> 304 x 304 x  64 1.514 BF
11 conv     128      3 x 3/ 2      304 x 304 x  64 -> 152 x 152 x 128 3.407 BF
12 conv     64       1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
13 route    11         -> 152 x 152 x 128
14 conv     64       1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
15 conv     64       1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
16 conv     64       3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
17 Shortcut Layer: 14,  wt = 0,  wn = 0,  outputs: 152 x 152 x  64 0.001 BF
18 conv     64       1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
19 conv     64       3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
20 Shortcut Layer: 17.  wt = 0.  wn = 0.  outputs: 152 x 152 x  64 0.001 BF
```

21	conv	64	1 x 1/ 1	152 x 152 x 64	->	152 x 152 x 64	0.189	BF
22	route	21 12			->	152 x 152 x 128		
23	conv	128	1 x 1/ 1	152 x 152 x 128	->	152 x 152 x 128	0.757	BF
24	conv	256	3 x 3/ 2	152 x 152 x 128	->	76 x 76 x 256	3.407	BF
25	conv	128	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
26	route	24			->	76 x 76 x 256		
27	conv	128	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
28	conv	128	1 x 1/ 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
29	conv	128	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
30	Shortcut Layer:	27,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001	BF		
31	conv	128	1 x 1/ 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
32	conv	128	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
33	Shortcut Layer:	30,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001	BF		
34	conv	128	1 x 1/ 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
35	conv	128	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
36	Shortcut Layer:	33,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001	BF		
37	conv	128	1 x 1/ 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
38	conv	128	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
39	Shortcut Layer:	36,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001	BF		
40	conv	128	1 x 1/ 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
41	conv	128	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
42	Shortcut Layer:	39,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001	BF		
43	conv	128	1 x 1/ 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
44	conv	128	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
45	Shortcut Layer:	42,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001	BF		
46	conv	128	1 x 1/ 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
47	conv	128	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
48	Shortcut Layer:	45,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001	BF		
49	conv	128	1 x 1/ 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
50	conv	128	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
51	Shortcut Layer:	48,	wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001	BF		
52	conv	128	1 x 1/ 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
53	route	52 25			->	76 x 76 x 256		
54	conv	256	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 256	0.757	BF
55	conv	512	3 x 3/ 2	76 x 76 x 256	->	38 x 38 x 512	3.407	BF
56	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
57	route	55			->	38 x 38 x 512		
58	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
59	conv	256	1 x 1/ 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
60	conv	256	3 x 3/ 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
61	Shortcut Layer:	58,	wt = 0, wn = 0, outputs:	38 x 38 x 256	0.000	BF		
62	conv	256	1 x 1/ 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
63	conv	256	3 x 3/ 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
64	Shortcut Layer:	61,	wt = 0, wn = 0, outputs:	38 x 38 x 256	0.000	BF		
65	conv	256	1 x 1/ 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
66	conv	256	3 x 3/ 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
67	Shortcut Layer:	64,	wt = 0, wn = 0, outputs:	38 x 38 x 256	0.000	BF		
68	conv	256	1 x 1/ 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
69	conv	256	3 x 3/ 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
70	Shortcut Layer:	67,	wt = 0, wn = 0, outputs:	38 x 38 x 256	0.000	BF		
71	conv	256	1 x 1/ 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
72	conv	256	3 x 3/ 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
73	Shortcut Layer:	70,	wt = 0, wn = 0, outputs:	38 x 38 x 256	0.000	BF		
74	conv	256	1 x 1/ 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
75	conv	256	3 x 3/ 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
76	Shortcut Layer:	73,	wt = 0, wn = 0, outputs:	38 x 38 x 256	0.000	BF		
77	conv	256	1 x 1/ 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
78	conv	256	3 x 3/ 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
79	Shortcut Layer:	76,	wt = 0, wn = 0, outputs:	38 x 38 x 256	0.000	BF		
80	conv	256	1 x 1/ 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF

```

81 conv    256      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
83 conv    256      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
84 route   83 56                -> 38 x 38 x 512
85 conv    512      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
86 conv    1024     3 x 3/ 2      38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
87 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
88 route   86                -> 19 x 19 x 1024
89 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
90 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
91 conv    512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
93 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
94 conv    512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
96 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
97 conv    512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
99 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
100 conv   512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
102 conv   512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
103 route  102 87                -> 19 x 19 x 1024
104 conv   1024     1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
105 conv   512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
106 conv   1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
107 conv   512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
108 max    5x 5/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
109 route  107                -> 19 x 19 x 512
110 max    9x 9/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.015 BF
111 route  107                -> 19 x 19 x 512
112 max    13x13/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.031 BF
113 route  112 110 108 107                -> 19 x 19 x 2048
114 conv   512      1 x 1/ 1      19 x 19 x 2048 -> 19 x 19 x 512 0.757 BF
115 conv   1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
116 conv   512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
117 conv   256      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 256 0.095 BF
118 upsample 2x      19 x 19 x 256 -> 38 x 38 x 256
119 route  85                -> 38 x 38 x 512
120 conv   256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
121 route  120 118                -> 38 x 38 x 512
122 conv   256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
123 conv   512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
124 conv   256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
125 conv   512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
126 conv   256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
127 conv   128      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 128 0.095 BF
128 upsample 2x      38 x 38 x 128 -> 76 x 76 x 128
129 route  54                -> 76 x 76 x 256
130 conv   128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
131 route  130 128                -> 76 x 76 x 256
132 conv   128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
133 conv   256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
134 conv   128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
135 conv   256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
136 conv   128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
137 conv   256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
138 conv   24       1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 24 0.071 BF
139 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d

```

```

nms_kind: greedyNMS (1), beta = 0.600000
140 route 136                                     -> 76 x 76 x 128
141 conv 256      3 x 3/ 2      76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route 141 126                                -> 38 x 38 x 512
143 conv 256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv 512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv 256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv 512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv 256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv 512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv 24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyNMS (1), beta = 0.600000
151 route 147                                     -> 38 x 38 x 256
152 conv 512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route 152 116                                -> 19 x 19 x 1024
154 conv 512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
155 conv 1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
156 conv 512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
157 conv 1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
158 conv 512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
159 conv 1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
160 conv 24       1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyNMS (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung A31/Figure 6.png: Predicted i
Visible change with cavitation: 90%
Unable to init server: Could not connect: Connection refused

(predictions:7183): Gtk-WARNING **: 10:18:40.689: cannot open display:
```

Visible change with cavitation: 0.90



```
!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc
imShow('predictions.jpg')

!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc
imShow('predictions.jpg')

!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc
imShow('predictions.jpg')

!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc
imShow('predictions.jpg')
```

```
imshow( predictions.jpg )  
  
!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc  
imShow('predictions.jpg')  
  
!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc  
imShow('predictions.jpg')
```

```

CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
    layer   filters   size/strd(dil)      input           output
    0 Create CUDA-stream - 0
Create cudnn-handle 0
conv    32      3 x 3/ 1     608 x 608 x   3 -> 608 x 608 x  32 0.639 BF
1 conv    64      3 x 3/ 2     608 x 608 x  32 -> 304 x 304 x  64 3.407 BF
2 conv    64      1 x 1/ 1     304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
3 route   1                  -> 304 x 304 x  64
4 conv    64      1 x 1/ 1     304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
5 conv    32      1 x 1/ 1     304 x 304 x  64 -> 304 x 304 x  32 0.379 BF
6 conv    64      3 x 3/ 1     304 x 304 x  32 -> 304 x 304 x  64 3.407 BF
7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
8 conv    64      1 x 1/ 1     304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
9 route   8 2                  -> 304 x 304 x 128
10 conv   64      1 x 1/ 1     304 x 304 x 128 -> 304 x 304 x  64 1.514 BF
11 conv   128     3 x 3/ 2     304 x 304 x  64 -> 152 x 152 x 128 3.407 BF
12 conv   64      1 x 1/ 1     152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
13 route   11                 -> 152 x 152 x 128
14 conv   64      1 x 1/ 1     152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
15 conv   64      1 x 1/ 1     152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
16 conv   64      3 x 3/ 1     152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
17 Shortcut Layer: 14, wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
18 conv   64      1 x 1/ 1     152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
19 conv   64      3 x 3/ 1     152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
20 Shortcut Layer: 17, wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
21 conv   64      1 x 1/ 1     152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
22 route  21 12                 -> 152 x 152 x 128
23 conv   128     1 x 1/ 1     152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
24 conv   256     3 x 3/ 2     152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
25 conv   128     1 x 1/ 1     76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
26 route   24                 -> 76 x 76 x 256
27 conv   128     1 x 1/ 1     76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
28 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
29 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
31 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
32 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
34 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
35 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
37 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
38 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
40 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
41 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
43 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
44 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
46 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
47 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
49 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
50 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF

```

51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 53 route 52 25 -> 76 x 76 x 256
 54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
 55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
 56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 57 route 55 -> 38 x 38 x 512
 58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 106 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 107 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 108 max 5x 5/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
 109 route 107 -> 19 x 19 x 512
 110 max 9x 9/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.015 BF

```

111 route 107
112 max           13x13/ 1      19 x   19 x 512 -> 19 x   19 x 512 0.031 BF
113 route 112 110 108 107
114 conv    512      1 x 1/ 1      19 x   19 x 2048 -> 19 x   19 x 512 0.757 BF
115 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
116 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
117 conv    256      1 x 1/ 1      19 x   19 x 512 -> 19 x   19 x 256 0.095 BF
118 upsample
119 route 85
120 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
121 route 120 118
122 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
123 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
124 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
125 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
126 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
127 conv    128      1 x 1/ 1      38 x   38 x 256 -> 38 x   38 x 128 0.095 BF
128 upsample
129 route 54
130 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
131 route 130 128
132 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
133 conv    256      3 x 3/ 1      76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
134 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
135 conv    256      3 x 3/ 1      76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
136 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
137 conv    256      3 x 3/ 1      76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
138 conv    24       1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 24 0.071 BF
139 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route 136
141 conv    256      3 x 3/ 2      76 x   76 x 128 -> 38 x   38 x 256 0.852 BF
142 route 141 126
143 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
144 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
145 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
146 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 24 0.035 BF
150 yolo

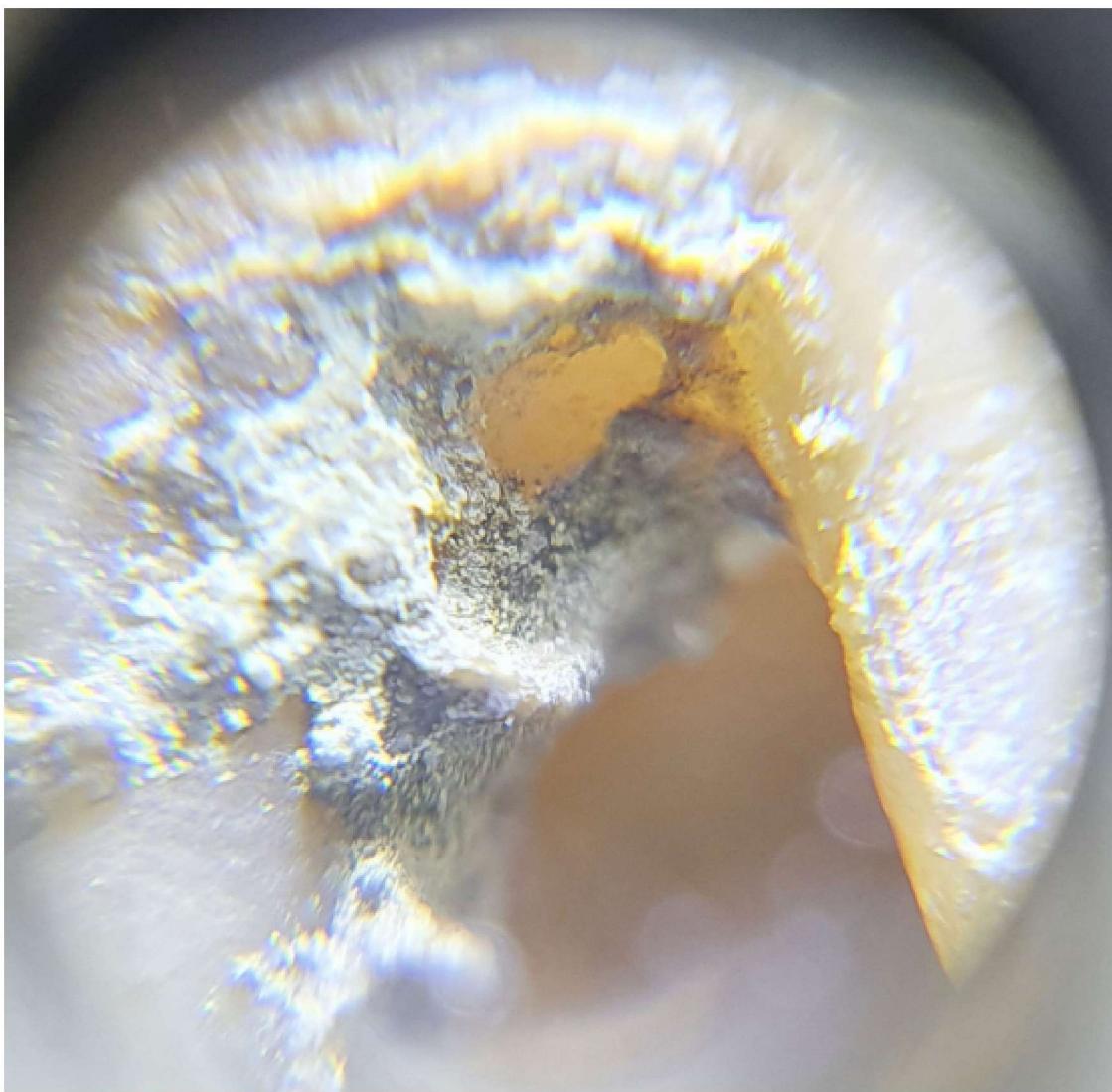
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route 147
152 conv    512      3 x 3/ 2      38 x   38 x 256 -> 19 x   19 x 512 0.852 BF
153 route 152 116
154 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB

```

```
Loading weights from /myarive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S10/Figure 1.png: Predicted i
Unable to init server: Could not connect: Connection refused

(predictions:2255): Gtk-WARNING **: 11:55:48.457: cannot open display:
```



```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer filters size/strd(dil)      input           output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv    32      3 x 3/ 1      608 x 608 x   3 ->  608 x 608 x  32 0.639 BF
1 conv    64      3 x 3/ 2      608 x 608 x  32 ->  304 x 304 x  64 3.407 BF
2 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
3 route   1                  ->  304 x 304 x  64
4 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
5 conv    32      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  32 0.379 BF
6 conv    64      3 x 3/ 1      304 x 304 x  32 ->  304 x 304 x  64 3.407 BF
7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
8 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
9 route   0 2                  ->  304 x 304 x 120
```

#	route	op	size	input	output	op	size	input	output
10	conv	64	1 x 1/ 1	304 x 304 x 128	->	304	x 304	x 64	1.514 BF
11	conv	128	3 x 3/ 2	304 x 304 x 64	->	152	x 152	x 128	3.407 BF
12	conv	64	1 x 1/ 1	152 x 152 x 128	->	152	x 152	x 64	0.379 BF
13	route	11			->	152	x 152	x 128	
14	conv	64	1 x 1/ 1	152 x 152 x 128	->	152	x 152	x 64	0.379 BF
15	conv	64	1 x 1/ 1	152 x 152 x 64	->	152	x 152	x 64	0.189 BF
16	conv	64	3 x 3/ 1	152 x 152 x 64	->	152	x 152	x 64	1.703 BF
17	Shortcut Layer:	14, wt = 0, wn = 0, outputs:	152 x 152 x 64	0.001 BF					
18	conv	64	1 x 1/ 1	152 x 152 x 64	->	152	x 152	x 64	0.189 BF
19	conv	64	3 x 3/ 1	152 x 152 x 64	->	152	x 152	x 64	1.703 BF
20	Shortcut Layer:	17, wt = 0, wn = 0, outputs:	152 x 152 x 64	0.001 BF					
21	conv	64	1 x 1/ 1	152 x 152 x 64	->	152	x 152	x 64	0.189 BF
22	route	21 12			->	152	x 152	x 128	
23	conv	128	1 x 1/ 1	152 x 152 x 128	->	152	x 152	x 128	0.757 BF
24	conv	256	3 x 3/ 2	152 x 152 x 128	->	76	x 76	x 256	3.407 BF
25	conv	128	1 x 1/ 1	76 x 76 x 256	->	76	x 76	x 128	0.379 BF
26	route	24			->	76	x 76	x 256	
27	conv	128	1 x 1/ 1	76 x 76 x 256	->	76	x 76	x 128	0.379 BF
28	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
29	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
30	Shortcut Layer:	27, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
31	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
32	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
33	Shortcut Layer:	30, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
34	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
35	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
36	Shortcut Layer:	33, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
37	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
38	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
39	Shortcut Layer:	36, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
40	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
41	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
42	Shortcut Layer:	39, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
43	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
44	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
45	Shortcut Layer:	42, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
46	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
47	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
48	Shortcut Layer:	45, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
49	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
50	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
51	Shortcut Layer:	48, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
52	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
53	route	52 25			->	76	x 76	x 256	
54	conv	256	1 x 1/ 1	76 x 76 x 256	->	76	x 76	x 256	0.757 BF
55	conv	512	3 x 3/ 2	76 x 76 x 256	->	38	x 38	x 512	3.407 BF
56	conv	256	1 x 1/ 1	38 x 38 x 512	->	38	x 38	x 256	0.379 BF
57	route	55			->	38	x 38	x 512	
58	conv	256	1 x 1/ 1	38 x 38 x 512	->	38	x 38	x 256	0.379 BF
59	conv	256	1 x 1/ 1	38 x 38 x 256	->	38	x 38	x 256	0.189 BF
60	conv	256	3 x 3/ 1	38 x 38 x 256	->	38	x 38	x 256	1.703 BF
61	Shortcut Layer:	58, wt = 0, wn = 0, outputs:	38 x 38 x 256	0.000 BF					
62	conv	256	1 x 1/ 1	38 x 38 x 256	->	38	x 38	x 256	0.189 BF
63	conv	256	3 x 3/ 1	38 x 38 x 256	->	38	x 38	x 256	1.703 BF
64	Shortcut Layer:	61, wt = 0, wn = 0, outputs:	38 x 38 x 256	0.000 BF					
65	conv	256	1 x 1/ 1	38 x 38 x 256	->	38	x 38	x 256	0.189 BF
66	conv	256	3 x 3/ 1	38 x 38 x 256	->	38	x 38	x 256	1.703 BF
67	Shortcut Layer:	64, wt = 0, wn = 0, outputs:	38 x 38 x 256	0.000 BF					
68	conv	256	1 x 1/ 1	38 x 38 x 256	->	38	x 38	x 256	0.189 BF
69	conv	256	3 x 3/ 1	38 x 38 x 256	->	38	x 38	x 256	1.703 BF

70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 106 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 107 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 108 max 5x 5/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
 109 route 107 -> 19 x 19 x 512
 110 max 9x 9/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.015 BF
 111 route 107 -> 19 x 19 x 512
 112 max 13x13/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.031 BF
 113 route 112 110 108 107 -> 19 x 19 x 2048
 114 conv 512 1 x 1/ 1 19 x 19 x 2048 -> 19 x 19 x 512 0.757 BF
 115 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 116 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 117 conv 256 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 256 0.095 BF
 118 upsample 2x 19 x 19 x 256 -> 38 x 38 x 256
 119 route 85 -> 38 x 38 x 512
 120 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 121 route 120 118 -> 38 x 38 x 512
 122 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 123 conv 512 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
 124 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 125 conv 512 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
 126 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 127 conv 128 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 128 0.095 BF
 128 upsample 2x 38 x 38 x 128 -> 76 x 76 x 128
 129 route 54 -> 76 x 76 x 256

```

130 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
131 route   130 128
132 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
133 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
134 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
135 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
136 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
137 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
138 conv    24       1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 24 0.071 BF
139 yolo

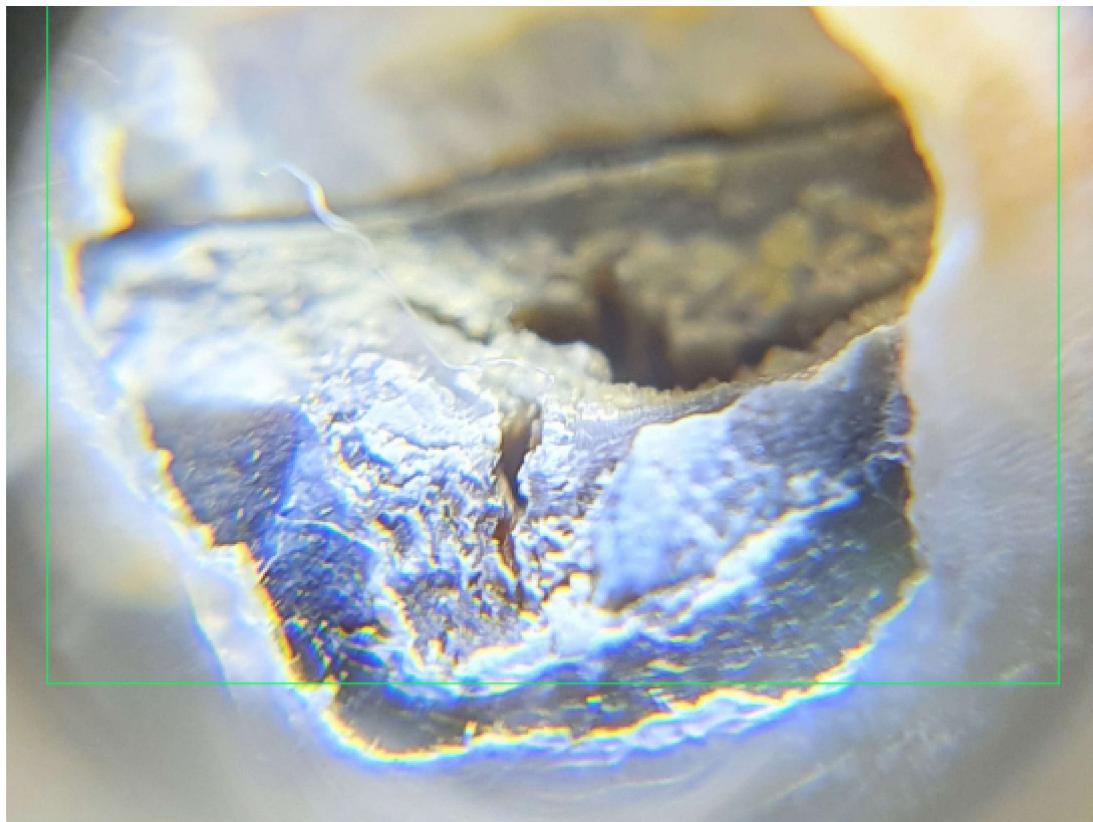
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route   136
141 conv    256      3 x 3/ 2      76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route   141 126
143 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route   147
152 conv    512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route   152 116
154 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S10/Figure 2.png: Predicted i
Visible change with cavitation: 60%
Unable to init server: Could not connect: Connection refused

(predictions:2269): Gtk-WARNING **: 11:55:55.807: cannot open display:
```





```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
 0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer   filters   size/strd(dil)      input           output
 0 Create CUDA-stream - 0
Create cudnn-handle 0
conv     32       3 x 3/ 1      608 x 608 x    3 -> 608 x 608 x  32 0.639 BF
  1 conv     64       3 x 3/ 2      608 x 608 x  32 -> 304 x 304 x  64 3.407 BF
  2 conv     64       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
  3 route    1                   -> 304 x 304 x  64
  4 conv     64       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
  5 conv     32       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  32 0.379 BF
  6 conv     64       3 x 3/ 1      304 x 304 x  32 -> 304 x 304 x  64 3.407 BF
  7 Shortcut Layer: 4,  wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
  8 conv     64       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
  9 route    8 2                   -> 304 x 304 x 128
 10 conv    64       1 x 1/ 1      304 x 304 x 128 -> 304 x 304 x  64 1.514 BF
 11 conv    128      3 x 3/ 2      304 x 304 x  64 -> 152 x 152 x 128 3.407 BF
 12 conv    64       1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
 13 route    11                  -> 152 x 152 x 128
 14 conv    64       1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
 15 conv    64       1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
 16 conv    64       3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
 17 Shortcut Layer: 14,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
 18 conv    64       1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
 19 conv    64       3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
 20 Shortcut Layer: 17,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
 21 conv    64       1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
 22 route   21 12                  -> 152 x 152 x 128
 23 conv    128      1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
 24 conv    256      3 x 3/ 2      152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
 25 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 26 route   24                   -> 76 x 76 x 256
 27          100      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 100 0.379 BF
```

```

27 conv    128      1 x 1/ 1      /6 x   /6 x 256 ->   /6 x   /6 x 128 0.3/9 BF
28 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
29 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
31 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
32 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
34 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
35 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
37 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
38 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
40 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
41 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
43 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
44 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
46 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
47 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
49 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
50 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
52 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
53 route   52 25                               ->   76 x 76 x 256
54 conv    256      1 x 1/ 1      76 x   76 x 256 ->   76 x   76 x 256 0.757 BF
55 conv    512      3 x 3/ 2      76 x   76 x 256 ->   38 x   38 x 512 3.407 BF
56 conv    256      1 x 1/ 1      38 x   38 x 512 ->   38 x   38 x 256 0.379 BF
57 route   55                               ->   38 x 38 x 512
58 conv    256      1 x 1/ 1      38 x   38 x 512 ->   38 x   38 x 256 0.379 BF
59 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
60 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
62 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
63 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
65 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
66 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
68 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
69 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
71 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
72 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
74 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
75 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
77 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
78 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
80 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
81 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
83 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
84 route   83 56                               ->   38 x 38 x 512
85 conv    512      1 x 1/ 1      38 x   38 x 512 ->   38 x   38 x 512 0.757 BF
86 conv    1024     3 x 3/ 2      38 x   38 x 512 ->   19 x   19 x 1024 3.407 BF
87 conv    512      1 x 1/ 1      19 x   19 x 1024 ->   19 x   19 x 512 0.379 RF

```

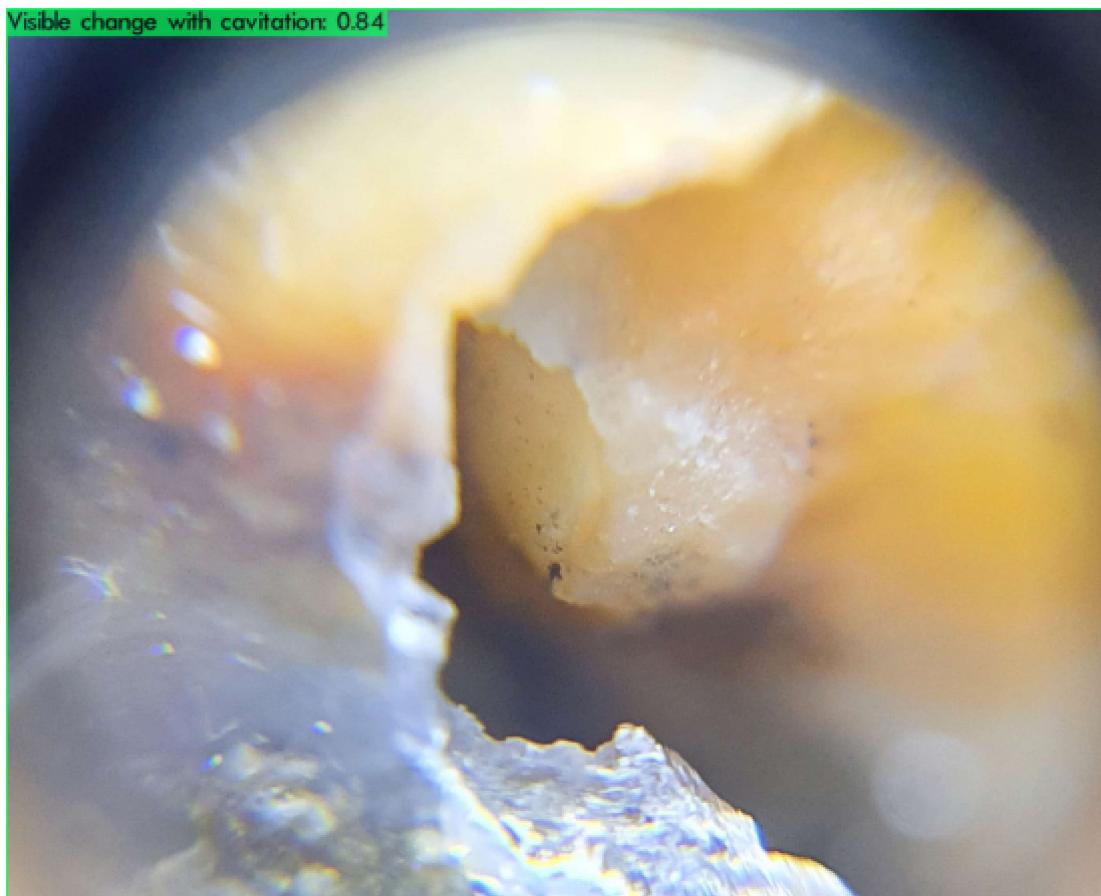
Op	Conv	Route	Input	Output	Size	Format	Op	Conv	Route	Input	Output	Size	Format
88	conv	route 86			19	x 19 x 512	->	19	x 19 x 1024				
89	conv	512	1 x 1/ 1	19 x 19 x 1024	->	19 x 19 x 512	0.379	BF					
90	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512	0.189	BF					
91	conv	512	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 512	1.703	BF					
92	Shortcut	Layer: 89,	wt = 0, wn = 0, outputs:	19 x 19 x 512	0.000	BF							
93	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512	0.189	BF					
94	conv	512	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 512	1.703	BF					
95	Shortcut	Layer: 92,	wt = 0, wn = 0, outputs:	19 x 19 x 512	0.000	BF							
96	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512	0.189	BF					
97	conv	512	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 512	1.703	BF					
98	Shortcut	Layer: 95,	wt = 0, wn = 0, outputs:	19 x 19 x 512	0.000	BF							
99	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512	0.189	BF					
100	conv	512	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 512	1.703	BF					
101	Shortcut	Layer: 98,	wt = 0, wn = 0, outputs:	19 x 19 x 512	0.000	BF							
102	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512	0.189	BF					
103	route	102 87					->	19 x 19 x 1024					
104	conv	1024	1 x 1/ 1	19 x 19 x 1024	->	19 x 19 x 1024	0.757	BF					
105	conv	512	1 x 1/ 1	19 x 19 x 1024	->	19 x 19 x 512	0.379	BF					
106	conv	1024	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 1024	3.407	BF					
107	conv	512	1 x 1/ 1	19 x 19 x 1024	->	19 x 19 x 512	0.379	BF					
108	max		5x 5/ 1	19 x 19 x 512	->	19 x 19 x 512	0.005	BF					
109	route	107					->	19 x 19 x 512					
110	max		9x 9/ 1	19 x 19 x 512	->	19 x 19 x 512	0.015	BF					
111	route	107					->	19 x 19 x 512					
112	max		13x13/ 1	19 x 19 x 512	->	19 x 19 x 512	0.031	BF					
113	route	112 110 108 107					->	19 x 19 x 2048					
114	conv	512	1 x 1/ 1	19 x 19 x 2048	->	19 x 19 x 512	0.757	BF					
115	conv	1024	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 1024	3.407	BF					
116	conv	512	1 x 1/ 1	19 x 19 x 1024	->	19 x 19 x 512	0.379	BF					
117	conv	256	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 256	0.095	BF					
118	upsample		2x	19 x 19 x 256	->	38 x 38 x 256							
119	route	85					->	38 x 38 x 512					
120	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF					
121	route	120 118					->	38 x 38 x 512					
122	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF					
123	conv	512	3 x 3/ 1	38 x 38 x 256	->	38 x 38 x 512	3.407	BF					
124	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF					
125	conv	512	3 x 3/ 1	38 x 38 x 256	->	38 x 38 x 512	3.407	BF					
126	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF					
127	conv	128	1 x 1/ 1	38 x 38 x 256	->	38 x 38 x 128	0.095	BF					
128	upsample		2x	38 x 38 x 128	->	76 x 76 x 128							
129	route	54					->	76 x 76 x 256					
130	conv	128	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF					
131	route	130 128					->	76 x 76 x 256					
132	conv	128	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF					
133	conv	256	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 256	3.407	BF					
134	conv	128	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF					
135	conv	256	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 256	3.407	BF					
136	conv	128	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF					
137	conv	256	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 256	3.407	BF					
138	conv	24	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 24	0.071	BF					
139	yolo												
[yolo]	params:	iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedy nms (1), beta = 0.600000											
140	route	136					->	76 x 76 x 128					
141	conv	256	3 x 3/ 2	76 x 76 x 128	->	38 x 38 x 256	0.852	BF					
142	route	141 126					->	38 x 38 x 512					
143	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF					
144	conv	512	3 x 3/ 1	38 x 38 x 256	->	38 x 38 x 512	3.407	BF					
145	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF					

```

146 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv     24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route   147
152 conv    512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route   152 116
154 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
160 conv     24       1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 24 0.018 BF
161 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S10/Figure 3.png: Predicted i
Visible change with cavitation: 84%
Unable to init server: Could not connect: Connection refused

```

(predictions:2283): Gtk-WARNING **: 11:56:03.327: cannot open display:





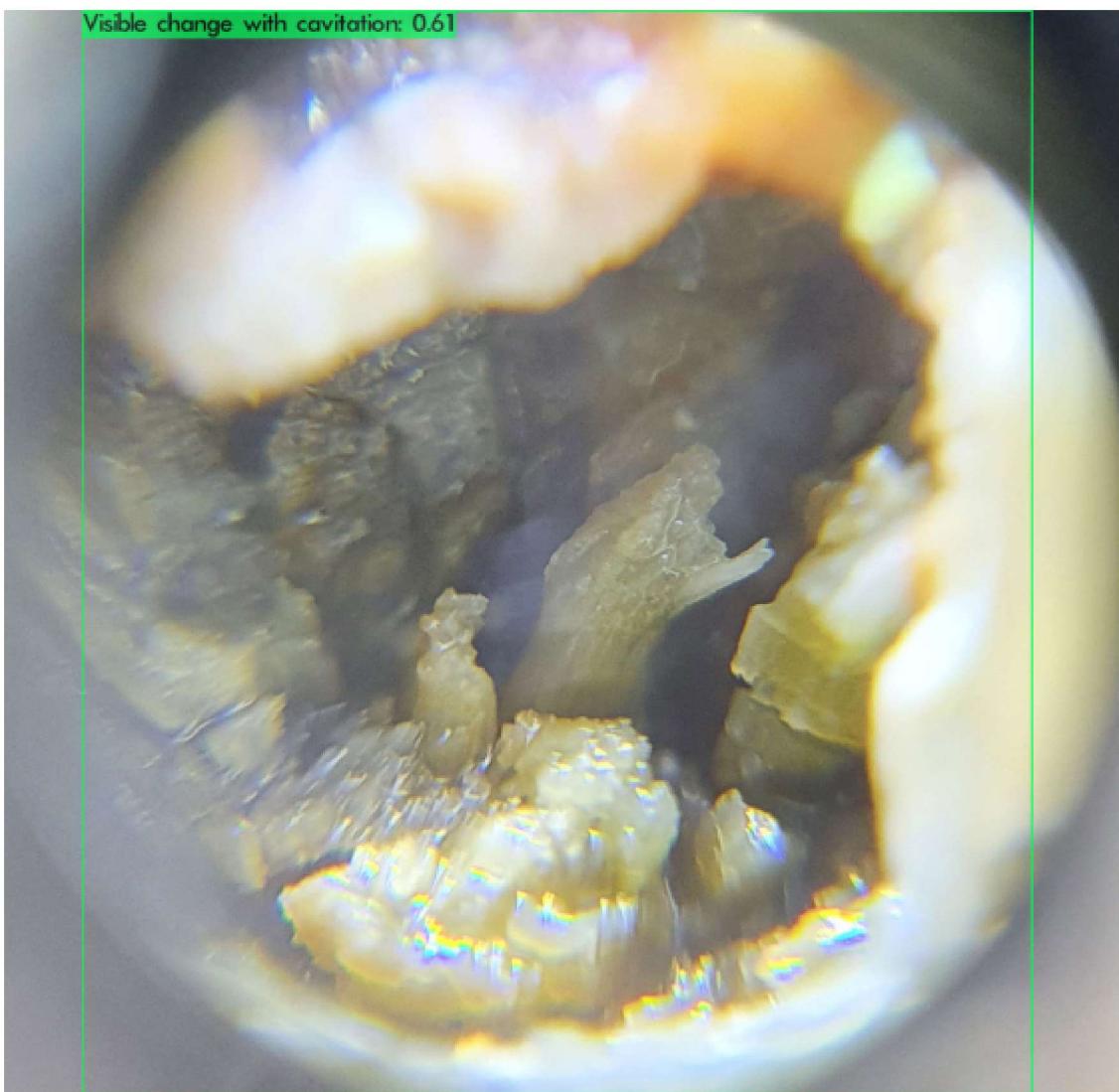
```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
    layer   filters   size/strd(dil)      input           output
    0 Create CUDA-stream - 0
Create cudnn-handle 0
conv    32      3 x 3/ 1     608 x 608 x   3 ->  608 x 608 x  32 0.639 BF
    1 conv    64      3 x 3/ 2     608 x 608 x  32 ->  304 x 304 x  64 3.407 BF
    2 conv    64      1 x 1/ 1     304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
    3 route   1                  ->  304 x 304 x  64
    4 conv    64      1 x 1/ 1     304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
    5 conv    32      1 x 1/ 1     304 x 304 x  64 ->  304 x 304 x  32 0.379 BF
    6 conv    64      3 x 3/ 1     304 x 304 x  32 ->  304 x 304 x  64 3.407 BF
    7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
    8 conv    64      1 x 1/ 1     304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
    9 route   8 2                  ->  304 x 304 x 128
    10 conv   64      1 x 1/ 1     304 x 304 x 128 ->  304 x 304 x  64 1.514 BF
    11 conv   128     3 x 3/ 2     304 x 304 x  64 ->  152 x 152 x 128 3.407 BF
    12 conv   64      1 x 1/ 1     152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
    13 route   11                  ->  152 x 152 x 128
    14 conv   64      1 x 1/ 1     152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
    15 conv   64      1 x 1/ 1     152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
    16 conv   64      3 x 3/ 1     152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
    17 Shortcut Layer: 14, wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
    18 conv   64      1 x 1/ 1     152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
    19 conv   64      3 x 3/ 1     152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
    20 Shortcut Layer: 17, wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
    21 conv   64      1 x 1/ 1     152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
    22 route   21 12                  ->  152 x 152 x 128
    23 conv   128     1 x 1/ 1     152 x 152 x 128 ->  152 x 152 x 128 0.757 BF
    24 conv   256     3 x 3/ 2     152 x 152 x 128 ->  76 x 76 x 256 3.407 BF
    25 conv   128     1 x 1/ 1     76 x 76 x 256 ->  76 x 76 x 128 0.379 BF
    26 route   24                  ->  76 x 76 x 256
    27 conv   128     1 x 1/ 1     76 x 76 x 256 ->  76 x 76 x 128 0.379 BF
    28 conv   128     1 x 1/ 1     76 x 76 x 128 ->  76 x 76 x 128 0.189 BF
    29 conv   128     3 x 3/ 1     76 x 76 x 128 ->  76 x 76 x 128 1.703 BF
    30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
    31 conv   128     1 x 1/ 1     76 x 76 x 128 ->  76 x 76 x 128 0.189 BF
    32 conv   128     3 x 3/ 1     76 x 76 x 128 ->  76 x 76 x 128 1.703 BF
    33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
    34 conv   128     1 x 1/ 1     76 x 76 x 128 ->  76 x 76 x 128 0.189 BF
    35 conv   128     3 x 3/ 1     76 x 76 x 128 ->  76 x 76 x 128 1.703 BF
    36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
    37 conv   128     1 x 1/ 1     76 x 76 x 128 ->  76 x 76 x 128 0.189 BF
    38 conv   128     3 x 3/ 1     76 x 76 x 128 ->  76 x 76 x 128 1.703 BF
    39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
    40 conv   128     1 x 1/ 1     76 x 76 x 128 ->  76 x 76 x 128 0.189 BF
    41 conv   128     3 x 3/ 1     76 x 76 x 128 ->  76 x 76 x 128 1.703 BF
    42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
    43 conv   128     1 x 1/ 1     76 x 76 x 128 ->  76 x 76 x 128 0.189 BF
    44 conv   128     3 x 3/ 1     76 x 76 x 128 ->  76 x 76 x 128 1.703 BF
```

45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 46 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 47 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 49 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 50 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 53 route 52 25 -> 76 x 76 x 256
 54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
 55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
 56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 57 route 55 -> 38 x 38 x 512
 58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF

layer	name	in	out	operations	shape	size	norm	kind
106	conv	1024	3 x 3 / 1		19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
107	conv	512	1 x 1 / 1		19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
108	max		5x 5 / 1		19 x 19 x 512	->	19 x 19 x 512	0.005 BF
109	route	107				->	19 x 19 x 512	
110	max		9x 9 / 1		19 x 19 x 512	->	19 x 19 x 512	0.015 BF
111	route	107				->	19 x 19 x 512	
112	max		13x13 / 1		19 x 19 x 512	->	19 x 19 x 512	0.031 BF
113	route	112 110 108 107				->	19 x 19 x 2048	
114	conv	512	1 x 1 / 1		19 x 19 x 2048	->	19 x 19 x 512	0.757 BF
115	conv	1024	3 x 3 / 1		19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
116	conv	512	1 x 1 / 1		19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
117	conv	256	1 x 1 / 1		19 x 19 x 512	->	19 x 19 x 256	0.095 BF
118	upsample		2x		19 x 19 x 256	->	38 x 38 x 256	
119	route	85				->	38 x 38 x 512	
120	conv	256	1 x 1 / 1		38 x 38 x 512	->	38 x 38 x 256	0.379 BF
121	route	120 118				->	38 x 38 x 512	
122	conv	256	1 x 1 / 1		38 x 38 x 512	->	38 x 38 x 256	0.379 BF
123	conv	512	3 x 3 / 1		38 x 38 x 256	->	38 x 38 x 512	3.407 BF
124	conv	256	1 x 1 / 1		38 x 38 x 512	->	38 x 38 x 256	0.379 BF
125	conv	512	3 x 3 / 1		38 x 38 x 256	->	38 x 38 x 512	3.407 BF
126	conv	256	1 x 1 / 1		38 x 38 x 512	->	38 x 38 x 256	0.379 BF
127	conv	128	1 x 1 / 1		38 x 38 x 256	->	38 x 38 x 128	0.095 BF
128	upsample		2x		38 x 38 x 128	->	76 x 76 x 128	
129	route	54				->	76 x 76 x 256	
130	conv	128	1 x 1 / 1		76 x 76 x 256	->	76 x 76 x 128	0.379 BF
131	route	130 128				->	76 x 76 x 256	
132	conv	128	1 x 1 / 1		76 x 76 x 256	->	76 x 76 x 128	0.379 BF
133	conv	256	3 x 3 / 1		76 x 76 x 128	->	76 x 76 x 256	3.407 BF
134	conv	128	1 x 1 / 1		76 x 76 x 256	->	76 x 76 x 128	0.379 BF
135	conv	256	3 x 3 / 1		76 x 76 x 128	->	76 x 76 x 256	3.407 BF
136	conv	128	1 x 1 / 1		76 x 76 x 256	->	76 x 76 x 128	0.379 BF
137	conv	256	3 x 3 / 1		76 x 76 x 128	->	76 x 76 x 256	3.407 BF
138	conv	24	1 x 1 / 1		76 x 76 x 256	->	76 x 76 x 24	0.071 BF
139	yolo							
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedy_nms (1), beta = 0.600000								
140	route	136				->	76 x 76 x 128	
141	conv	256	3 x 3 / 2		76 x 76 x 128	->	38 x 38 x 256	0.852 BF
142	route	141 126				->	38 x 38 x 512	
143	conv	256	1 x 1 / 1		38 x 38 x 512	->	38 x 38 x 256	0.379 BF
144	conv	512	3 x 3 / 1		38 x 38 x 256	->	38 x 38 x 512	3.407 BF
145	conv	256	1 x 1 / 1		38 x 38 x 512	->	38 x 38 x 256	0.379 BF
146	conv	512	3 x 3 / 1		38 x 38 x 256	->	38 x 38 x 512	3.407 BF
147	conv	256	1 x 1 / 1		38 x 38 x 512	->	38 x 38 x 256	0.379 BF
148	conv	512	3 x 3 / 1		38 x 38 x 256	->	38 x 38 x 512	3.407 BF
149	conv	24	1 x 1 / 1		38 x 38 x 512	->	38 x 38 x 24	0.035 BF
150	yolo							
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedy_nms (1), beta = 0.600000								
151	route	147				->	38 x 38 x 256	
152	conv	512	3 x 3 / 2		38 x 38 x 256	->	19 x 19 x 512	0.852 BF
153	route	152 116				->	19 x 19 x 1024	
154	conv	512	1 x 1 / 1		19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
155	conv	1024	3 x 3 / 1		19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
156	conv	512	1 x 1 / 1		19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
157	conv	1024	3 x 3 / 1		19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
158	conv	512	1 x 1 / 1		19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
159	conv	1024	3 x 3 / 1		19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
160	conv	24	1 x 1 / 1		19 x 19 x 1024	->	19 x 19 x 24	0.018 BF
161	volo							

```
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyNMS (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S10/Figure 4.png: Predicted i
Visible change with cavitation: 61%
Unable to init server: Could not connect: Connection refused
```

(predictions:2297): Gtk-WARNING **: 11:56:11.646: cannot open display:



```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer filters size/strd(dil) input output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv 32 3 x 3/ 1 608 x 608 x 3 -> 608 x 608 x 32 0.639 BF
1 conv 64 3 x 3/ 2 608 x 608 x 32 -> 304 x 304 x 64 3.407 BF
2 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
```

3 route 1 -> 304 x 304 x 64
 4 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
 5 conv 32 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 32 0.379 BF
 6 conv 64 3 x 3/ 1 304 x 304 x 32 -> 304 x 304 x 64 3.407 BF
 7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x 64 0.006 BF
 8 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
 9 route 8 2 -> 304 x 304 x 128
 10 conv 64 1 x 1/ 1 304 x 304 x 128 -> 304 x 304 x 64 1.514 BF
 11 conv 128 3 x 3/ 2 304 x 304 x 64 -> 152 x 152 x 128 3.407 BF
 12 conv 64 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 64 0.379 BF
 13 route 11 -> 152 x 152 x 128
 14 conv 64 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 64 0.379 BF
 15 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 16 conv 64 3 x 3/ 1 152 x 152 x 64 -> 152 x 152 x 64 1.703 BF
 17 Shortcut Layer: 14, wt = 0, wn = 0, outputs: 152 x 152 x 64 0.001 BF
 18 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 19 conv 64 3 x 3/ 1 152 x 152 x 64 -> 152 x 152 x 64 1.703 BF
 20 Shortcut Layer: 17, wt = 0, wn = 0, outputs: 152 x 152 x 64 0.001 BF
 21 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 22 route 21 12 -> 152 x 152 x 128
 23 conv 128 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
 24 conv 256 3 x 3/ 2 152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
 25 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 26 route 24 -> 76 x 76 x 256
 27 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 28 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 29 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 31 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 32 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 34 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 35 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 37 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 38 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 40 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 41 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 43 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 44 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 46 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 47 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 49 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 50 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 53 route 52 25 -> 76 x 76 x 256
 54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
 55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
 56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 57 route 55 -> 38 x 38 x 512
 58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF

63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 106 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 107 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 108 max 5x 5/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
 109 route 107 -> 19 x 19 x 512
 110 max 9x 9/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.015 BF
 111 route 107 -> 19 x 19 x 512
 112 max 13x13/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.031 BF
 113 route 112 110 108 107 -> 19 x 19 x 2048
 114 conv 512 1 x 1/ 1 19 x 19 x 2048 -> 19 x 19 x 512 0.757 BF
 115 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 116 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 117 conv 256 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 256 0.095 BF
 118 upsample 2x 19 x 19 x 256 -> 38 x 38 x 256
 119 route 85 -> 38 x 38 x 512
 120 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 121 route 120 118 -> 38 x 38 x 512
 122 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 123 -> 38 x 38 x 512 0.379 BF

```

123 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.40/ BF
124 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
125 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
126 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
127 conv    128      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 128 0.095 BF
128 upsample          2x      38 x 38 x 128 -> 76 x 76 x 128
129 route   54                  -> 76 x 76 x 256
130 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
131 route   130 128          -> 76 x 76 x 256
132 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
133 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
134 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
135 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
136 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
137 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
138 conv    24       1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 24 0.071 BF
139 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route   136          -> 76 x 76 x 128
141 conv    256      3 x 3/ 2      76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route   141 126          -> 38 x 38 x 512
143 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo

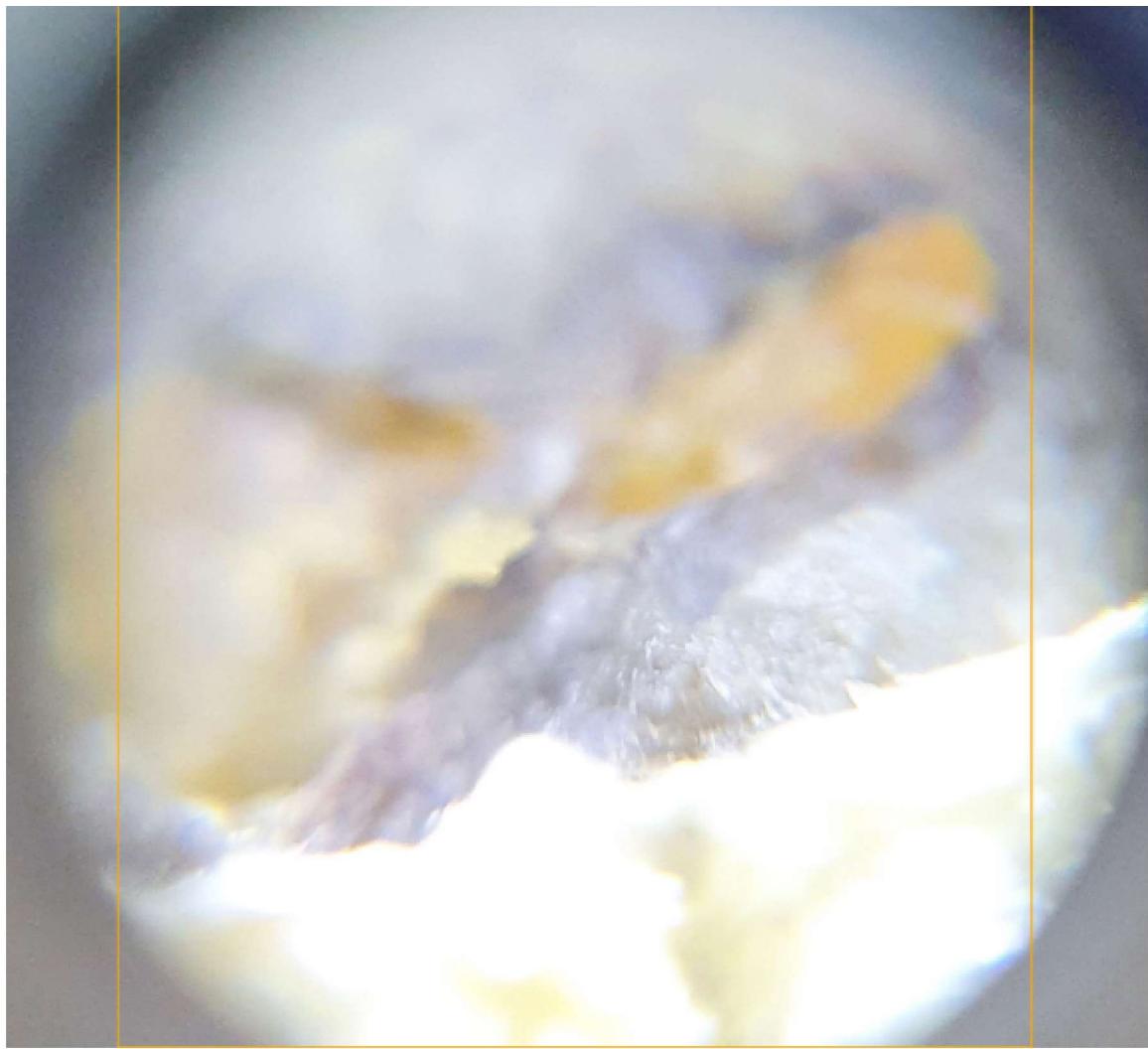
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route   147          -> 38 x 38 x 256
152 conv    512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route   152 116          -> 19 x 19 x1024
154 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S10/Figure 5.png: Predicted i
Visible change with microcavitation: 42%
Unable to init server: Could not connect: Connection refused

(predictions:2311): Gtk-WARNING **: 11:56:19.358: cannot open display:

```

Visible change with microcavitation: 0.42



```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer filters size/strd(dil)      input           output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv    32      3 x 3/ 1      608 x 608 x   3 ->  608 x 608 x  32 0.639 BF
1 conv    64      3 x 3/ 2      608 x 608 x  32 ->  304 x 304 x  64 3.407 BF
2 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
3 route   1                  ->  304 x 304 x  64
4 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
5 conv    32      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  32 0.379 BF
6 conv    64      3 x 3/ 1      304 x 304 x  32 ->  304 x 304 x  64 3.407 BF
7 Shortcut Layer: 4,  wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
8 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
9 route   8 2                  ->  304 x 304 x 128
10 conv   64      1 x 1/ 1      304 x 304 x 128 -> 304 x 304 x  64 1.514 BF
11 conv   128     3 x 3/ 2      304 x 304 x  64 -> 152 x 152 x 128 3.407 BF
12 conv   64      1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
13 route  11                 -> 152 x 152 x 128
14 conv   64      1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
15 conv   64      1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
16 conv   64      3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
17 Shortcut Layer: 14,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
18 conv   64      1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
19 conv   64      3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
20 Shortcut Layer: 17.  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
```

21	conv	64	1 x 1 / 1	152 x 152 x 64	->	152 x 152 x 64	0.189	BF
22	route	21 12			->	152 x 152 x 128		
23	conv	128	1 x 1 / 1	152 x 152 x 128	->	152 x 152 x 128	0.757	BF
24	conv	256	3 x 3 / 2	152 x 152 x 128	->	76 x 76 x 256	3.407	BF
25	conv	128	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
26	route	24			->	76 x 76 x 256		
27	conv	128	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
28	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
29	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
30	Shortcut Layer:	27, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
31	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
32	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
33	Shortcut Layer:	30, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
34	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
35	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
36	Shortcut Layer:	33, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
37	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
38	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
39	Shortcut Layer:	36, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
40	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
41	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
42	Shortcut Layer:	39, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
43	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
44	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
45	Shortcut Layer:	42, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
46	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
47	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
48	Shortcut Layer:	45, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
49	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
50	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
51	Shortcut Layer:	48, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
52	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
53	route	52 25			->	76 x 76 x 256		
54	conv	256	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 256	0.757	BF
55	conv	512	3 x 3 / 2	76 x 76 x 256	->	38 x 38 x 512	3.407	BF
56	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
57	route	55			->	38 x 38 x 512		
58	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
59	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
60	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
61	Shortcut Layer:	58, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
62	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
63	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
64	Shortcut Layer:	61, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
65	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
66	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
67	Shortcut Layer:	64, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
68	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
69	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
70	Shortcut Layer:	67, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
71	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
72	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
73	Shortcut Layer:	70, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
74	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
75	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
76	Shortcut Layer:	73, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
77	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
78	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
79	Shortcut Layer:	76, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
80	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF

```

81 conv    256      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
83 conv    256      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
84 route   83 56                -> 38 x 38 x 512
85 conv    512      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
86 conv    1024     3 x 3/ 2      38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
87 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
88 route   86                -> 19 x 19 x 1024
89 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
90 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
91 conv    512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
93 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
94 conv    512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
96 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
97 conv    512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
99 conv    512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
100 conv   512      3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
102 conv   512      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
103 route  102 87                -> 19 x 19 x 1024
104 conv   1024     1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
105 conv   512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
106 conv   1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
107 conv   512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
108 max    5x 5/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
109 route  107                -> 19 x 19 x 512
110 max    9x 9/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.015 BF
111 route  107                -> 19 x 19 x 512
112 max    13x13/ 1      19 x 19 x 512 -> 19 x 19 x 512 0.031 BF
113 route  112 110 108 107                -> 19 x 19 x 2048
114 conv   512      1 x 1/ 1      19 x 19 x 2048 -> 19 x 19 x 512 0.757 BF
115 conv   1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
116 conv   512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
117 conv   256      1 x 1/ 1      19 x 19 x 512 -> 19 x 19 x 256 0.095 BF
118 upsample 2x      19 x 19 x 256 -> 38 x 38 x 256
119 route  85                -> 38 x 38 x 512
120 conv   256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
121 route  120 118                -> 38 x 38 x 512
122 conv   256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
123 conv   512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
124 conv   256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
125 conv   512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
126 conv   256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
127 conv   128      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 128 0.095 BF
128 upsample 2x      38 x 38 x 128 -> 76 x 76 x 128
129 route  54                -> 76 x 76 x 256
130 conv   128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
131 route  130 128                -> 76 x 76 x 256
132 conv   128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
133 conv   256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
134 conv   128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
135 conv   256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
136 conv   128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
137 conv   256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
138 conv   24       1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 24 0.071 BF
139 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d

```

```

nms_kind: greedyNMS (1), beta = 0.600000
140 route 136                                     -> 76 x 76 x 128
141 conv   256      3 x 3/ 2       76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route 141 126                                -> 38 x 38 x 512
143 conv   256      1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv   512      3 x 3/ 1       38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv   256      1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv   512      3 x 3/ 1       38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv   256      1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv   512      3 x 3/ 1       38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv   24       1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyNMS (1), beta = 0.600000
151 route 147                                     -> 38 x 38 x 256
152 conv   512      3 x 3/ 2       38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route 152 116                                -> 19 x 19 x 1024
154 conv   512      1 x 1/ 1       19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
155 conv   1024     3 x 3/ 1       19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
156 conv   512      1 x 1/ 1       19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
157 conv   1024     3 x 3/ 1       19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF

!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc
imShow('predictions.jpg')

```

CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0

layer	filters	size/strd(dil)	input	output
0	Create CUDA-stream - 0			
	Create cudnn-handle 0			
conv	32	3 x 3/ 1	608 x 608 x 3 -> 608 x 608 x 32	0.639 BF
1 conv	64	3 x 3/ 2	608 x 608 x 32 -> 304 x 304 x 64	3.407 BF
2 conv	64	1 x 1/ 1	304 x 304 x 64 -> 304 x 304 x 64	0.757 BF
3 route	1		-> 304 x 304 x 64	
4 conv	64	1 x 1/ 1	304 x 304 x 64 -> 304 x 304 x 64	0.757 BF
5 conv	32	1 x 1/ 1	304 x 304 x 64 -> 304 x 304 x 32	0.379 BF
6 conv	64	3 x 3/ 1	304 x 304 x 32 -> 304 x 304 x 64	3.407 BF
7 Shortcut Layer: 4,	wt = 0, wn = 0,	outputs: 304 x 304 x 64	0.006 BF	
8 conv	64	1 x 1/ 1	304 x 304 x 64 -> 304 x 304 x 64	0.757 BF
9 route	8 2		-> 304 x 304 x 128	
10 conv	64	1 x 1/ 1	304 x 304 x 128 -> 304 x 304 x 64	1.514 BF
11 conv	128	3 x 3/ 2	304 x 304 x 64 -> 152 x 152 x 128	3.407 BF
12 conv	64	1 x 1/ 1	152 x 152 x 128 -> 152 x 152 x 64	0.379 BF
13 route	11		-> 152 x 152 x 128	
14 conv	64	1 x 1/ 1	152 x 152 x 128 -> 152 x 152 x 64	0.379 BF
15 conv	64	1 x 1/ 1	152 x 152 x 64 -> 152 x 152 x 64	0.189 BF
16 conv	64	3 x 3/ 1	152 x 152 x 64 -> 152 x 152 x 64	1.703 BF
17 Shortcut Layer: 14,	wt = 0, wn = 0,	outputs: 152 x 152 x 64	0.001 BF	
18 conv	64	1 x 1/ 1	152 x 152 x 64 -> 152 x 152 x 64	0.189 BF
19 conv	64	3 x 3/ 1	152 x 152 x 64 -> 152 x 152 x 64	1.703 BF
20 Shortcut Layer: 17,	wt = 0, wn = 0,	outputs: 152 x 152 x 64	0.001 BF	
21 conv	64	1 x 1/ 1	152 x 152 x 64 -> 152 x 152 x 64	0.189 BF
22 route	21 12		-> 152 x 152 x 128	
23 conv	128	1 x 1/ 1	152 x 152 x 128 -> 152 x 152 x 128	0.757 BF
24 conv	256	3 x 3/ 2	152 x 152 x 128 -> 76 x 76 x 256	3.407 BF
25 conv	128	1 x 1/ 1	76 x 76 x 256 -> 76 x 76 x 128	0.379 BF
26 route	24		-> 76 x 76 x 256	
27 conv	128	1 x 1/ 1	76 x 76 x 256 -> 76 x 76 x 128	0.379 BF
28 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
29 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
30 Shortcut Layer: 27,	wt = 0, wn = 0,	outputs: 76 x 76 x 128	0.001 BF	
31 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
32 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
33 Shortcut Layer: 30,	wt = 0, wn = 0,	outputs: 76 x 76 x 128	0.001 BF	
34 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
35 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
36 Shortcut Layer: 33,	wt = 0, wn = 0,	outputs: 76 x 76 x 128	0.001 BF	
37 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
38 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
39 Shortcut Layer: 36,	wt = 0, wn = 0,	outputs: 76 x 76 x 128	0.001 BF	
40 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
41 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
42 Shortcut Layer: 39,	wt = 0, wn = 0,	outputs: 76 x 76 x 128	0.001 BF	
43 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
44 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
45 Shortcut Layer: 42,	wt = 0, wn = 0,	outputs: 76 x 76 x 128	0.001 BF	
46 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
47 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF
48 Shortcut Layer: 45,	wt = 0, wn = 0,	outputs: 76 x 76 x 128	0.001 BF	
49 conv	128	1 x 1/ 1	76 x 76 x 128 -> 76 x 76 x 128	0.189 BF
50 conv	128	3 x 3/ 1	76 x 76 x 128 -> 76 x 76 x 128	1.703 BF

51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 53 route 52 25 -> 76 x 76 x 256
 54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
 55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
 56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 57 route 55 -> 38 x 38 x 512
 58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 106 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 107 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 108 max 5x 5/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
 109 route 107 -> 19 x 19 x 512
 110 max 9x 9/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.015 BF

```

111 route 107
112 max           13x13/ 1      19 x   19 x 512 -> 19 x   19 x 512 0.031 BF
113 route 112 110 108 107
114 conv    512      1 x 1/ 1      19 x   19 x 2048 -> 19 x   19 x 512 0.757 BF
115 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
116 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
117 conv    256      1 x 1/ 1      19 x   19 x 512 -> 19 x   19 x 256 0.095 BF
118 upsample
119 route 85
120 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
121 route 120 118
122 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
123 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
124 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
125 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
126 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
127 conv    128      1 x 1/ 1      38 x   38 x 256 -> 38 x   38 x 128 0.095 BF
128 upsample
129 route 54
130 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
131 route 130 128
132 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
133 conv    256      3 x 3/ 1      76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
134 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
135 conv    256      3 x 3/ 1      76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
136 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
137 conv    256      3 x 3/ 1      76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
138 conv    24       1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 24 0.071 BF
139 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route 136
141 conv    256      3 x 3/ 2      76 x   76 x 128 -> 38 x   38 x 256 0.852 BF
142 route 141 126
143 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
144 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
145 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
146 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 24 0.035 BF
150 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route 147
152 conv    512      3 x 3/ 2      38 x   38 x 256 -> 19 x   19 x 512 0.852 BF
153 route 152 116
154 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB

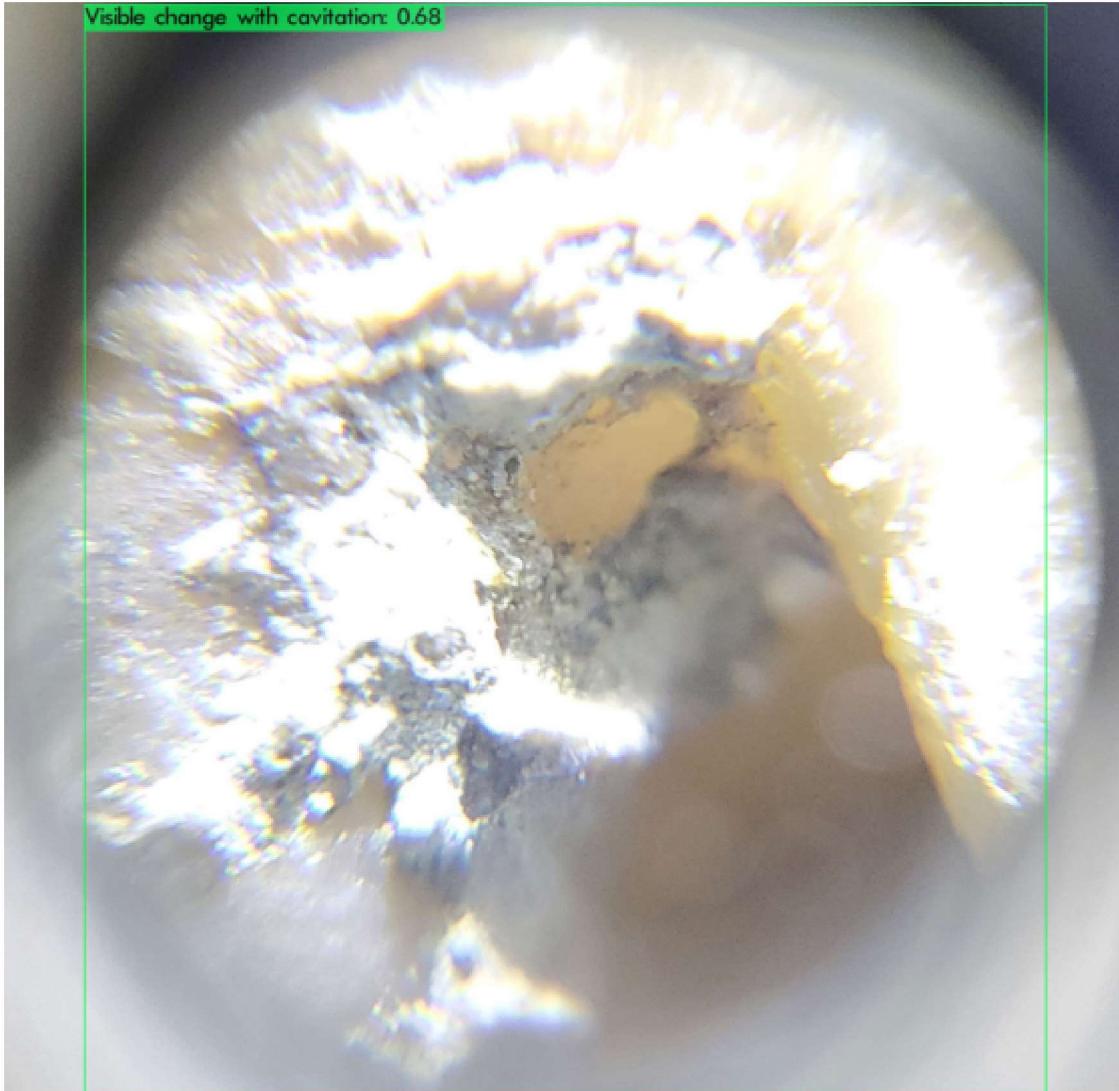
```

```

Loading weights from /myarive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S10 5G/Figure 1.png: Predicted
Visible change with cavitation: 68%
Unable to init server: Could not connect: Connection refused

```

(predictions:7532): Gtk-WARNING **: 10:28:06.474: cannot open display:



```

CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer   filters  size/strd(dil)      input           output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv     32       3 x 3/ 1    608 x 608 x  3 -> 608 x 608 x  32 0.639 BF
1 conv     64       3 x 3/ 2    608 x 608 x  32 -> 304 x 304 x  64 3.407 BF
2 conv     64       1 x 1/ 1    304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
3 route    1          -> 304 x 304 x  64
4 conv     64       1 x 1/ 1    304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
5 conv     32       1 x 1/ 1    304 x 304 x  64 -> 304 x 304 x  32 0.379 BF
6 conv     64       3 x 3/ 1    304 x 304 x  32 -> 304 x 304 x  64 3.407 BF
7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
8 conv     64       1 x 1/ 1    304 x 304 x  64 -> 304 x 304 x  64 0.757 BF

```

op	conv	04	\downarrow	x	$\downarrow/$	\downarrow	304	x	304	x	04	->	304	x	304	x	04	0. / C /	BF	
9	route	8 2											->	304	x	304	x	128		
10	conv	64	1	x	1/	1	304	x	304	x	128	->	304	x	304	x	64	1.514	BF	
11	conv	128	3	x	3/	2	304	x	304	x	64	->	152	x	152	x	128	3.407	BF	
12	conv	64	1	x	1/	1	152	x	152	x	128	->	152	x	152	x	64	0.379	BF	
13	route	11											->	152	x	152	x	128		
14	conv	64	1	x	1/	1	152	x	152	x	128	->	152	x	152	x	64	0.379	BF	
15	conv	64	1	x	1/	1	152	x	152	x	64	->	152	x	152	x	64	0.189	BF	
16	conv	64	3	x	3/	1	152	x	152	x	64	->	152	x	152	x	64	1.703	BF	
17	Shortcut Layer:	14,	wt = 0,	wn = 0,	outputs:	152	x	152	x	64	0.001	BF								
18	conv	64	1	x	1/	1	152	x	152	x	64	->	152	x	152	x	64	0.189	BF	
19	conv	64	3	x	3/	1	152	x	152	x	64	->	152	x	152	x	64	1.703	BF	
20	Shortcut Layer:	17,	wt = 0,	wn = 0,	outputs:	152	x	152	x	64	0.001	BF								
21	conv	64	1	x	1/	1	152	x	152	x	64	->	152	x	152	x	64	0.189	BF	
22	route	21 12											->	152	x	152	x	128		
23	conv	128	1	x	1/	1	152	x	152	x	128	->	152	x	152	x	128	0.757	BF	
24	conv	256	3	x	3/	2	152	x	152	x	128	->	76	x	76	x	256	3.407	BF	
25	conv	128	1	x	1/	1	76	x	76	x	256	->	76	x	76	x	128	0.379	BF	
26	route	24											->	76	x	76	x	256		
27	conv	128	1	x	1/	1	76	x	76	x	256	->	76	x	76	x	128	0.379	BF	
28	conv	128	1	x	1/	1	76	x	76	x	128	->	76	x	76	x	128	0.189	BF	
29	conv	128	3	x	3/	1	76	x	76	x	128	->	76	x	76	x	128	1.703	BF	
30	Shortcut Layer:	27,	wt = 0,	wn = 0,	outputs:	76	x	76	x	128	0.001	BF								
31	conv	128	1	x	1/	1	76	x	76	x	128	->	76	x	76	x	128	0.189	BF	
32	conv	128	3	x	3/	1	76	x	76	x	128	->	76	x	76	x	128	1.703	BF	
33	Shortcut Layer:	30,	wt = 0,	wn = 0,	outputs:	76	x	76	x	128	0.001	BF								
34	conv	128	1	x	1/	1	76	x	76	x	128	->	76	x	76	x	128	0.189	BF	
35	conv	128	3	x	3/	1	76	x	76	x	128	->	76	x	76	x	128	1.703	BF	
36	Shortcut Layer:	33,	wt = 0,	wn = 0,	outputs:	76	x	76	x	128	0.001	BF								
37	conv	128	1	x	1/	1	76	x	76	x	128	->	76	x	76	x	128	0.189	BF	
38	conv	128	3	x	3/	1	76	x	76	x	128	->	76	x	76	x	128	1.703	BF	
39	Shortcut Layer:	36,	wt = 0,	wn = 0,	outputs:	76	x	76	x	128	0.001	BF								
40	conv	128	1	x	1/	1	76	x	76	x	128	->	76	x	76	x	128	0.189	BF	
41	conv	128	3	x	3/	1	76	x	76	x	128	->	76	x	76	x	128	1.703	BF	
42	Shortcut Layer:	39,	wt = 0,	wn = 0,	outputs:	76	x	76	x	128	0.001	BF								
43	conv	128	1	x	1/	1	76	x	76	x	128	->	76	x	76	x	128	0.189	BF	
44	conv	128	3	x	3/	1	76	x	76	x	128	->	76	x	76	x	128	1.703	BF	
45	Shortcut Layer:	42,	wt = 0,	wn = 0,	outputs:	76	x	76	x	128	0.001	BF								
46	conv	128	1	x	1/	1	76	x	76	x	128	->	76	x	76	x	128	0.189	BF	
47	conv	128	3	x	3/	1	76	x	76	x	128	->	76	x	76	x	128	1.703	BF	
48	Shortcut Layer:	45,	wt = 0,	wn = 0,	outputs:	76	x	76	x	128	0.001	BF								
49	conv	128	1	x	1/	1	76	x	76	x	128	->	76	x	76	x	128	0.189	BF	
50	conv	128	3	x	3/	1	76	x	76	x	128	->	76	x	76	x	128	1.703	BF	
51	Shortcut Layer:	48,	wt = 0,	wn = 0,	outputs:	76	x	76	x	128	0.001	BF								
52	conv	128	1	x	1/	1	76	x	76	x	128	->	76	x	76	x	128	0.189	BF	
53	route	52 25											->	76	x	76	x	256		
54	conv	256	1	x	1/	1	76	x	76	x	256	->	76	x	76	x	256	0.757	BF	
55	conv	512	3	x	3/	2	76	x	76	x	256	->	38	x	38	x	512	3.407	BF	
56	conv	256	1	x	1/	1	38	x	38	x	512	->	38	x	38	x	256	0.379	BF	
57	route	55											->	38	x	38	x	512		
58	conv	256	1	x	1/	1	38	x	38	x	512	->	38	x	38	x	256	0.379	BF	
59	conv	256	1	x	1/	1	38	x	38	x	256	->	38	x	38	x	256	0.189	BF	
60	conv	256	3	x	3/	1	38	x	38	x	256	->	38	x	38	x	256	1.703	BF	
61	Shortcut Layer:	58,	wt = 0,	wn = 0,	outputs:	38	x	38	x	256	0.000	BF								
62	conv	256	1	x	1/	1	38	x	38	x	256	->	38	x	38	x	256	0.189	BF	
63	conv	256	3	x	3/	1	38	x	38	x	256	->	38	x	38	x	256	1.703	BF	
64	Shortcut Layer:	61,	wt = 0,	wn = 0,	outputs:	38	x	38	x	256	0.000	BF								
65	conv	256	1	x	1/	1	38	x	38	x	256	->	38	x	38	x	256	0.189	BF	
66	conv	256	3	x	3/	1	38	x	38	x	256	->	38	x	38	x	256	1.703	BF	
67	Shortcut Layer:	64,	wt = 0,	wn = 0,	outputs:	38	x	38	x	256	0.000	BF								
68	conv	256	1	x	1/	1	38	x	38	x	256	->	38	x	38	x	256	0.189	BF	

69	conv	256	3 x 3 / 1	38 x 38 x 256 ->	38 x 38 x 256 1.703 BF
70	Shortcut Layer:	67, wt = 0, wn = 0, outputs:	38 x 38 x 256 0.000 BF		
71	conv	256	1 x 1 / 1	38 x 38 x 256 ->	38 x 38 x 256 0.189 BF
72	conv	256	3 x 3 / 1	38 x 38 x 256 ->	38 x 38 x 256 1.703 BF
73	Shortcut Layer:	70, wt = 0, wn = 0, outputs:	38 x 38 x 256 0.000 BF		
74	conv	256	1 x 1 / 1	38 x 38 x 256 ->	38 x 38 x 256 0.189 BF
75	conv	256	3 x 3 / 1	38 x 38 x 256 ->	38 x 38 x 256 1.703 BF
76	Shortcut Layer:	73, wt = 0, wn = 0, outputs:	38 x 38 x 256 0.000 BF		
77	conv	256	1 x 1 / 1	38 x 38 x 256 ->	38 x 38 x 256 0.189 BF
78	conv	256	3 x 3 / 1	38 x 38 x 256 ->	38 x 38 x 256 1.703 BF
79	Shortcut Layer:	76, wt = 0, wn = 0, outputs:	38 x 38 x 256 0.000 BF		
80	conv	256	1 x 1 / 1	38 x 38 x 256 ->	38 x 38 x 256 0.189 BF
81	conv	256	3 x 3 / 1	38 x 38 x 256 ->	38 x 38 x 256 1.703 BF
82	Shortcut Layer:	79, wt = 0, wn = 0, outputs:	38 x 38 x 256 0.000 BF		
83	conv	256	1 x 1 / 1	38 x 38 x 256 ->	38 x 38 x 256 0.189 BF
84	route	83 56		->	38 x 38 x 512
85	conv	512	1 x 1 / 1	38 x 38 x 512 ->	38 x 38 x 512 0.757 BF
86	conv	1024	3 x 3 / 2	38 x 38 x 512 ->	19 x 19 x 1024 3.407 BF
87	conv	512	1 x 1 / 1	19 x 19 x 1024 ->	19 x 19 x 512 0.379 BF
88	route	86		->	19 x 19 x 1024
89	conv	512	1 x 1 / 1	19 x 19 x 1024 ->	19 x 19 x 512 0.379 BF
90	conv	512	1 x 1 / 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
91	conv	512	3 x 3 / 1	19 x 19 x 512 ->	19 x 19 x 512 1.703 BF
92	Shortcut Layer:	89, wt = 0, wn = 0, outputs:	19 x 19 x 512 0.000 BF		
93	conv	512	1 x 1 / 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
94	conv	512	3 x 3 / 1	19 x 19 x 512 ->	19 x 19 x 512 1.703 BF
95	Shortcut Layer:	92, wt = 0, wn = 0, outputs:	19 x 19 x 512 0.000 BF		
96	conv	512	1 x 1 / 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
97	conv	512	3 x 3 / 1	19 x 19 x 512 ->	19 x 19 x 512 1.703 BF
98	Shortcut Layer:	95, wt = 0, wn = 0, outputs:	19 x 19 x 512 0.000 BF		
99	conv	512	1 x 1 / 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
100	conv	512	3 x 3 / 1	19 x 19 x 512 ->	19 x 19 x 512 1.703 BF
101	Shortcut Layer:	98, wt = 0, wn = 0, outputs:	19 x 19 x 512 0.000 BF		
102	conv	512	1 x 1 / 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
103	route	102 87		->	19 x 19 x 1024
104	conv	1024	1 x 1 / 1	19 x 19 x 1024 ->	19 x 19 x 1024 0.757 BF
105	conv	512	1 x 1 / 1	19 x 19 x 1024 ->	19 x 19 x 512 0.379 BF
106	conv	1024	3 x 3 / 1	19 x 19 x 512 ->	19 x 19 x 1024 3.407 BF
107	conv	512	1 x 1 / 1	19 x 19 x 1024 ->	19 x 19 x 512 0.379 BF
108	max		5x 5 / 1	19 x 19 x 512 ->	19 x 19 x 512 0.005 BF
109	route	107		->	19 x 19 x 512
110	max		9x 9 / 1	19 x 19 x 512 ->	19 x 19 x 512 0.015 BF
111	route	107		->	19 x 19 x 512
112	max		13x13 / 1	19 x 19 x 512 ->	19 x 19 x 512 0.031 BF
113	route	112 110 108 107		->	19 x 19 x 2048
114	conv	512	1 x 1 / 1	19 x 19 x 2048 ->	19 x 19 x 512 0.757 BF
115	conv	1024	3 x 3 / 1	19 x 19 x 512 ->	19 x 19 x 1024 3.407 BF
116	conv	512	1 x 1 / 1	19 x 19 x 1024 ->	19 x 19 x 512 0.379 BF
117	conv	256	1 x 1 / 1	19 x 19 x 512 ->	19 x 19 x 256 0.095 BF
118	upsample		2x	19 x 19 x 256 ->	38 x 38 x 256
119	route	85		->	38 x 38 x 512
120	conv	256	1 x 1 / 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
121	route	120 118		->	38 x 38 x 512
122	conv	256	1 x 1 / 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
123	conv	512	3 x 3 / 1	38 x 38 x 256 ->	38 x 38 x 512 3.407 BF
124	conv	256	1 x 1 / 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
125	conv	512	3 x 3 / 1	38 x 38 x 256 ->	38 x 38 x 512 3.407 BF
126	conv	256	1 x 1 / 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
127	conv	128	1 x 1 / 1	38 x 38 x 256 ->	38 x 38 x 128 0.095 BF
128	upsample		2x	38 x 38 x 128 ->	76 x 76 x 128

```

129 route 54                                     -> 76 x 76 x 256
130 conv 128          1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
131 route 130 128                                -> 76 x 76 x 256
132 conv 128          1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
133 conv 256          3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
134 conv 128          1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
135 conv 256          3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
136 conv 128          1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
137 conv 256          3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
138 conv 24           1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 24 0.071 BF
139 yolo

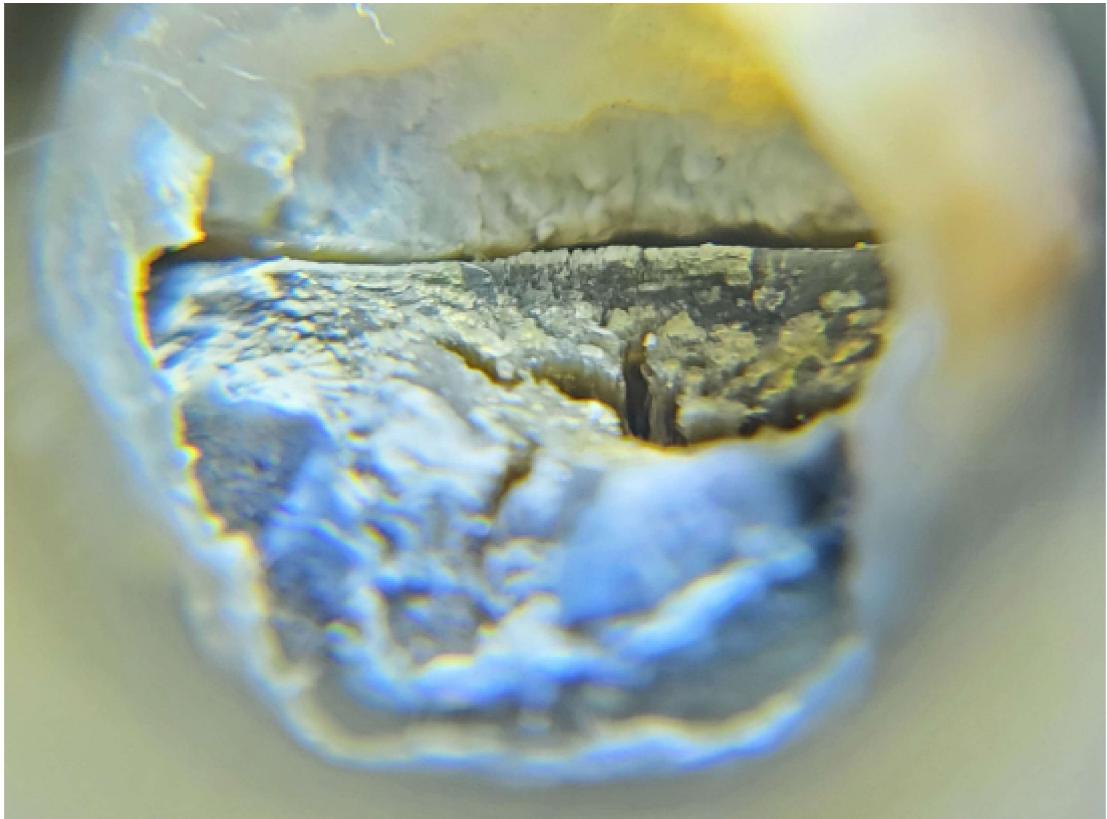
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route 136                                     -> 76 x 76 x 128
141 conv 256          3 x 3/ 2      76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route 141 126                                -> 38 x 38 x 512
143 conv 256          1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv 512           3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv 256          1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv 512           3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv 256          1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv 512           3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv 24           1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route 147                                     -> 38 x 38 x 256
152 conv 512           3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route 152 116                                -> 19 x 19 x 1024
154 conv 512           1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
155 conv 1024          3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
156 conv 512           1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
157 conv 1024          3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
158 conv 512           1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
159 conv 1024          3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
160 conv 24           1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S10 5G/Figure 2.png: Predictions
Unable to init server: Could not connect: Connection refused

(predictions:7548): Gtk-WARNING **: 10:28:14.405: cannot open display:
```





```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
 0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer   filters   size/strd(dil)      input           output
 0 Create CUDA-stream - 0
Create cudnn-handle 0
conv     32       3 x 3/ 1      608 x 608 x    3 ->  608 x 608 x  32 0.639 BF
  1 conv     64       3 x 3/ 2      608 x 608 x  32 ->  304 x 304 x  64 3.407 BF
  2 conv     64       1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
  3 route   1                   ->  304 x 304 x  64
  4 conv     64       1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
  5 conv     32       1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  32 0.379 BF
  6 conv     64       3 x 3/ 1      304 x 304 x  32 ->  304 x 304 x  64 3.407 BF
  7 Shortcut Layer: 4,  wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
  8 conv     64       1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
  9 route   8 2                   ->  304 x 304 x 128
 10 conv    64       1 x 1/ 1      304 x 304 x 128 ->  304 x 304 x  64 1.514 BF
 11 conv    128      3 x 3/ 2      304 x 304 x  64 ->  152 x 152 x 128 3.407 BF
 12 conv    64       1 x 1/ 1      152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
 13 route   11                  ->  152 x 152 x 128
 14 conv    64       1 x 1/ 1      152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
 15 conv    64       1 x 1/ 1      152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
 16 conv    64       3 x 3/ 1      152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
 17 Shortcut Layer: 14,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
 18 conv    64       1 x 1/ 1      152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
 19 conv    64       3 x 3/ 1      152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
 20 Shortcut Layer: 17,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
 21 conv    64       1 x 1/ 1      152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
 22 route   21 12                  ->  152 x 152 x 128
 23 conv    128      1 x 1/ 1      152 x 152 x 128 ->  152 x 152 x 128 0.757 BF
 24 conv    256      3 x 3/ 2      152 x 152 x 128 ->  76 x  76 x 256 3.407 BF
 25 conv    128      1 x 1/ 1      76 x  76 x 256 ->  76 x  76 x 128 0.379 BF
 26 route   24                  ->  76 x  76 x 256
--          100      1  100 1  76  76  256 1  76  76  100 0  256 25
```

```

27 conv    128      1 x 1/ 1      /6 x   /6 x 256 ->   /6 x   /6 x 128 0.3/9 BF
28 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
29 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
31 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
32 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
34 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
35 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
37 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
38 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
40 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
41 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
43 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
44 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
46 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
47 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
49 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
50 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
52 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
53 route   52 25                               ->   76 x 76 x 256
54 conv    256      1 x 1/ 1      76 x   76 x 256 ->   76 x   76 x 256 0.757 BF
55 conv    512      3 x 3/ 2      76 x   76 x 256 ->   38 x   38 x 512 3.407 BF
56 conv    256      1 x 1/ 1      38 x   38 x 512 ->   38 x   38 x 256 0.379 BF
57 route   55                               ->   38 x 38 x 512
58 conv    256      1 x 1/ 1      38 x   38 x 512 ->   38 x   38 x 256 0.379 BF
59 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
60 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
62 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
63 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
65 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
66 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
68 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
69 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
71 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
72 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
74 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
75 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
77 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
78 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
80 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
81 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
83 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
84 route   83 56                               ->   38 x 38 x 512
85 conv    512      1 x 1/ 1      38 x   38 x 512 ->   38 x   38 x 512 0.757 BF
86 conv    1024     3 x 3/ 2      38 x   38 x 512 ->   19 x   19 x 1024 3.407 BF
87 conv    512      1 x 1/ 1      19 x   19 x 1024 ->   19 x   19 x 512 0.379 RF

```

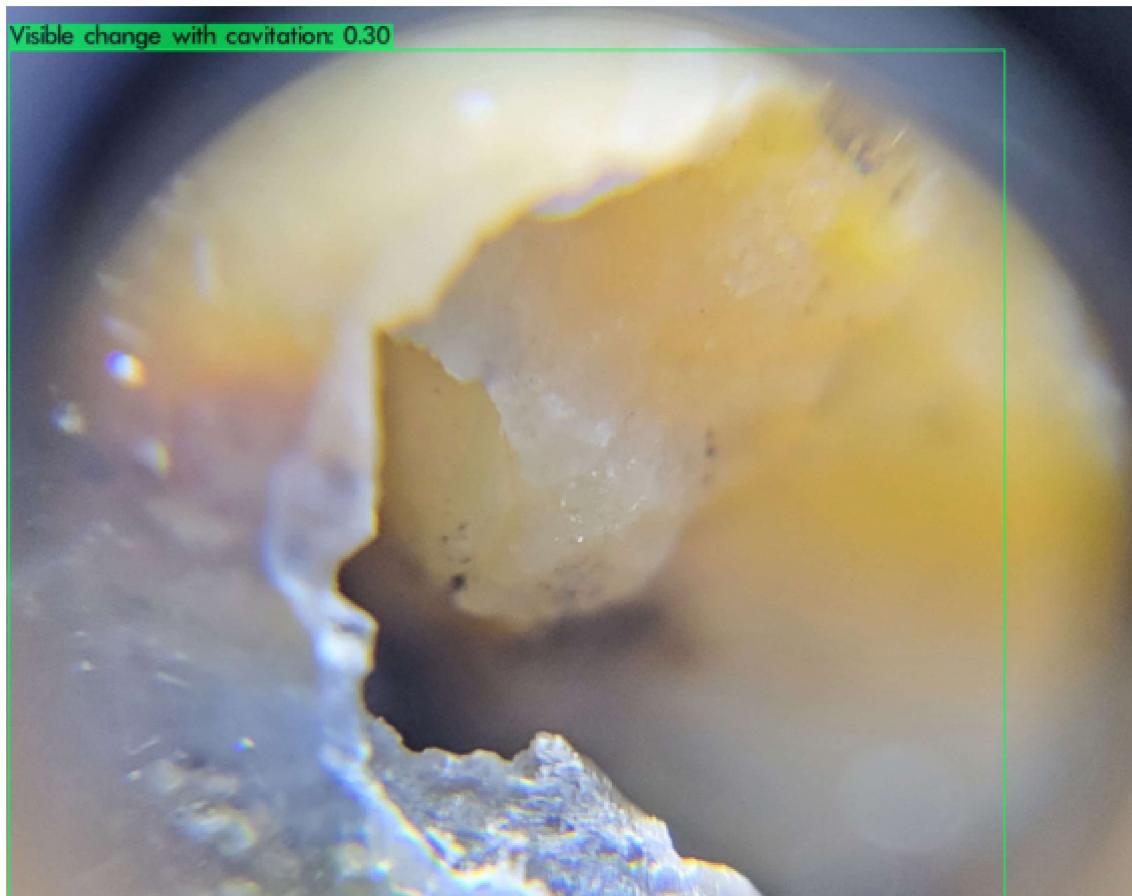
Op	Conv	Route	Input	Kernel	Stride	Output	Operations	Memory	Time
88	route	86					->	19 x 19 x 512 0.000 BF	
89	conv	512	1 x 1/ 1	19 x 19 x 1024	1	->	19 x 19 x 512 0.379 BF		
90	conv	512	1 x 1/ 1	19 x 19 x 512	1	->	19 x 19 x 512 0.189 BF		
91	conv	512	3 x 3/ 1	19 x 19 x 512	1	->	19 x 19 x 512 1.703 BF		
92	Shortcut Layer:	89, wt = 0, wn = 0, outputs: 98	19 x 19 x 512	0.000	BF				
93	conv	512	1 x 1/ 1	19 x 19 x 512	1	->	19 x 19 x 512 0.189 BF		
94	conv	512	3 x 3/ 1	19 x 19 x 512	1	->	19 x 19 x 512 1.703 BF		
95	Shortcut Layer:	92, wt = 0, wn = 0, outputs: 95	19 x 19 x 512	0.000	BF				
96	conv	512	1 x 1/ 1	19 x 19 x 512	1	->	19 x 19 x 512 0.189 BF		
97	conv	512	3 x 3/ 1	19 x 19 x 512	1	->	19 x 19 x 512 1.703 BF		
98	Shortcut Layer:	95, wt = 0, wn = 0, outputs: 101	19 x 19 x 512	0.000	BF				
99	conv	512	1 x 1/ 1	19 x 19 x 512	1	->	19 x 19 x 512 0.189 BF		
100	conv	512	3 x 3/ 1	19 x 19 x 512	1	->	19 x 19 x 512 1.703 BF		
101	Shortcut Layer:	98, wt = 0, wn = 0, outputs: 102	19 x 19 x 512	0.000	BF				
102	conv	512	1 x 1/ 1	19 x 19 x 512	1	->	19 x 19 x 512 0.189 BF		
103	route	102 87				->	19 x 19 x 1024		
104	conv	1024	1 x 1/ 1	19 x 19 x 1024	1	->	19 x 19 x 1024 0.757 BF		
105	conv	512	1 x 1/ 1	19 x 19 x 1024	1	->	19 x 19 x 512 0.379 BF		
106	conv	1024	3 x 3/ 1	19 x 19 x 512	1	->	19 x 19 x 1024 3.407 BF		
107	conv	512	1 x 1/ 1	19 x 19 x 1024	1	->	19 x 19 x 512 0.379 BF		
108	max		5x 5/ 1	19 x 19 x 512	1	->	19 x 19 x 512 0.005 BF		
109	route	107				->	19 x 19 x 512		
110	max		9x 9/ 1	19 x 19 x 512	1	->	19 x 19 x 512 0.015 BF		
111	route	107				->	19 x 19 x 512		
112	max		13x13/ 1	19 x 19 x 512	1	->	19 x 19 x 512 0.031 BF		
113	route	112 110 108 107				->	19 x 19 x 2048		
114	conv	512	1 x 1/ 1	19 x 19 x 2048	1	->	19 x 19 x 512 0.757 BF		
115	conv	1024	3 x 3/ 1	19 x 19 x 512	1	->	19 x 19 x 1024 3.407 BF		
116	conv	512	1 x 1/ 1	19 x 19 x 1024	1	->	19 x 19 x 512 0.379 BF		
117	conv	256	1 x 1/ 1	19 x 19 x 512	1	->	19 x 19 x 256 0.095 BF		
118	upsample		2x	19 x 19 x 256	1	->	38 x 38 x 256		
119	route	85				->	38 x 38 x 512		
120	conv	256	1 x 1/ 1	38 x 38 x 512	1	->	38 x 38 x 256 0.379 BF		
121	route	120 118				->	38 x 38 x 512		
122	conv	256	1 x 1/ 1	38 x 38 x 512	1	->	38 x 38 x 256 0.379 BF		
123	conv	512	3 x 3/ 1	38 x 38 x 256	1	->	38 x 38 x 512 3.407 BF		
124	conv	256	1 x 1/ 1	38 x 38 x 512	1	->	38 x 38 x 256 0.379 BF		
125	conv	512	3 x 3/ 1	38 x 38 x 256	1	->	38 x 38 x 512 3.407 BF		
126	conv	256	1 x 1/ 1	38 x 38 x 512	1	->	38 x 38 x 256 0.379 BF		
127	conv	128	1 x 1/ 1	38 x 38 x 256	1	->	38 x 38 x 128 0.095 BF		
128	upsample		2x	38 x 38 x 128	1	->	76 x 76 x 128		
129	route	54				->	76 x 76 x 256		
130	conv	128	1 x 1/ 1	76 x 76 x 256	1	->	76 x 76 x 128 0.379 BF		
131	route	130 128				->	76 x 76 x 256		
132	conv	128	1 x 1/ 1	76 x 76 x 256	1	->	76 x 76 x 128 0.379 BF		
133	conv	256	3 x 3/ 1	76 x 76 x 128	1	->	76 x 76 x 256 3.407 BF		
134	conv	128	1 x 1/ 1	76 x 76 x 256	1	->	76 x 76 x 128 0.379 BF		
135	conv	256	3 x 3/ 1	76 x 76 x 128	1	->	76 x 76 x 256 3.407 BF		
136	conv	128	1 x 1/ 1	76 x 76 x 256	1	->	76 x 76 x 128 0.379 BF		
137	conv	256	3 x 3/ 1	76 x 76 x 128	1	->	76 x 76 x 256 3.407 BF		
138	conv	24	1 x 1/ 1	76 x 76 x 256	1	->	76 x 76 x 24 0.071 BF		
139	yolo								
[yolo]	params:	iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedy nms (1), beta = 0.600000							
140	route	136				->	76 x 76 x 128		
141	conv	256	3 x 3/ 2	76 x 76 x 128	1	->	38 x 38 x 256 0.852 BF		
142	route	141 126				->	38 x 38 x 512		
143	conv	256	1 x 1/ 1	38 x 38 x 512	1	->	38 x 38 x 256 0.379 BF		
144	conv	512	3 x 3/ 1	38 x 38 x 256	1	->	38 x 38 x 512 3.407 BF		
145	conv	256	1 x 1/ 1	38 x 38 x 512	1	->	38 x 38 x 256 0.379 BF		

```

146 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv     24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route   147
152 conv    512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route   152 116
154 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
160 conv     24       1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 24 0.018 BF
161 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S10 5G/Figure 3.png: Predicted
Visible change with cavitation: 30%
Unable to init server: Could not connect: Connection refused

```

(predictions:7560): Gtk-WARNING **: 10:28:24.258: cannot open display:





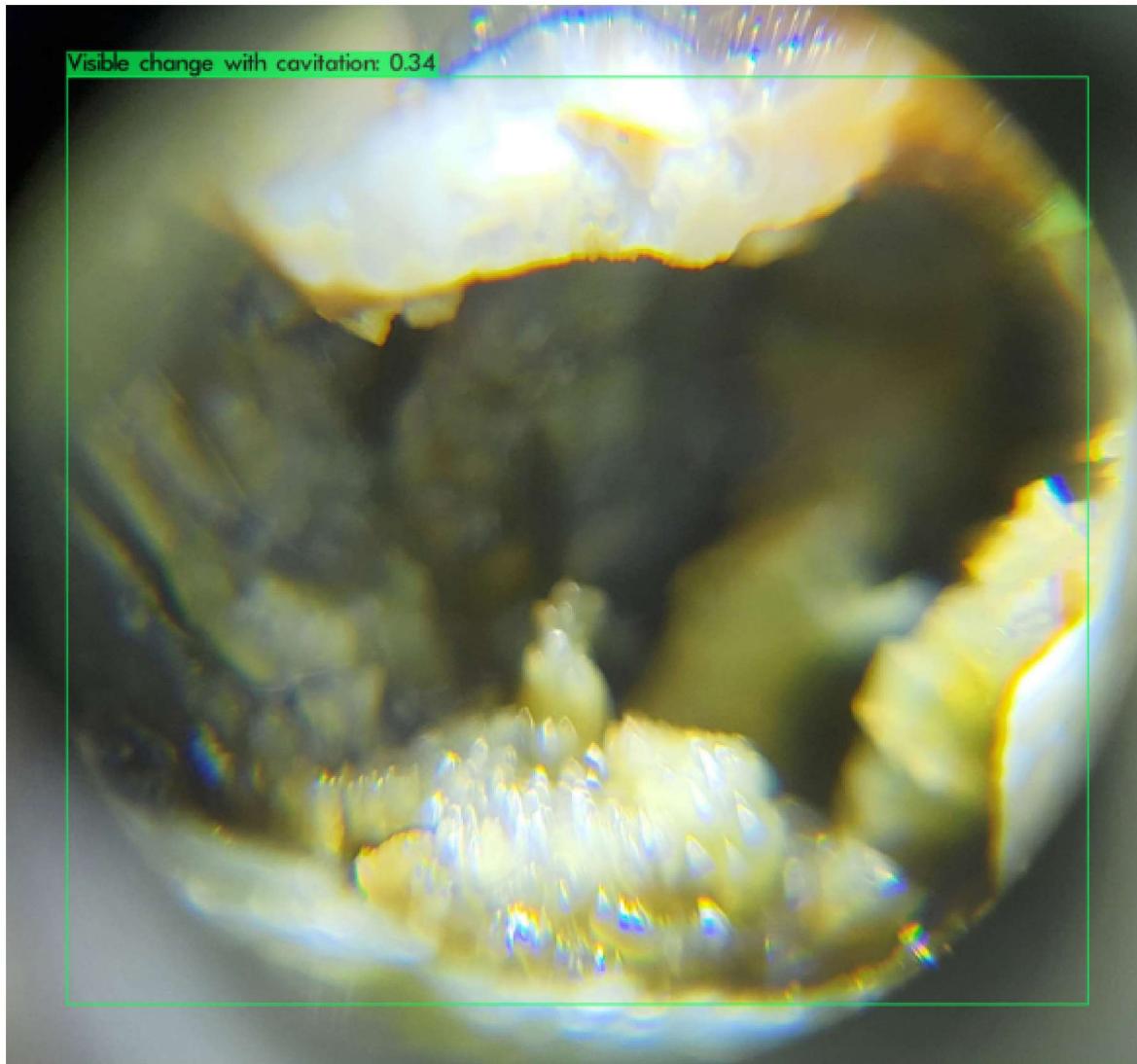
```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
    layer   filters   size/strd(dil)      input           output
    0 Create CUDA-stream - 0
Create cudnn-handle 0
conv      32       3 x 3/ 1      608 x 608 x   3 -> 608 x 608 x  32 0.639 BF
    1 conv      64       3 x 3/ 2      608 x 608 x  32 -> 304 x 304 x  64 3.407 BF
    2 conv      64       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
    3 route     1
    4 conv      64       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
    5 conv      32       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  32 0.379 BF
    6 conv      64       3 x 3/ 1      304 x 304 x  32 -> 304 x 304 x  64 3.407 BF
    7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
    8 conv      64       1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
    9 route     8 2
    10 conv     64       1 x 1/ 1      304 x 304 x  128 -> 304 x 304 x  64 1.514 BF
    11 conv     128      3 x 3/ 2      304 x 304 x  64 -> 152 x 152 x  128 3.407 BF
    12 conv     64       1 x 1/ 1      152 x 152 x  128 -> 152 x 152 x  64 0.379 BF
    13 route     11
    14 conv     64       1 x 1/ 1      152 x 152 x  128 -> 152 x 152 x  64 0.379 BF
    15 conv     64       1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
    16 conv     64       3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
    17 Shortcut Layer: 14, wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
    18 conv     64       1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
    19 conv     64       3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
    20 Shortcut Layer: 17, wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
    21 conv     64       1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
    22 route     21 12
    23 conv     128      1 x 1/ 1      152 x 152 x  128 -> 152 x 152 x  128 0.757 BF
    24 conv     256      3 x 3/ 2      152 x 152 x  128 -> 76 x 76 x 256 3.407 BF
    25 conv     128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
    26 route     24
    27 conv     128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
    28 conv     128      1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
    29 conv     128      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
    30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
    31 conv     128      1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
    32 conv     128      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
    33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
    34 conv     128      1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
    35 conv     128      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
    36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
    37 conv     128      1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
    38 conv     128      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
    39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
    40 conv     128      1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
    41 conv     128      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
    42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
    43 conv     128      1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
    44 conv     128      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
```

45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 46 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 47 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 49 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 50 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 53 route 52 25 -> 76 x 76 x 256
 54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
 55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
 56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 57 route 55 -> 38 x 38 x 512
 58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF

layer	op	in	out	desc	
106	conv	1024	3 x 3 / 1	19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF	
107	conv	512	1 x 1 / 1	19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF	
108	max		5x 5 / 1	19 x 19 x 512 -> 19 x 19 x 512 0.005 BF	
109	route	107		-> 19 x 19 x 512	
110	max		9x 9 / 1	19 x 19 x 512 -> 19 x 19 x 512 0.015 BF	
111	route	107		-> 19 x 19 x 512	
112	max		13x13 / 1	19 x 19 x 512 -> 19 x 19 x 512 0.031 BF	
113	route	112 110 108 107		-> 19 x 19 x 2048	
114	conv	512	1 x 1 / 1	19 x 19 x 2048 -> 19 x 19 x 512 0.757 BF	
115	conv	1024	3 x 3 / 1	19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF	
116	conv	512	1 x 1 / 1	19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF	
117	conv	256	1 x 1 / 1	19 x 19 x 512 -> 19 x 19 x 256 0.095 BF	
118	upsample		2x	19 x 19 x 256 -> 38 x 38 x 256	
119	route	85		-> 38 x 38 x 512	
120	conv	256	1 x 1 / 1	38 x 38 x 512 -> 38 x 38 x 256 0.379 BF	
121	route	120 118		-> 38 x 38 x 512	
122	conv	256	1 x 1 / 1	38 x 38 x 512 -> 38 x 38 x 256 0.379 BF	
123	conv	512	3 x 3 / 1	38 x 38 x 256 -> 38 x 38 x 512 3.407 BF	
124	conv	256	1 x 1 / 1	38 x 38 x 512 -> 38 x 38 x 256 0.379 BF	
125	conv	512	3 x 3 / 1	38 x 38 x 256 -> 38 x 38 x 512 3.407 BF	
126	conv	256	1 x 1 / 1	38 x 38 x 512 -> 38 x 38 x 256 0.379 BF	
127	conv	128	1 x 1 / 1	38 x 38 x 256 -> 38 x 38 x 128 0.095 BF	
128	upsample		2x	38 x 38 x 128 -> 76 x 76 x 128	
129	route	54		-> 76 x 76 x 256	
130	conv	128	1 x 1 / 1	76 x 76 x 256 -> 76 x 76 x 128 0.379 BF	
131	route	130 128		-> 76 x 76 x 256	
132	conv	128	1 x 1 / 1	76 x 76 x 256 -> 76 x 76 x 128 0.379 BF	
133	conv	256	3 x 3 / 1	76 x 76 x 128 -> 76 x 76 x 256 3.407 BF	
134	conv	128	1 x 1 / 1	76 x 76 x 256 -> 76 x 76 x 128 0.379 BF	
135	conv	256	3 x 3 / 1	76 x 76 x 128 -> 76 x 76 x 256 3.407 BF	
136	conv	128	1 x 1 / 1	76 x 76 x 256 -> 76 x 76 x 128 0.379 BF	
137	conv	256	3 x 3 / 1	76 x 76 x 128 -> 76 x 76 x 256 3.407 BF	
138	conv	24	1 x 1 / 1	76 x 76 x 256 -> 76 x 76 x 24 0.071 BF	
139	yolo				
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedyrnms (1), beta = 0.600000					
140	route	136		-> 76 x 76 x 128	
141	conv	256	3 x 3 / 2	76 x 76 x 128 -> 38 x 38 x 256 0.852 BF	
142	route	141 126		-> 38 x 38 x 512	
143	conv	256	1 x 1 / 1	38 x 38 x 512 -> 38 x 38 x 256 0.379 BF	
144	conv	512	3 x 3 / 1	38 x 38 x 256 -> 38 x 38 x 512 3.407 BF	
145	conv	256	1 x 1 / 1	38 x 38 x 512 -> 38 x 38 x 256 0.379 BF	
146	conv	512	3 x 3 / 1	38 x 38 x 256 -> 38 x 38 x 512 3.407 BF	
147	conv	256	1 x 1 / 1	38 x 38 x 512 -> 38 x 38 x 256 0.379 BF	
148	conv	512	3 x 3 / 1	38 x 38 x 256 -> 38 x 38 x 512 3.407 BF	
149	conv	24	1 x 1 / 1	38 x 38 x 512 -> 38 x 38 x 24 0.035 BF	
150	yolo				
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedyrnms (1), beta = 0.600000					
151	route	147		-> 38 x 38 x 256	
152	conv	512	3 x 3 / 2	38 x 38 x 256 -> 19 x 19 x 512 0.852 BF	
153	route	152 116		-> 19 x 19 x 1024	
154	conv	512	1 x 1 / 1	19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF	
155	conv	1024	3 x 3 / 1	19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF	
156	conv	512	1 x 1 / 1	19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF	
157	conv	1024	3 x 3 / 1	19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF	
158	conv	512	1 x 1 / 1	19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF	
159	conv	1024	3 x 3 / 1	19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF	
160	conv	24	1 x 1 / 1	19 x 19 x 1024 -> 19 x 19 x 24 0.018 BF	
161	volo				

```
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d  
nms_kind: greedyNMS (1), beta = 0.600000  
Total BFLOPS 127.263  
avg_outputs = 1046775  
Allocate additional workspace_size = 6.65 MB  
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...  
seen 64, trained: 139 K-images (2 Kilo-batches_64)  
Done! Loaded 162 layers from weights-file  
Detection layer: 139 - type = 28  
Detection layer: 150 - type = 28  
Detection layer: 161 - type = 28  
/content/gdrive/MyDrive/tooth/Processed images/Samsung S10 5G/Figure 4.png: Predicted  
Visible change with cavitation: 34%  
Unable to init server: Could not connect: Connection refused
```

(predictions:7574): Gtk-WARNING **: 10:28:33.457: cannot open display:



```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1  
CUDNN_HALF=1  
OpenCV version: 3.2.0  
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80  
net.optimized_memory = 0  
mini_batch = 1, batch = 32, time_steps = 1, train = 0  
layer filters size/strd(dil) input output  
0 Create CUDA-stream - 0  
Create cudnn-handle 0  
conv 32 3 x 3/ 1 608 x 608 x 3 -> 608 x 608 x 32 0.639 BF  
1 conv 64 3 x 3/ 2 608 x 608 x 32 -> 304 x 304 x 64 3.407 BF  
2 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
```

3 route 1 -> 304 x 304 x 64
 4 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
 5 conv 32 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 32 0.379 BF
 6 conv 64 3 x 3/ 1 304 x 304 x 32 -> 304 x 304 x 64 3.407 BF
 7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x 64 0.006 BF
 8 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
 9 route 8 2 -> 304 x 304 x 128
 10 conv 64 1 x 1/ 1 304 x 304 x 128 -> 304 x 304 x 64 1.514 BF
 11 conv 128 3 x 3/ 2 304 x 304 x 64 -> 152 x 152 x 128 3.407 BF
 12 conv 64 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 64 0.379 BF
 13 route 11 -> 152 x 152 x 128
 14 conv 64 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 64 0.379 BF
 15 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 16 conv 64 3 x 3/ 1 152 x 152 x 64 -> 152 x 152 x 64 1.703 BF
 17 Shortcut Layer: 14, wt = 0, wn = 0, outputs: 152 x 152 x 64 0.001 BF
 18 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 19 conv 64 3 x 3/ 1 152 x 152 x 64 -> 152 x 152 x 64 1.703 BF
 20 Shortcut Layer: 17, wt = 0, wn = 0, outputs: 152 x 152 x 64 0.001 BF
 21 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 22 route 21 12 -> 152 x 152 x 128
 23 conv 128 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
 24 conv 256 3 x 3/ 2 152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
 25 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 26 route 24 -> 76 x 76 x 256
 27 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 28 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 29 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 31 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 32 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 34 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 35 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 37 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 38 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 40 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 41 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 43 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 44 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 46 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 47 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 49 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 50 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 53 route 52 25 -> 76 x 76 x 256
 54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
 55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
 56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 57 route 55 -> 38 x 38 x 512
 58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF

63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 106 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 107 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 108 max 5x 5/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
 109 route 107 -> 19 x 19 x 512
 110 max 9x 9/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.015 BF
 111 route 107 -> 19 x 19 x 512
 112 max 13x13/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.031 BF
 113 route 112 110 108 107 -> 19 x 19 x 2048
 114 conv 512 1 x 1/ 1 19 x 19 x 2048 -> 19 x 19 x 512 0.757 BF
 115 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 116 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 117 conv 256 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 256 0.095 BF
 118 upsample 2x 19 x 19 x 256 -> 38 x 38 x 256
 119 route 85 -> 38 x 38 x 512
 120 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 121 route 120 118 -> 38 x 38 x 512
 122 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 123 -> 38 x 38 x 512 0.379 BF

```

123 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.40/ BF
124 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
125 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
126 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
127 conv    128      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 128 0.095 BF
128 upsample          2x      38 x 38 x 128 -> 76 x 76 x 128
129 route   54                  -> 76 x 76 x 256
130 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
131 route   130 128          -> 76 x 76 x 256
132 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
133 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
134 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
135 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
136 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
137 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
138 conv    24       1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 24 0.071 BF
139 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route   136          -> 76 x 76 x 128
141 conv    256      3 x 3/ 2      76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route   141 126          -> 38 x 38 x 512
143 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo

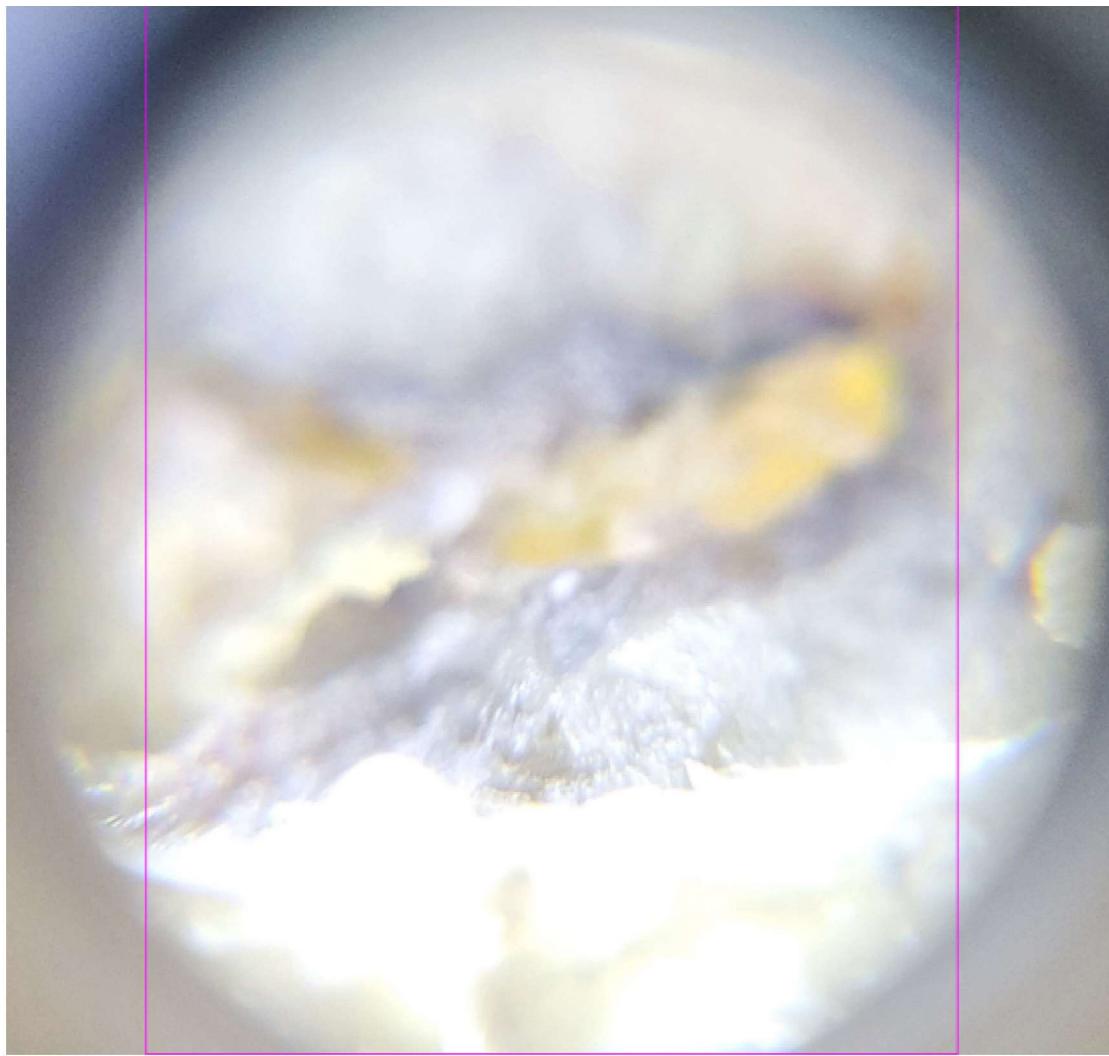
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route   147          -> 38 x 38 x 256
152 conv    512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route   152 116          -> 19 x 19 x1024
154 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S10 5G/Figure 5.png: Predictie
Visible change without cavitation: 78%
Unable to init server: Could not connect: Connection refused

(predictions:7588): Gtk-WARNING **: 10:28:41.247: cannot open display:

Visible change without cavitation: 0.78

```



```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer filters size/strd(dil)      input                  output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv    32      3 x 3/ 1      608 x 608 x   3 ->  608 x 608 x  32 0.639 BF
1 conv    64      3 x 3/ 2      608 x 608 x  32 ->  304 x 304 x  64 3.407 BF
2 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
3 route   1                   ->  304 x 304 x  64
4 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
5 conv    32      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  32 0.379 BF
6 conv    64      3 x 3/ 1      304 x 304 x  32 ->  304 x 304 x  64 3.407 BF
7 Shortcut Layer: 4,  wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
8 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
9 route   8 2                   ->  304 x 304 x 128
10 conv   64      1 x 1/ 1      304 x 304 x 128 ->  304 x 304 x  64 1.514 BF
11 conv   128     3 x 3/ 2      304 x 304 x  64 ->  152 x 152 x 128 3.407 BF
12 conv   64      1 x 1/ 1      152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
13 route  11                   ->  152 x 152 x 128
14 conv   64      1 x 1/ 1      152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
15 conv   64      1 x 1/ 1      152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
16 conv   64      3 x 3/ 1      152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
17 Shortcut Layer: 14,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
18 conv   64      1 x 1/ 1      152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
19 conv   64      3 x 3/ 1      152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
20 Shortcut Layer: 17.  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
```

21	conv	64	1 x 1 / 1	152 x 152 x 64	->	152 x 152 x 64	0.189	BF
22	route	21 12			->	152 x 152 x 128		
23	conv	128	1 x 1 / 1	152 x 152 x 128	->	152 x 152 x 128	0.757	BF
24	conv	256	3 x 3 / 2	152 x 152 x 128	->	76 x 76 x 256	3.407	BF
25	conv	128	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
26	route	24			->	76 x 76 x 256		
27	conv	128	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
28	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
29	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
30	Shortcut Layer:	27, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
31	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
32	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
33	Shortcut Layer:	30, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
34	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
35	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
36	Shortcut Layer:	33, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
37	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
38	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
39	Shortcut Layer:	36, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
40	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
41	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
42	Shortcut Layer:	39, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
43	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
44	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
45	Shortcut Layer:	42, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
46	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
47	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
48	Shortcut Layer:	45, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
49	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
50	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
51	Shortcut Layer:	48, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
52	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
53	route	52 25			->	76 x 76 x 256		
54	conv	256	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 256	0.757	BF
55	conv	512	3 x 3 / 2	76 x 76 x 256	->	38 x 38 x 512	3.407	BF
56	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
57	route	55			->	38 x 38 x 512		
58	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
59	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
60	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
61	Shortcut Layer:	58, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
62	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
63	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
64	Shortcut Layer:	61, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
65	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
66	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
67	Shortcut Layer:	64, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
68	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
69	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
70	Shortcut Layer:	67, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
71	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
72	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
73	Shortcut Layer:	70, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
74	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
75	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
76	Shortcut Layer:	73, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
77	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
78	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
79	Shortcut Layer:	76, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
80	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF

81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 106 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 107 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 108 max 5x 5/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
 109 route 107 -> 19 x 19 x 512
 110 max 9x 9/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.015 BF
 111 route 107 -> 19 x 19 x 512
 112 max 13x13/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.031 BF
 113 route 112 110 108 107 -> 19 x 19 x 2048
 114 conv 512 1 x 1/ 1 19 x 19 x 2048 -> 19 x 19 x 512 0.757 BF
 115 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 116 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 117 conv 256 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 256 0.095 BF
 118 upsample 2x 19 x 19 x 256 -> 38 x 38 x 256
 119 route 85 -> 38 x 38 x 512
 120 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 121 route 120 118 -> 38 x 38 x 512
 122 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 123 conv 512 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
 124 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 125 conv 512 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
 126 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 127 conv 128 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 128 0.095 BF
 128 upsample 2x 38 x 38 x 128 -> 76 x 76 x 128
 129 route 54 -> 76 x 76 x 256
 130 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 131 route 130 128 -> 76 x 76 x 256
 132 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 133 conv 256 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
 134 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 135 conv 256 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
 136 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 137 conv 256 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
 138 conv 24 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 24 0.071 BF
 139 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d

```

nms_kind: greedyNMS (1), beta = 0.600000
140 route 136                                     -> 76 x 76 x 128
141 conv   256      3 x 3/ 2       76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route 141 126                                -> 38 x 38 x 512
143 conv   256      1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv   512      3 x 3/ 1       38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv   256      1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv   512      3 x 3/ 1       38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv   256      1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv   512      3 x 3/ 1       38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv   24       1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyNMS (1), beta = 0.600000
151 route 147                                     -> 38 x 38 x 256
152 conv   512      3 x 3/ 2       38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route 152 116                                -> 19 x 19 x 1024
154 conv   512      1 x 1/ 1       19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
155 conv   1024     3 x 3/ 1       19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
156 conv   512      1 x 1/ 1       19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
157 conv   1024     3 x 3/ 1       19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
158 conv   512      1 x 1/ 1       19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
159 conv   1024     3 x 3/ 1       19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
160 conv   24       1 x 1/ 1       19 x 19 x 1024 -> 19 x 19 x 24 0.018 BF
161 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyNMS (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S10 5G/Figure 6.png: Predictions
Unable to init server: Could not connect: Connection refused

(predictions:7602): Gtk-WARNING **: 10:28:49.322: cannot open display:
```



```
!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolov4-custom_best.weights
imShow('predictions.jpg')
```

```
!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc
imShow('predictions.jpg')

!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc
imShow('predictions.jpg')
```

```

CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
    layer   filters   size/strd(dil)      input           output
    0 Create CUDA-stream - 0
Create cudnn-handle 0
conv    32      3 x 3/ 1     608 x 608 x   3 -> 608 x 608 x   32 0.639 BF
1 conv    64      3 x 3/ 2     608 x 608 x   32 -> 304 x 304 x   64 3.407 BF
2 conv    64      1 x 1/ 1     304 x 304 x   64 -> 304 x 304 x   64 0.757 BF
3 route   1                  -> 304 x 304 x   64
4 conv    64      1 x 1/ 1     304 x 304 x   64 -> 304 x 304 x   64 0.757 BF
5 conv    32      1 x 1/ 1     304 x 304 x   64 -> 304 x 304 x   32 0.379 BF
6 conv    64      3 x 3/ 1     304 x 304 x   32 -> 304 x 304 x   64 3.407 BF
7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x   64 0.006 BF
8 conv    64      1 x 1/ 1     304 x 304 x   64 -> 304 x 304 x   64 0.757 BF
9 route   8 2                  -> 304 x 304 x 128
10 conv   64      1 x 1/ 1     304 x 304 x 128 -> 304 x 304 x   64 1.514 BF
11 conv   128     3 x 3/ 2     304 x 304 x   64 -> 152 x 152 x 128 3.407 BF
12 conv   64      1 x 1/ 1     152 x 152 x 128 -> 152 x 152 x   64 0.379 BF
13 route   11                 -> 152 x 152 x 128
14 conv   64      1 x 1/ 1     152 x 152 x 128 -> 152 x 152 x   64 0.379 BF
15 conv   64      1 x 1/ 1     152 x 152 x   64 -> 152 x 152 x   64 0.189 BF
16 conv   64      3 x 3/ 1     152 x 152 x   64 -> 152 x 152 x   64 1.703 BF
17 Shortcut Layer: 14, wt = 0, wn = 0, outputs: 152 x 152 x   64 0.001 BF
18 conv   64      1 x 1/ 1     152 x 152 x   64 -> 152 x 152 x   64 0.189 BF
19 conv   64      3 x 3/ 1     152 x 152 x   64 -> 152 x 152 x   64 1.703 BF
20 Shortcut Layer: 17, wt = 0, wn = 0, outputs: 152 x 152 x   64 0.001 BF
21 conv   64      1 x 1/ 1     152 x 152 x   64 -> 152 x 152 x   64 0.189 BF
22 route  21 12                 -> 152 x 152 x 128
23 conv   128     1 x 1/ 1     152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
24 conv   256     3 x 3/ 2     152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
25 conv   128     1 x 1/ 1     76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
26 route   24                 -> 76 x 76 x 256
27 conv   128     1 x 1/ 1     76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
28 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
29 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
31 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
32 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
34 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
35 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
37 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
38 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
40 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
41 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
43 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
44 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
46 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
47 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
49 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
50 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF

```

51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 53 route 52 25 -> 76 x 76 x 256
 54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
 55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
 56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 57 route 55 -> 38 x 38 x 512
 58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 106 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 107 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 108 max 5x 5/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
 109 route 107 -> 19 x 19 x 512
 110 max 9x 9/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.015 BF

```

111 route 107
112 max           13x13/ 1      19 x   19 x 512 -> 19 x   19 x 512 0.031 BF
113 route 112 110 108 107
114 conv    512      1 x 1/ 1      19 x   19 x 2048 -> 19 x   19 x 512 0.757 BF
115 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
116 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
117 conv    256      1 x 1/ 1      19 x   19 x 512 -> 19 x   19 x 256 0.095 BF
118 upsample
119 route 85
120 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
121 route 120 118
122 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
123 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
124 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
125 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
126 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
127 conv    128      1 x 1/ 1      38 x   38 x 256 -> 38 x   38 x 128 0.095 BF
128 upsample
129 route 54
130 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
131 route 130 128
132 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
133 conv    256      3 x 3/ 1      76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
134 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
135 conv    256      3 x 3/ 1      76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
136 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
137 conv    256      3 x 3/ 1      76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
138 conv    24       1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 24 0.071 BF
139 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route 136
141 conv    256      3 x 3/ 2      76 x   76 x 128 -> 38 x   38 x 256 0.852 BF
142 route 141 126
143 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
144 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
145 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
146 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 24 0.035 BF
150 yolo

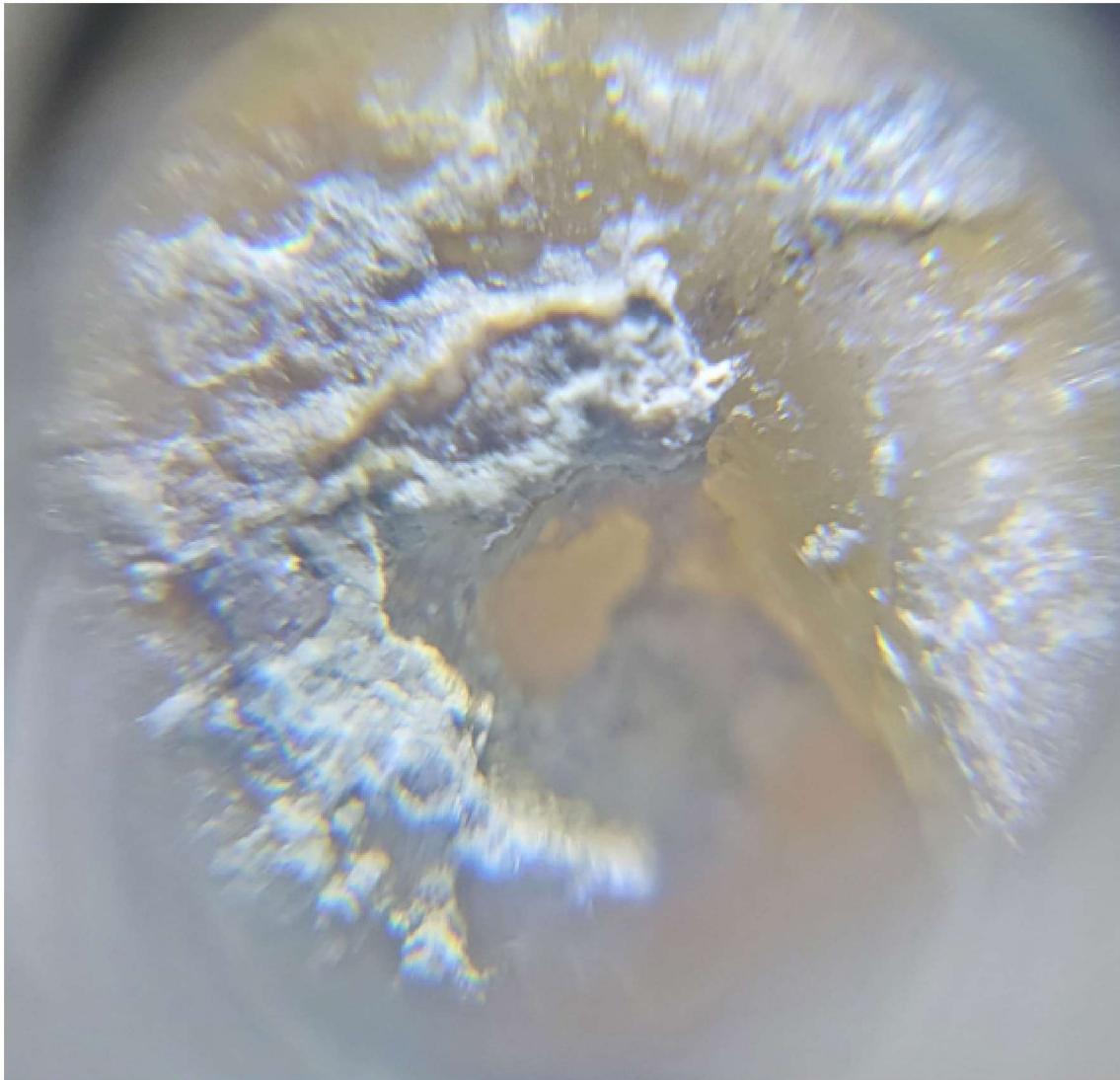
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route 147
152 conv    512      3 x 3/ 2      38 x   38 x 256 -> 19 x   19 x 512 0.852 BF
153 route 152 116
154 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB

```

```
Loading weights from /myarive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S10e/Figure 1.png: Predicted
Unable to init server: Could not connect: Connection refused
```

(predictions:7636): Gtk-WARNING **: 10:30:13.068: cannot open display:



```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer filters size/strd(dil)      input           output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv    32      3 x 3/ 1      608 x 608 x   3 ->  608 x 608 x  32 0.639 BF
1 conv    64      3 x 3/ 2      608 x 608 x  32 ->  304 x 304 x  64 3.407 BF
2 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
3 route   1          ->  304 x 304 x  64
4 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
5 conv    32      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  32 0.379 BF
6 conv    64      3 x 3/ 1      304 x 304 x  32 ->  304 x 304 x  64 3.407 BF
7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
8 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
9 route   0 2          ->  304 x 304 x 120
```

#	route	op	size	input	output	op	size	input	output
10	conv	64	1 x 1/ 1	304 x 304 x 128	->	304	x 304	x 64	1.514 BF
11	conv	128	3 x 3/ 2	304 x 304 x 64	->	152	x 152	x 128	3.407 BF
12	conv	64	1 x 1/ 1	152 x 152 x 128	->	152	x 152	x 64	0.379 BF
13	route	11			->	152	x 152	x 128	
14	conv	64	1 x 1/ 1	152 x 152 x 128	->	152	x 152	x 64	0.379 BF
15	conv	64	1 x 1/ 1	152 x 152 x 64	->	152	x 152	x 64	0.189 BF
16	conv	64	3 x 3/ 1	152 x 152 x 64	->	152	x 152	x 64	1.703 BF
17	Shortcut Layer:	14, wt = 0, wn = 0, outputs:	152 x 152 x 64	0.001 BF					
18	conv	64	1 x 1/ 1	152 x 152 x 64	->	152	x 152	x 64	0.189 BF
19	conv	64	3 x 3/ 1	152 x 152 x 64	->	152	x 152	x 64	1.703 BF
20	Shortcut Layer:	17, wt = 0, wn = 0, outputs:	152 x 152 x 64	0.001 BF					
21	conv	64	1 x 1/ 1	152 x 152 x 64	->	152	x 152	x 64	0.189 BF
22	route	21 12			->	152	x 152	x 128	
23	conv	128	1 x 1/ 1	152 x 152 x 128	->	152	x 152	x 128	0.757 BF
24	conv	256	3 x 3/ 2	152 x 152 x 128	->	76	x 76	x 256	3.407 BF
25	conv	128	1 x 1/ 1	76 x 76 x 256	->	76	x 76	x 128	0.379 BF
26	route	24			->	76	x 76	x 256	
27	conv	128	1 x 1/ 1	76 x 76 x 256	->	76	x 76	x 128	0.379 BF
28	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
29	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
30	Shortcut Layer:	27, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
31	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
32	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
33	Shortcut Layer:	30, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
34	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
35	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
36	Shortcut Layer:	33, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
37	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
38	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
39	Shortcut Layer:	36, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
40	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
41	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
42	Shortcut Layer:	39, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
43	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
44	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
45	Shortcut Layer:	42, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
46	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
47	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
48	Shortcut Layer:	45, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
49	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
50	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
51	Shortcut Layer:	48, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
52	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
53	route	52 25			->	76	x 76	x 256	
54	conv	256	1 x 1/ 1	76 x 76 x 256	->	76	x 76	x 256	0.757 BF
55	conv	512	3 x 3/ 2	76 x 76 x 256	->	38	x 38	x 512	3.407 BF
56	conv	256	1 x 1/ 1	38 x 38 x 512	->	38	x 38	x 256	0.379 BF
57	route	55			->	38	x 38	x 512	
58	conv	256	1 x 1/ 1	38 x 38 x 512	->	38	x 38	x 256	0.379 BF
59	conv	256	1 x 1/ 1	38 x 38 x 256	->	38	x 38	x 256	0.189 BF
60	conv	256	3 x 3/ 1	38 x 38 x 256	->	38	x 38	x 256	1.703 BF
61	Shortcut Layer:	58, wt = 0, wn = 0, outputs:	38 x 38 x 256	0.000 BF					
62	conv	256	1 x 1/ 1	38 x 38 x 256	->	38	x 38	x 256	0.189 BF
63	conv	256	3 x 3/ 1	38 x 38 x 256	->	38	x 38	x 256	1.703 BF
64	Shortcut Layer:	61, wt = 0, wn = 0, outputs:	38 x 38 x 256	0.000 BF					
65	conv	256	1 x 1/ 1	38 x 38 x 256	->	38	x 38	x 256	0.189 BF
66	conv	256	3 x 3/ 1	38 x 38 x 256	->	38	x 38	x 256	1.703 BF
67	Shortcut Layer:	64, wt = 0, wn = 0, outputs:	38 x 38 x 256	0.000 BF					
68	conv	256	1 x 1/ 1	38 x 38 x 256	->	38	x 38	x 256	0.189 BF
69	conv	256	3 x 3/ 1	38 x 38 x 256	->	38	x 38	x 256	1.703 BF

70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
84 route 83 56 -> 38 x 38 x 512
85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
88 route 86 -> 19 x 19 x 1024
89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
103 route 102 87 -> 19 x 19 x 1024
104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
106 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
107 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
108 max 5x 5/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
109 route 107 -> 19 x 19 x 512
110 max 9x 9/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.015 BF
111 route 107 -> 19 x 19 x 512
112 max 13x13/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.031 BF
113 route 112 110 108 107 -> 19 x 19 x 2048
114 conv 512 1 x 1/ 1 19 x 19 x 2048 -> 19 x 19 x 512 0.757 BF
115 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
116 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
117 conv 256 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 256 0.095 BF
118 upsample 2x 19 x 19 x 256 -> 38 x 38 x 256
119 route 85 -> 38 x 38 x 512
120 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
121 route 120 118 -> 38 x 38 x 512
122 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
123 conv 512 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
124 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
125 conv 512 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
126 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
127 conv 128 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 128 0.095 BF
128 upsample 2x 38 x 38 x 128 -> 76 x 76 x 128
129 route 54 -> 76 x 76 x 256

```

130 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
131 route   130 128
132 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
133 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
134 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
135 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
136 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
137 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
138 conv    24       1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 24 0.071 BF
139 yolo

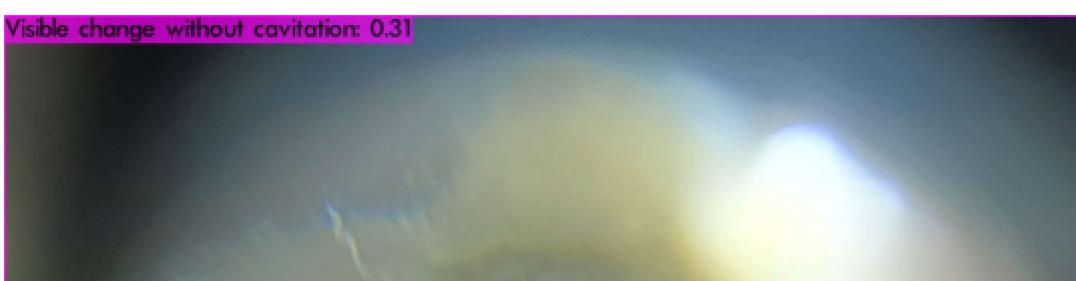
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route   136
141 conv    256      3 x 3/ 2      76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route   141 126
143 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo

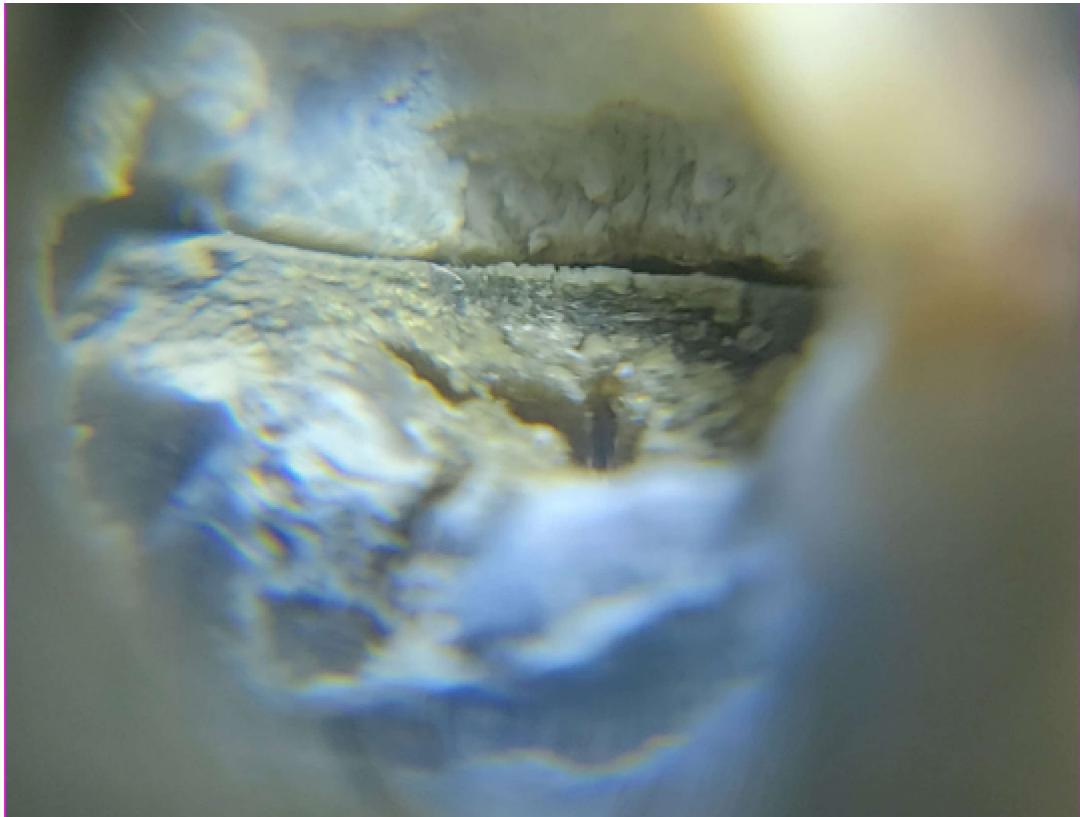
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route   147
152 conv    512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route   152 116
154 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S10e/Figure 2.png: Predicted
Visible change without cavitation: 31%
Unable to init server: Could not connect: Connection refused

(predictions:7650): Gtk-WARNING **: 10:30:21.321: cannot open display:
Visible change without cavitation: 0.31

```





```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
 0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
    layer   filters   size/strd(dil)       input           output
    0 Create CUDA-stream - 0
Create cudnn-handle 0
conv      32      3 x 3/ 1      608 x 608 x     3 ->  608 x 608 x  32 0.639 BF
    1 conv      64      3 x 3/ 2      608 x 608 x  32 ->  304 x 304 x  64 3.407 BF
    2 conv      64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
    3 route     1                  ->  304 x 304 x  64
    4 conv      64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
    5 conv      32      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  32 0.379 BF
    6 conv      64      3 x 3/ 1      304 x 304 x  32 ->  304 x 304 x  64 3.407 BF
    7 Shortcut Layer: 4,  wt = 0,  wn = 0,  outputs: 304 x 304 x  64 0.006 BF
    8 conv      64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
    9 route     8 2                  ->  304 x 304 x 128
   10 conv      64      1 x 1/ 1      304 x 304 x 128 ->  304 x 304 x  64 1.514 BF
   11 conv     128      3 x 3/ 2      304 x 304 x  64 ->  152 x 152 x 128 3.407 BF
   12 conv      64      1 x 1/ 1      152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
   13 route     11                 ->  152 x 152 x 128
   14 conv      64      1 x 1/ 1      152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
   15 conv      64      1 x 1/ 1      152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
   16 conv      64      3 x 3/ 1      152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
   17 Shortcut Layer: 14,  wt = 0,  wn = 0,  outputs: 152 x 152 x  64 0.001 BF
   18 conv      64      1 x 1/ 1      152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
   19 conv      64      3 x 3/ 1      152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
   20 Shortcut Layer: 17,  wt = 0,  wn = 0,  outputs: 152 x 152 x  64 0.001 BF
   21 conv      64      1 x 1/ 1      152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
   22 route    21 12                 ->  152 x 152 x 128
   23 conv     128      1 x 1/ 1      152 x 152 x 128 ->  152 x 152 x 128 0.757 BF
   24 conv     256      3 x 3/ 2      152 x 152 x 128 ->  76 x  76 x 256 3.407 BF
   25 conv     128      1 x 1/ 1      76 x  76 x 256 ->  76 x  76 x 128 0.379 BF
   26 route    24                  ->  76 x  76 x 256
-->    100      1 x 1/ 1      76      76      256      ->  76      76      100 0.379 BF
```

```

27 conv    128      1 x 1/ 1      /6 x   /6 x 256 ->   /6 x   /6 x 128 0.3/9 BF
28 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
29 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
31 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
32 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
34 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
35 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
37 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
38 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
40 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
41 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
43 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
44 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
46 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
47 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
49 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
50 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
52 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
53 route   52 25                               ->   76 x 76 x 256
54 conv    256      1 x 1/ 1      76 x   76 x 256 ->   76 x   76 x 256 0.757 BF
55 conv    512      3 x 3/ 2      76 x   76 x 256 ->   38 x   38 x 512 3.407 BF
56 conv    256      1 x 1/ 1      38 x   38 x 512 ->   38 x   38 x 256 0.379 BF
57 route   55                               ->   38 x 38 x 512
58 conv    256      1 x 1/ 1      38 x   38 x 512 ->   38 x   38 x 256 0.379 BF
59 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
60 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
62 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
63 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
65 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
66 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
68 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
69 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
71 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
72 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
74 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
75 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
77 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
78 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
80 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
81 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
83 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
84 route   83 56                               ->   38 x 38 x 512
85 conv    512      1 x 1/ 1      38 x   38 x 512 ->   38 x   38 x 512 0.757 BF
86 conv    1024     3 x 3/ 2      38 x   38 x 512 ->   19 x   19 x 1024 3.407 BF
87 conv    512      1 x 1/ 1      19 x   19 x 1024 ->   19 x   19 x 512 0.379 RF

```

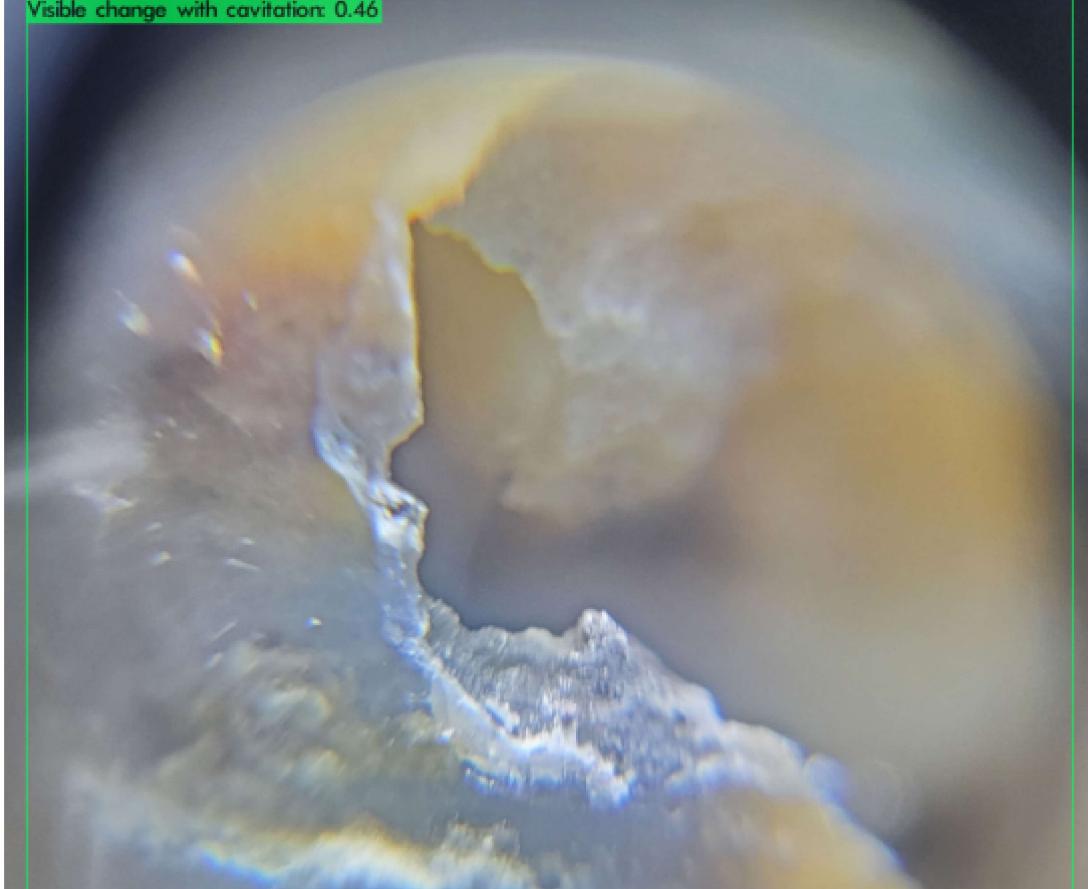
Op	Conv	Route	Input	Operation	Output	Shape	Type	Value
88	route	86						
89	conv	512	1 x 1/ 1	19 x 19 x1024	->	19 x 19 x 512	0.379	BF
90	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512	0.189	BF
91	conv	512	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 512	1.703	BF
92	Shortcut Layer:	89, wt = 0, wn = 0, outputs:		19 x 19 x 512	0.000	BF		
93	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512	0.189	BF
94	conv	512	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 512	1.703	BF
95	Shortcut Layer:	92, wt = 0, wn = 0, outputs:		19 x 19 x 512	0.000	BF		
96	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512	0.189	BF
97	conv	512	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 512	1.703	BF
98	Shortcut Layer:	95, wt = 0, wn = 0, outputs:		19 x 19 x 512	0.000	BF		
99	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512	0.189	BF
100	conv	512	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x 512	1.703	BF
101	Shortcut Layer:	98, wt = 0, wn = 0, outputs:		19 x 19 x 512	0.000	BF		
102	conv	512	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 512	0.189	BF
103	route	102 87			->	19 x 19 x1024		
104	conv	1024	1 x 1/ 1	19 x 19 x1024	->	19 x 19 x1024	0.757	BF
105	conv	512	1 x 1/ 1	19 x 19 x1024	->	19 x 19 x 512	0.379	BF
106	conv	1024	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x1024	3.407	BF
107	conv	512	1 x 1/ 1	19 x 19 x1024	->	19 x 19 x 512	0.379	BF
108	max		5x 5/ 1	19 x 19 x 512	->	19 x 19 x 512	0.005	BF
109	route	107			->	19 x 19 x 512		
110	max		9x 9/ 1	19 x 19 x 512	->	19 x 19 x 512	0.015	BF
111	route	107			->	19 x 19 x 512		
112	max		13x13/ 1	19 x 19 x 512	->	19 x 19 x 512	0.031	BF
113	route	112 110 108 107			->	19 x 19 x2048		
114	conv	512	1 x 1/ 1	19 x 19 x2048	->	19 x 19 x 512	0.757	BF
115	conv	1024	3 x 3/ 1	19 x 19 x 512	->	19 x 19 x1024	3.407	BF
116	conv	512	1 x 1/ 1	19 x 19 x1024	->	19 x 19 x 512	0.379	BF
117	conv	256	1 x 1/ 1	19 x 19 x 512	->	19 x 19 x 256	0.095	BF
118	upsample		2x	19 x 19 x 256	->	38 x 38 x 256		
119	route	85			->	38 x 38 x 512		
120	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
121	route	120 118			->	38 x 38 x 512		
122	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
123	conv	512	3 x 3/ 1	38 x 38 x 256	->	38 x 38 x 512	3.407	BF
124	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
125	conv	512	3 x 3/ 1	38 x 38 x 256	->	38 x 38 x 512	3.407	BF
126	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
127	conv	128	1 x 1/ 1	38 x 38 x 256	->	38 x 38 x 128	0.095	BF
128	upsample		2x	38 x 38 x 128	->	76 x 76 x 128		
129	route	54			->	76 x 76 x 256		
130	conv	128	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
131	route	130 128			->	76 x 76 x 256		
132	conv	128	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
133	conv	256	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 256	3.407	BF
134	conv	128	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
135	conv	256	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 256	3.407	BF
136	conv	128	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
137	conv	256	3 x 3/ 1	76 x 76 x 128	->	76 x 76 x 256	3.407	BF
138	conv	24	1 x 1/ 1	76 x 76 x 256	->	76 x 76 x 24	0.071	BF
139	yolo							
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedyrnms (1), beta = 0.600000								
140	route	136			->	76 x 76 x 128		
141	conv	256	3 x 3/ 2	76 x 76 x 128	->	38 x 38 x 256	0.852	BF
142	route	141 126			->	38 x 38 x 512		
143	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
144	conv	512	3 x 3/ 1	38 x 38 x 256	->	38 x 38 x 512	3.407	BF
145	conv	256	1 x 1/ 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF

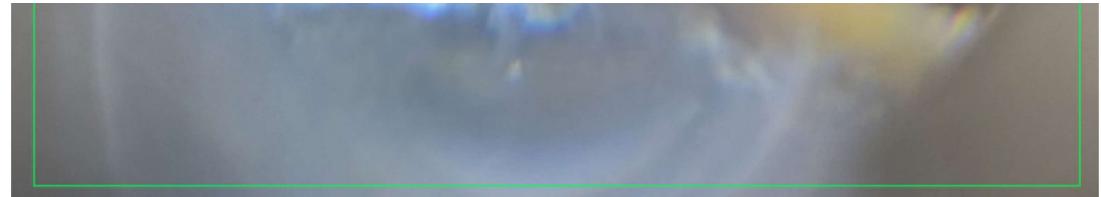
```

146 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv     24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route   147
152 conv    512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route   152 116
154 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
160 conv     24       1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 24 0.018 BF
161 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S10e/Figure 3.png: Predicted
Visible change with cavitation: 46%
Unable to init server: Could not connect: Connection refused

```

(predictions:7662): Gtk-WARNING **: 10:30:30.645: cannot open display:





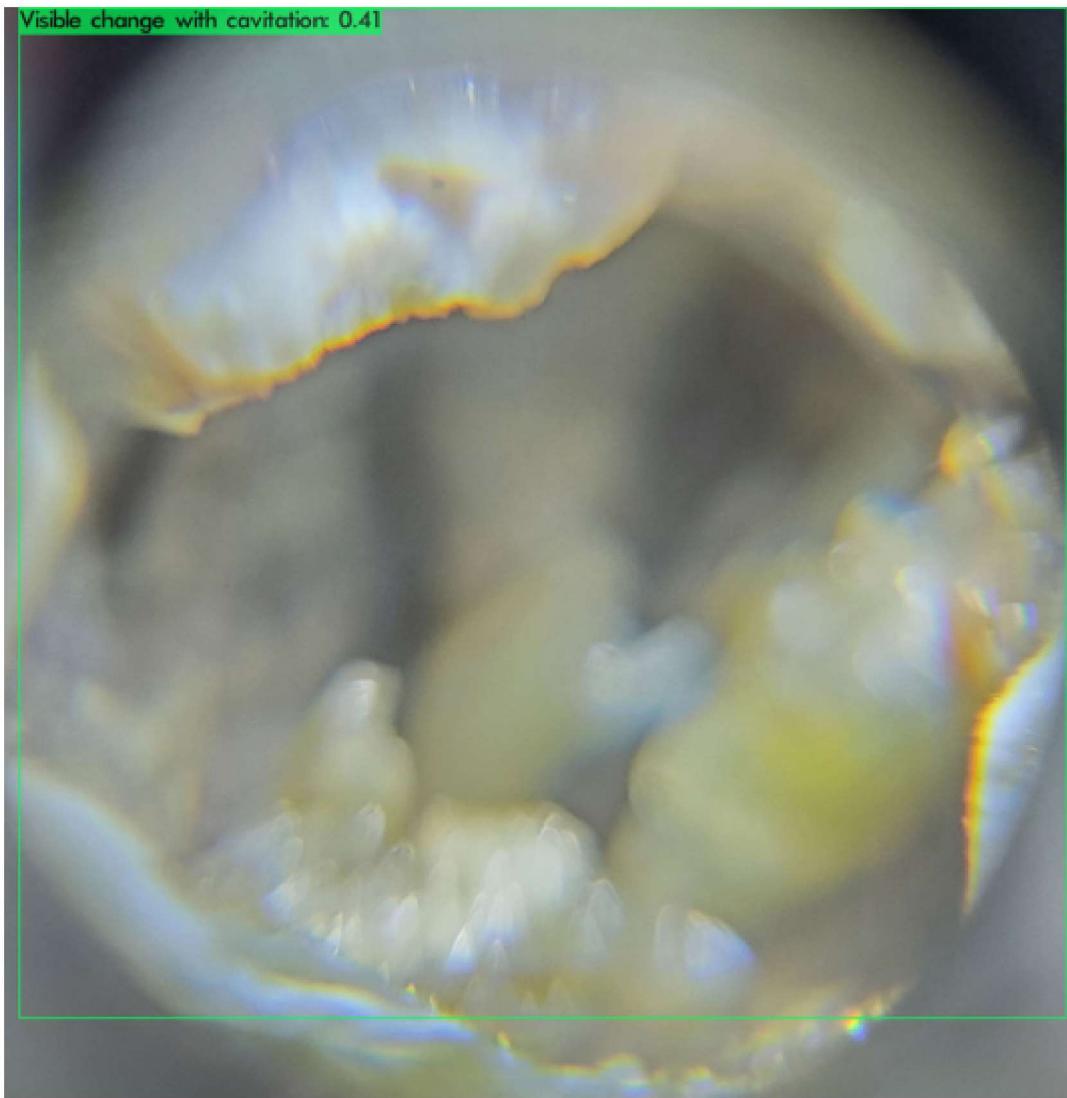
```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
    layer   filters   size/strd(dil)      input           output
    0 Create CUDA-stream - 0
Create cudnn-handle 0
conv    32      3 x 3/ 1     608 x 608 x   3 ->  608 x 608 x  32 0.639 BF
    1 conv    64      3 x 3/ 2     608 x 608 x  32 ->  304 x 304 x  64 3.407 BF
    2 conv    64      1 x 1/ 1     304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
    3 route   1                  ->  304 x 304 x  64
    4 conv    64      1 x 1/ 1     304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
    5 conv    32      1 x 1/ 1     304 x 304 x  64 ->  304 x 304 x  32 0.379 BF
    6 conv    64      3 x 3/ 1     304 x 304 x  32 ->  304 x 304 x  64 3.407 BF
    7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
    8 conv    64      1 x 1/ 1     304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
    9 route   8 2                  ->  304 x 304 x 128
    10 conv   64      1 x 1/ 1     304 x 304 x 128 ->  304 x 304 x  64 1.514 BF
    11 conv   128     3 x 3/ 2     304 x 304 x  64 ->  152 x 152 x 128 3.407 BF
    12 conv   64      1 x 1/ 1     152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
    13 route   11                  ->  152 x 152 x 128
    14 conv   64      1 x 1/ 1     152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
    15 conv   64      1 x 1/ 1     152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
    16 conv   64      3 x 3/ 1     152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
    17 Shortcut Layer: 14, wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
    18 conv   64      1 x 1/ 1     152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
    19 conv   64      3 x 3/ 1     152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
    20 Shortcut Layer: 17, wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
    21 conv   64      1 x 1/ 1     152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
    22 route   21 12                  ->  152 x 152 x 128
    23 conv   128     1 x 1/ 1     152 x 152 x 128 ->  152 x 152 x 128 0.757 BF
    24 conv   256     3 x 3/ 2     152 x 152 x 128 ->  76 x 76 x 256 3.407 BF
    25 conv   128     1 x 1/ 1     76 x 76 x 256 ->  76 x 76 x 128 0.379 BF
    26 route   24                  ->  76 x 76 x 256
    27 conv   128     1 x 1/ 1     76 x 76 x 256 ->  76 x 76 x 128 0.379 BF
    28 conv   128     1 x 1/ 1     76 x 76 x 128 ->  76 x 76 x 128 0.189 BF
    29 conv   128     3 x 3/ 1     76 x 76 x 128 ->  76 x 76 x 128 1.703 BF
    30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
    31 conv   128     1 x 1/ 1     76 x 76 x 128 ->  76 x 76 x 128 0.189 BF
    32 conv   128     3 x 3/ 1     76 x 76 x 128 ->  76 x 76 x 128 1.703 BF
    33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
    34 conv   128     1 x 1/ 1     76 x 76 x 128 ->  76 x 76 x 128 0.189 BF
    35 conv   128     3 x 3/ 1     76 x 76 x 128 ->  76 x 76 x 128 1.703 BF
    36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
    37 conv   128     1 x 1/ 1     76 x 76 x 128 ->  76 x 76 x 128 0.189 BF
    38 conv   128     3 x 3/ 1     76 x 76 x 128 ->  76 x 76 x 128 1.703 BF
    39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
    40 conv   128     1 x 1/ 1     76 x 76 x 128 ->  76 x 76 x 128 0.189 BF
    41 conv   128     3 x 3/ 1     76 x 76 x 128 ->  76 x 76 x 128 1.703 BF
    42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
    43 conv   128     1 x 1/ 1     76 x 76 x 128 ->  76 x 76 x 128 0.189 BF
    44 conv   128     3 x 3/ 1     76 x 76 x 128 ->  76 x 76 x 128 1.703 BF
```

45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 46 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 47 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 49 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 50 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 53 route 52 25 -> 76 x 76 x 256
 54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
 55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
 56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 57 route 55 -> 38 x 38 x 512
 58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF

layer	type	in	out	operations	
106	conv	1024	3 x 3 / 1	19 x 19 x 512 ->	
107	conv	512	1 x 1 / 1	19 x 19 x 1024 ->	
108	max		5x 5 / 1	19 x 19 x 512 ->	
109	route	107		-> 19 x 19 x 512	
110	max		9x 9 / 1	19 x 19 x 512 ->	
111	route	107		-> 19 x 19 x 512	
112	max		13x13 / 1	19 x 19 x 512 ->	
113	route	112 110 108 107		-> 19 x 19 x 2048	
114	conv	512	1 x 1 / 1	19 x 19 x 2048 ->	
115	conv	1024	3 x 3 / 1	19 x 19 x 512 ->	
116	conv	512	1 x 1 / 1	19 x 19 x 1024 ->	
117	conv	256	1 x 1 / 1	19 x 19 x 512 ->	
118	upsample		2x	19 x 19 x 256 ->	
119	route	85		38 x 38 x 256	
120	conv	256	1 x 1 / 1	38 x 38 x 512 ->	
121	route	120 118		-> 38 x 38 x 512	
122	conv	256	1 x 1 / 1	38 x 38 x 512 ->	
123	conv	512	3 x 3 / 1	38 x 38 x 256 ->	
124	conv	256	1 x 1 / 1	38 x 38 x 512 ->	
125	conv	512	3 x 3 / 1	38 x 38 x 256 ->	
126	conv	256	1 x 1 / 1	38 x 38 x 512 ->	
127	conv	128	1 x 1 / 1	38 x 38 x 256 ->	
128	upsample		2x	38 x 38 x 128 ->	
129	route	54		76 x 76 x 128	
130	conv	128	1 x 1 / 1	76 x 76 x 256 ->	
131	route	130 128		-> 76 x 76 x 256	
132	conv	128	1 x 1 / 1	76 x 76 x 256 ->	
133	conv	256	3 x 3 / 1	76 x 76 x 128 ->	
134	conv	128	1 x 1 / 1	76 x 76 x 256 ->	
135	conv	256	3 x 3 / 1	76 x 76 x 128 ->	
136	conv	128	1 x 1 / 1	76 x 76 x 256 ->	
137	conv	256	3 x 3 / 1	76 x 76 x 128 ->	
138	conv	24	1 x 1 / 1	76 x 76 x 256 ->	
139	yolo			76 x 76 x 24	
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedy_nms (1), beta = 0.600000					
140	route	136		-> 76 x 76 x 128	
141	conv	256	3 x 3 / 2	76 x 76 x 128 ->	
142	route	141 126		-> 38 x 38 x 512	
143	conv	256	1 x 1 / 1	38 x 38 x 512 ->	
144	conv	512	3 x 3 / 1	38 x 38 x 256 ->	
145	conv	256	1 x 1 / 1	38 x 38 x 512 ->	
146	conv	512	3 x 3 / 1	38 x 38 x 256 ->	
147	conv	256	1 x 1 / 1	38 x 38 x 512 ->	
148	conv	512	3 x 3 / 1	38 x 38 x 256 ->	
149	conv	24	1 x 1 / 1	38 x 38 x 512 ->	
150	yolo			38 x 38 x 24	
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedy_nms (1), beta = 0.600000					
151	route	147		-> 38 x 38 x 256	
152	conv	512	3 x 3 / 2	38 x 38 x 256 ->	
153	route	152 116		-> 19 x 19 x 1024	
154	conv	512	1 x 1 / 1	19 x 19 x 1024 ->	
155	conv	1024	3 x 3 / 1	19 x 19 x 512 ->	
156	conv	512	1 x 1 / 1	19 x 19 x 1024 ->	
157	conv	1024	3 x 3 / 1	19 x 19 x 512 ->	
158	conv	512	1 x 1 / 1	19 x 19 x 1024 ->	
159	conv	1024	3 x 3 / 1	19 x 19 x 512 ->	
160	conv	24	1 x 1 / 1	19 x 19 x 1024 ->	
161	volo			19 x 19 x 24	

```
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyNMS (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S10e/Figure 4.png: Predicted
Visible change with cavitation: 41%
Unable to init server: Could not connect: Connection refused
```

(predictions:7676): Gtk-WARNING **: 10:30:39.533: cannot open display:



```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer filters size/strd(dil) input output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv 32 3 x 3/ 1 608 x 608 x 3 -> 608 x 608 x 32 0.639 BF
1 conv 64 3 x 3/ 2 608 x 608 x 32 -> 304 x 304 x 64 3.407 BF
2 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
```

3 route 1 -> 304 x 304 x 64
 4 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
 5 conv 32 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 32 0.379 BF
 6 conv 64 3 x 3/ 1 304 x 304 x 32 -> 304 x 304 x 64 3.407 BF
 7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x 64 0.006 BF
 8 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
 9 route 8 2 -> 304 x 304 x 128
 10 conv 64 1 x 1/ 1 304 x 304 x 128 -> 304 x 304 x 64 1.514 BF
 11 conv 128 3 x 3/ 2 304 x 304 x 64 -> 152 x 152 x 128 3.407 BF
 12 conv 64 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 64 0.379 BF
 13 route 11 -> 152 x 152 x 128
 14 conv 64 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 64 0.379 BF
 15 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 16 conv 64 3 x 3/ 1 152 x 152 x 64 -> 152 x 152 x 64 1.703 BF
 17 Shortcut Layer: 14, wt = 0, wn = 0, outputs: 152 x 152 x 64 0.001 BF
 18 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 19 conv 64 3 x 3/ 1 152 x 152 x 64 -> 152 x 152 x 64 1.703 BF
 20 Shortcut Layer: 17, wt = 0, wn = 0, outputs: 152 x 152 x 64 0.001 BF
 21 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 22 route 21 12 -> 152 x 152 x 128
 23 conv 128 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
 24 conv 256 3 x 3/ 2 152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
 25 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 26 route 24 -> 76 x 76 x 256
 27 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 28 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 29 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 31 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 32 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 34 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 35 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 37 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 38 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 40 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 41 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 43 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 44 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 46 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 47 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 49 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 50 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 53 route 52 25 -> 76 x 76 x 256
 54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
 55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
 56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 57 route 55 -> 38 x 38 x 512
 58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF

63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 106 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 107 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 108 max 5x 5/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
 109 route 107 -> 19 x 19 x 512
 110 max 9x 9/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.015 BF
 111 route 107 -> 19 x 19 x 512
 112 max 13x13/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.031 BF
 113 route 112 110 108 107 -> 19 x 19 x 2048
 114 conv 512 1 x 1/ 1 19 x 19 x 2048 -> 19 x 19 x 512 0.757 BF
 115 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 116 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 117 conv 256 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 256 0.095 BF
 118 upsample 2x 19 x 19 x 256 -> 38 x 38 x 256
 119 route 85 -> 38 x 38 x 512
 120 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 121 route 120 118 -> 38 x 38 x 512
 122 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 123 -> 38 x 38 x 512 0.379 BF

```

123 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.40/ BF
124 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
125 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
126 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
127 conv    128      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 128 0.095 BF
128 upsample          2x      38 x 38 x 128 -> 76 x 76 x 128
129 route   54                  -> 76 x 76 x 256
130 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
131 route   130 128          -> 76 x 76 x 256
132 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
133 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
134 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
135 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
136 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
137 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
138 conv    24       1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 24 0.071 BF
139 yolo

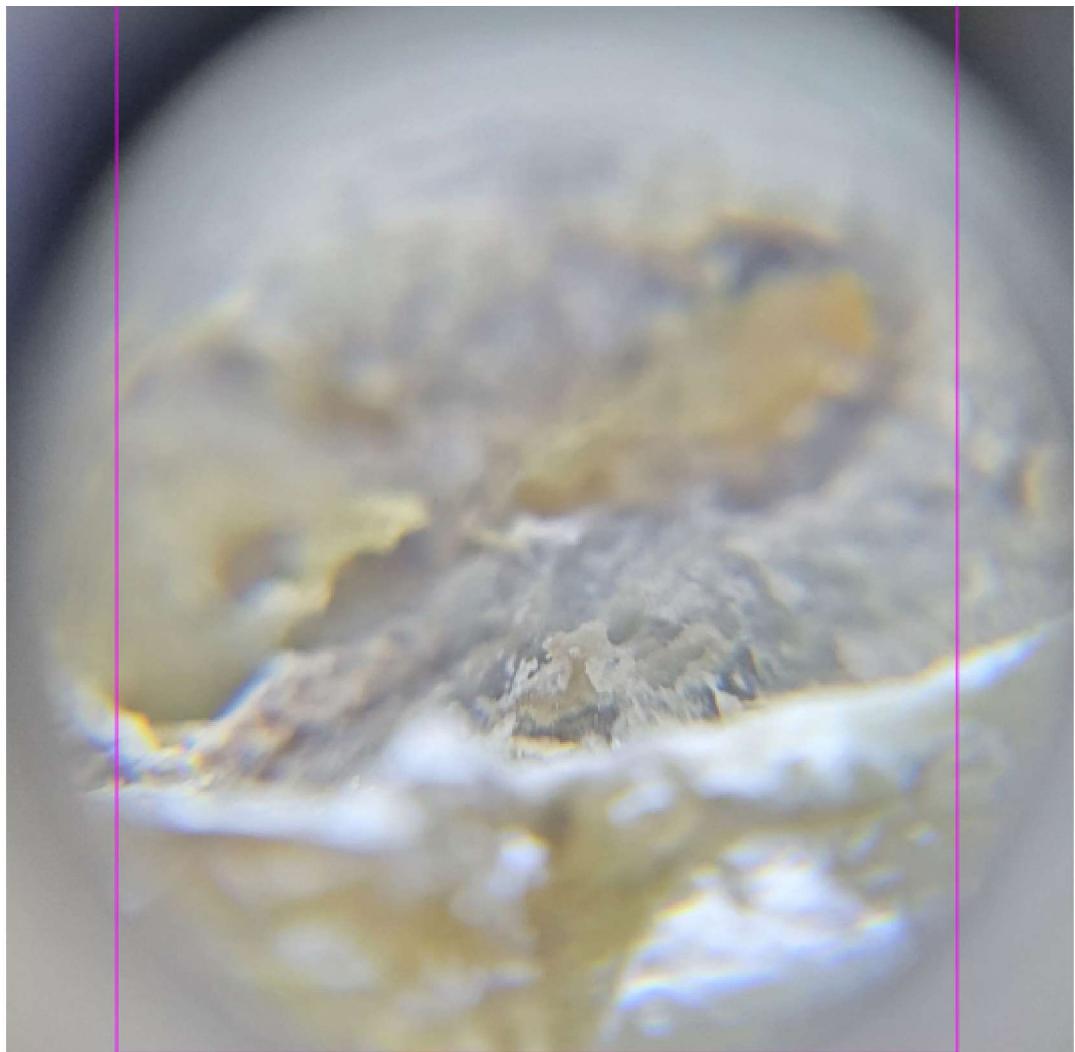
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route   136          -> 76 x 76 x 128
141 conv    256      3 x 3/ 2      76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route   141 126          -> 38 x 38 x 512
143 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route   147          -> 38 x 38 x 256
152 conv    512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route   152 116          -> 19 x 19 x1024
154 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S10e/Figure 5.png: Predicted
Visible change without cavitation: 86%
Unable to init server: Could not connect: Connection refused

(predictions:7690): Gtk-WARNING **: 10:30:48.819: cannot open display:
Visible change without cavitation: 0.86

```



```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer filters size/strd(dil)      input                  output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv    32      3 x 3/ 1      608 x 608 x   3 ->  608 x 608 x  32 0.639 BF
1 conv    64      3 x 3/ 2      608 x 608 x  32 ->  304 x 304 x  64 3.407 BF
2 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
3 route   1                   ->  304 x 304 x  64
4 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
5 conv    32      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  32 0.379 BF
6 conv    64      3 x 3/ 1      304 x 304 x  32 ->  304 x 304 x  64 3.407 BF
7 Shortcut Layer: 4,  wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
8 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
9 route   8 2                   ->  304 x 304 x 128
10 conv   64      1 x 1/ 1      304 x 304 x 128 ->  304 x 304 x  64 1.514 BF
11 conv   128     3 x 3/ 2      304 x 304 x  64 ->  152 x 152 x 128 3.407 BF
12 conv   64      1 x 1/ 1      152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
13 route  11                   ->  152 x 152 x 128
14 conv   64      1 x 1/ 1      152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
15 conv   64      1 x 1/ 1      152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
16 conv   64      3 x 3/ 1      152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
17 Shortcut Layer: 14,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
18 conv   64      1 x 1/ 1      152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
19 conv   64      3 x 3/ 1      152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
20 Shortcut Layer: 17.  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
```

21	conv	64	1 x 1 / 1	152 x 152 x 64	->	152 x 152 x 64	0.189	BF
22	route	21 12			->	152 x 152 x 128		
23	conv	128	1 x 1 / 1	152 x 152 x 128	->	152 x 152 x 128	0.757	BF
24	conv	256	3 x 3 / 2	152 x 152 x 128	->	76 x 76 x 256	3.407	BF
25	conv	128	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
26	route	24			->	76 x 76 x 256		
27	conv	128	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
28	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
29	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
30	Shortcut Layer:	27, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
31	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
32	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
33	Shortcut Layer:	30, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
34	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
35	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
36	Shortcut Layer:	33, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
37	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
38	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
39	Shortcut Layer:	36, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
40	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
41	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
42	Shortcut Layer:	39, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
43	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
44	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
45	Shortcut Layer:	42, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
46	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
47	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
48	Shortcut Layer:	45, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
49	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
50	conv	128	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 128	1.703	BF
51	Shortcut Layer:	48, wt = 0, wn = 0, outputs:		76 x 76 x 128	0.001	BF		
52	conv	128	1 x 1 / 1	76 x 76 x 128	->	76 x 76 x 128	0.189	BF
53	route	52 25			->	76 x 76 x 256		
54	conv	256	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 256	0.757	BF
55	conv	512	3 x 3 / 2	76 x 76 x 256	->	38 x 38 x 512	3.407	BF
56	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
57	route	55			->	38 x 38 x 512		
58	conv	256	1 x 1 / 1	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
59	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
60	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
61	Shortcut Layer:	58, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
62	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
63	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
64	Shortcut Layer:	61, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
65	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
66	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
67	Shortcut Layer:	64, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
68	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
69	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
70	Shortcut Layer:	67, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
71	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
72	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
73	Shortcut Layer:	70, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
74	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
75	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
76	Shortcut Layer:	73, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
77	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
78	conv	256	3 x 3 / 1	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
79	Shortcut Layer:	76, wt = 0, wn = 0, outputs:		38 x 38 x 256	0.000	BF		
80	conv	256	1 x 1 / 1	38 x 38 x 256	->	38 x 38 x 256	0.189	BF

81	conv	256	3 x 3/ 1	38 x 38 x 256 ->	38 x 38 x 256 1.703 BF
82	Shortcut Layer:	79,	wt = 0, wn = 0, outputs:	38 x 38 x 256 0.000 BF	
83	conv	256	1 x 1/ 1	38 x 38 x 256 ->	38 x 38 x 256 0.189 BF
84	route	83 56		->	38 x 38 x 512
85	conv	512	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 512 0.757 BF
86	conv	1024	3 x 3/ 2	38 x 38 x 512 ->	19 x 19 x 1024 3.407 BF
87	conv	512	1 x 1/ 1	19 x 19 x 1024 ->	19 x 19 x 512 0.379 BF
88	route	86		->	19 x 19 x 1024
89	conv	512	1 x 1/ 1	19 x 19 x 1024 ->	19 x 19 x 512 0.379 BF
90	conv	512	1 x 1/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
91	conv	512	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x 512 1.703 BF
92	Shortcut Layer:	89,	wt = 0, wn = 0, outputs:	19 x 19 x 512 0.000 BF	
93	conv	512	1 x 1/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
94	conv	512	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x 512 1.703 BF
95	Shortcut Layer:	92,	wt = 0, wn = 0, outputs:	19 x 19 x 512 0.000 BF	
96	conv	512	1 x 1/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
97	conv	512	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x 512 1.703 BF
98	Shortcut Layer:	95,	wt = 0, wn = 0, outputs:	19 x 19 x 512 0.000 BF	
99	conv	512	1 x 1/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
100	conv	512	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x 512 1.703 BF
101	Shortcut Layer:	98,	wt = 0, wn = 0, outputs:	19 x 19 x 512 0.000 BF	
102	conv	512	1 x 1/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.189 BF
103	route	102 87		->	19 x 19 x 1024
104	conv	1024	1 x 1/ 1	19 x 19 x 1024 ->	19 x 19 x 1024 0.757 BF
105	conv	512	1 x 1/ 1	19 x 19 x 1024 ->	19 x 19 x 512 0.379 BF
106	conv	1024	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x 1024 3.407 BF
107	conv	512	1 x 1/ 1	19 x 19 x 1024 ->	19 x 19 x 512 0.379 BF
108	max		5x 5/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.005 BF
109	route	107		->	19 x 19 x 512
110	max		9x 9/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.015 BF
111	route	107		->	19 x 19 x 512
112	max		13x13/ 1	19 x 19 x 512 ->	19 x 19 x 512 0.031 BF
113	route	112 110 108 107		->	19 x 19 x 2048
114	conv	512	1 x 1/ 1	19 x 19 x 2048 ->	19 x 19 x 512 0.757 BF
115	conv	1024	3 x 3/ 1	19 x 19 x 512 ->	19 x 19 x 1024 3.407 BF
116	conv	512	1 x 1/ 1	19 x 19 x 1024 ->	19 x 19 x 512 0.379 BF
117	conv	256	1 x 1/ 1	19 x 19 x 512 ->	19 x 19 x 256 0.095 BF
118	upsample		2x	19 x 19 x 256 ->	38 x 38 x 256
119	route	85		->	38 x 38 x 512
120	conv	256	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
121	route	120 118		->	38 x 38 x 512
122	conv	256	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
123	conv	512	3 x 3/ 1	38 x 38 x 256 ->	38 x 38 x 512 3.407 BF
124	conv	256	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
125	conv	512	3 x 3/ 1	38 x 38 x 256 ->	38 x 38 x 512 3.407 BF
126	conv	256	1 x 1/ 1	38 x 38 x 512 ->	38 x 38 x 256 0.379 BF
127	conv	128	1 x 1/ 1	38 x 38 x 256 ->	38 x 38 x 128 0.095 BF
128	upsample		2x	38 x 38 x 128 ->	76 x 76 x 128
129	route	54		->	76 x 76 x 256
130	conv	128	1 x 1/ 1	76 x 76 x 256 ->	76 x 76 x 128 0.379 BF
131	route	130 128		->	76 x 76 x 256
132	conv	128	1 x 1/ 1	76 x 76 x 256 ->	76 x 76 x 128 0.379 BF
133	conv	256	3 x 3/ 1	76 x 76 x 128 ->	76 x 76 x 256 3.407 BF
134	conv	128	1 x 1/ 1	76 x 76 x 256 ->	76 x 76 x 128 0.379 BF
135	conv	256	3 x 3/ 1	76 x 76 x 128 ->	76 x 76 x 256 3.407 BF
136	conv	128	1 x 1/ 1	76 x 76 x 256 ->	76 x 76 x 128 0.379 BF
137	conv	256	3 x 3/ 1	76 x 76 x 128 ->	76 x 76 x 256 3.407 BF
138	conv	24	1 x 1/ 1	76 x 76 x 256 ->	76 x 76 x 24 0.071 BF
139	yolo				

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d

```

nms_kind: greedyNMS (1), beta = 0.600000
140 route 136                                     -> 76 x 76 x 128
141 conv 256      3 x 3/ 2       76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route 141 126                                -> 38 x 38 x 512
143 conv 256      1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv 512      3 x 3/ 1       38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv 256      1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv 512      3 x 3/ 1       38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv 256      1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv 512      3 x 3/ 1       38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv 24       1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyNMS (1), beta = 0.600000
151 route 147                                     -> 38 x 38 x 256
152 conv 512      3 x 3/ 2       38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route 152 116                                -> 19 x 19 x 1024
154 conv 512      1 x 1/ 1       19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
155 conv 1024     3 x 3/ 1       19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
156 conv 512      1 x 1/ 1       19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
157 conv 1024     3 x 3/ 1       19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
158 conv 512      1 x 1/ 1       19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
159 conv 1024     3 x 3/ 1       19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
160 conv 24       1 x 1/ 1       19 x 19 x 1024 -> 19 x 19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyNMS (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28

!./darknet detector test data/obj.data cfg/yolov4-custom.cfg /mydrive/yolov4/training/yolc
imShow('predictions.jpg')

```

```

CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
    layer   filters   size/strd(dil)      input           output
    0 Create CUDA-stream - 0
Create cudnn-handle 0
conv    32      3 x 3/ 1     608 x 608 x   3 -> 608 x 608 x  32 0.639 BF
1 conv    64      3 x 3/ 2     608 x 608 x  32 -> 304 x 304 x  64 3.407 BF
2 conv    64      1 x 1/ 1     304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
3 route   1                  -> 304 x 304 x  64
4 conv    64      1 x 1/ 1     304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
5 conv    32      1 x 1/ 1     304 x 304 x  64 -> 304 x 304 x  32 0.379 BF
6 conv    64      3 x 3/ 1     304 x 304 x  32 -> 304 x 304 x  64 3.407 BF
7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
8 conv    64      1 x 1/ 1     304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
9 route   8 2                  -> 304 x 304 x 128
10 conv   64      1 x 1/ 1     304 x 304 x 128 -> 304 x 304 x  64 1.514 BF
11 conv   128     3 x 3/ 2     304 x 304 x  64 -> 152 x 152 x 128 3.407 BF
12 conv   64      1 x 1/ 1     152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
13 route   11                 -> 152 x 152 x 128
14 conv   64      1 x 1/ 1     152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
15 conv   64      1 x 1/ 1     152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
16 conv   64      3 x 3/ 1     152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
17 Shortcut Layer: 14, wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
18 conv   64      1 x 1/ 1     152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
19 conv   64      3 x 3/ 1     152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
20 Shortcut Layer: 17, wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
21 conv   64      1 x 1/ 1     152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
22 route  21 12                 -> 152 x 152 x 128
23 conv   128     1 x 1/ 1     152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
24 conv   256     3 x 3/ 2     152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
25 conv   128     1 x 1/ 1     76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
26 route   24                 -> 76 x 76 x 256
27 conv   128     1 x 1/ 1     76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
28 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
29 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
31 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
32 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
34 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
35 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
37 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
38 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
40 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
41 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
43 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
44 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
46 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
47 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
49 conv   128     1 x 1/ 1     76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
50 conv   128     3 x 3/ 1     76 x 76 x 128 -> 76 x 76 x 128 1.703 BF

```

51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 53 route 52 25 -> 76 x 76 x 256
 54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
 55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
 56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 57 route 55 -> 38 x 38 x 512
 58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 106 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 107 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 108 max 5x 5/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
 109 route 107 -> 19 x 19 x 512
 110 max 9x 9/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.015 BF

```

111 route 107
112 max           13x13/ 1      19 x   19 x 512 -> 19 x   19 x 512 0.031 BF
113 route 112 110 108 107
114 conv    512      1 x 1/ 1      19 x   19 x 2048 -> 19 x   19 x 512 0.757 BF
115 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
116 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
117 conv    256      1 x 1/ 1      19 x   19 x 512 -> 19 x   19 x 256 0.095 BF
118 upsample
119 route 85
120 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
121 route 120 118
122 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
123 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
124 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
125 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
126 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
127 conv    128      1 x 1/ 1      38 x   38 x 256 -> 38 x   38 x 128 0.095 BF
128 upsample
129 route 54
130 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
131 route 130 128
132 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
133 conv    256      3 x 3/ 1      76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
134 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
135 conv    256      3 x 3/ 1      76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
136 conv    128      1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 128 0.379 BF
137 conv    256      3 x 3/ 1      76 x   76 x 128 -> 76 x   76 x 256 3.407 BF
138 conv    24       1 x 1/ 1      76 x   76 x 256 -> 76 x   76 x 24 0.071 BF
139 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route 136
141 conv    256      3 x 3/ 2      76 x   76 x 128 -> 38 x   38 x 256 0.852 BF
142 route 141 126
143 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
144 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
145 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
146 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x   38 x 256 -> 38 x   38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x   38 x 512 -> 38 x   38 x 24 0.035 BF
150 yolo

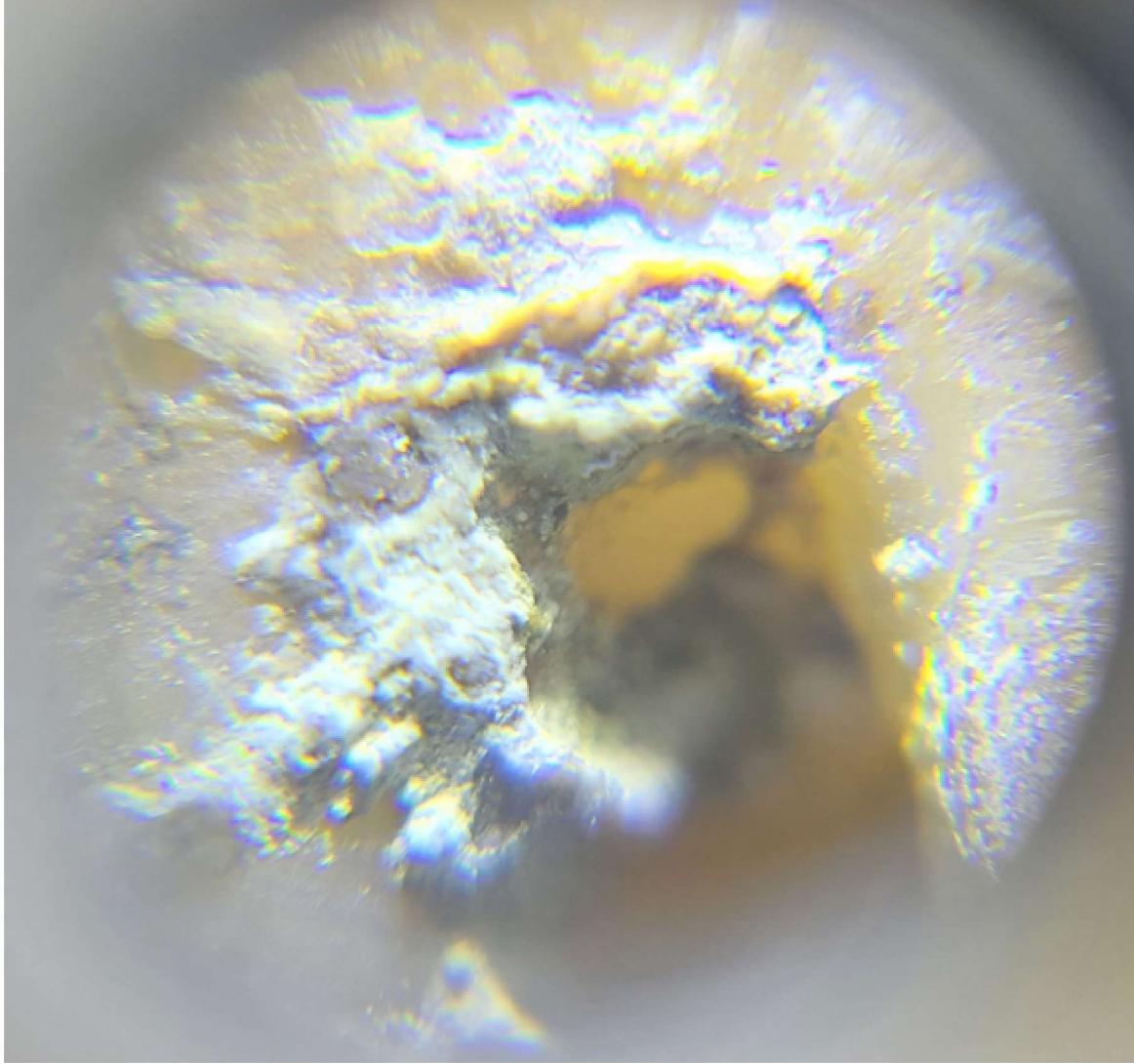
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route 147
152 conv    512      3 x 3/ 2      38 x   38 x 256 -> 19 x   19 x 512 0.852 BF
153 route 152 116
154 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x   19 x 512 -> 19 x   19 x 1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x   19 x 1024 -> 19 x   19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB

```

```
Loading weights from /myarive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S20/Figure 1.png: Predicted i
Unable to init server: Could not connect: Connection refused
```

```
(predictions:7720): Gtk-WARNING **: 10:31:11.902: cannot open display:
```



```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer filters size/strd(dil)      input           output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv    32      3 x 3/ 1      608 x 608 x   3 ->  608 x 608 x  32 0.639 BF
1 conv    64      3 x 3/ 2      608 x 608 x  32 ->  304 x 304 x  64 3.407 BF
2 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
3 route  1          ->  304 x 304 x  64
4 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
5 conv    32      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  32 0.379 BF
6 conv    64      3 x 3/ 1      304 x 304 x  32 ->  304 x 304 x  64 3.407 BF
7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
8 conv    64      1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
9 route  0          ->  304 x 304 x  120
```

#	route	op	size	input	output	op	size	input	output
10	conv	64	1 x 1/ 1	304 x 304 x 128	->	304	x 304	x 64	1.514 BF
11	conv	128	3 x 3/ 2	304 x 304 x 64	->	152	x 152	x 128	3.407 BF
12	conv	64	1 x 1/ 1	152 x 152 x 128	->	152	x 152	x 64	0.379 BF
13	route	11			->	152	x 152	x 128	
14	conv	64	1 x 1/ 1	152 x 152 x 128	->	152	x 152	x 64	0.379 BF
15	conv	64	1 x 1/ 1	152 x 152 x 64	->	152	x 152	x 64	0.189 BF
16	conv	64	3 x 3/ 1	152 x 152 x 64	->	152	x 152	x 64	1.703 BF
17	Shortcut Layer:	14, wt = 0, wn = 0, outputs:	152 x 152 x 64	0.001 BF					
18	conv	64	1 x 1/ 1	152 x 152 x 64	->	152	x 152	x 64	0.189 BF
19	conv	64	3 x 3/ 1	152 x 152 x 64	->	152	x 152	x 64	1.703 BF
20	Shortcut Layer:	17, wt = 0, wn = 0, outputs:	152 x 152 x 64	0.001 BF					
21	conv	64	1 x 1/ 1	152 x 152 x 64	->	152	x 152	x 64	0.189 BF
22	route	21 12			->	152	x 152	x 128	
23	conv	128	1 x 1/ 1	152 x 152 x 128	->	152	x 152	x 128	0.757 BF
24	conv	256	3 x 3/ 2	152 x 152 x 128	->	76	x 76	x 256	3.407 BF
25	conv	128	1 x 1/ 1	76 x 76 x 256	->	76	x 76	x 128	0.379 BF
26	route	24			->	76	x 76	x 256	
27	conv	128	1 x 1/ 1	76 x 76 x 256	->	76	x 76	x 128	0.379 BF
28	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
29	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
30	Shortcut Layer:	27, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
31	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
32	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
33	Shortcut Layer:	30, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
34	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
35	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
36	Shortcut Layer:	33, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
37	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
38	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
39	Shortcut Layer:	36, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
40	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
41	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
42	Shortcut Layer:	39, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
43	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
44	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
45	Shortcut Layer:	42, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
46	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
47	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
48	Shortcut Layer:	45, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
49	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
50	conv	128	3 x 3/ 1	76 x 76 x 128	->	76	x 76	x 128	1.703 BF
51	Shortcut Layer:	48, wt = 0, wn = 0, outputs:	76 x 76 x 128	0.001 BF					
52	conv	128	1 x 1/ 1	76 x 76 x 128	->	76	x 76	x 128	0.189 BF
53	route	52 25			->	76	x 76	x 256	
54	conv	256	1 x 1/ 1	76 x 76 x 256	->	76	x 76	x 256	0.757 BF
55	conv	512	3 x 3/ 2	76 x 76 x 256	->	38	x 38	x 512	3.407 BF
56	conv	256	1 x 1/ 1	38 x 38 x 512	->	38	x 38	x 256	0.379 BF
57	route	55			->	38	x 38	x 512	
58	conv	256	1 x 1/ 1	38 x 38 x 512	->	38	x 38	x 256	0.379 BF
59	conv	256	1 x 1/ 1	38 x 38 x 256	->	38	x 38	x 256	0.189 BF
60	conv	256	3 x 3/ 1	38 x 38 x 256	->	38	x 38	x 256	1.703 BF
61	Shortcut Layer:	58, wt = 0, wn = 0, outputs:	38 x 38 x 256	0.000 BF					
62	conv	256	1 x 1/ 1	38 x 38 x 256	->	38	x 38	x 256	0.189 BF
63	conv	256	3 x 3/ 1	38 x 38 x 256	->	38	x 38	x 256	1.703 BF
64	Shortcut Layer:	61, wt = 0, wn = 0, outputs:	38 x 38 x 256	0.000 BF					
65	conv	256	1 x 1/ 1	38 x 38 x 256	->	38	x 38	x 256	0.189 BF
66	conv	256	3 x 3/ 1	38 x 38 x 256	->	38	x 38	x 256	1.703 BF
67	Shortcut Layer:	64, wt = 0, wn = 0, outputs:	38 x 38 x 256	0.000 BF					
68	conv	256	1 x 1/ 1	38 x 38 x 256	->	38	x 38	x 256	0.189 BF
69	conv	256	3 x 3/ 1	38 x 38 x 256	->	38	x 38	x 256	1.703 BF

```

70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
84 route 83 56 -> 38 x 38 x 512
85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x1024 3.407 BF
87 conv 512 1 x 1/ 1 19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
88 route 86 -> 19 x 19 x1024
89 conv 512 1 x 1/ 1 19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
103 route 102 87 -> 19 x 19 x1024
104 conv 1024 1 x 1/ 1 19 x 19 x1024 -> 19 x 19 x1024 0.757 BF
105 conv 512 1 x 1/ 1 19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
106 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
107 conv 512 1 x 1/ 1 19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
108 max 5x 5/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
109 route 107 -> 19 x 19 x 512
110 max 9x 9/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.015 BF
111 route 107 -> 19 x 19 x 512
112 max 13x13/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.031 BF
113 route 112 110 108 107 -> 19 x 19 x2048
114 conv 512 1 x 1/ 1 19 x 19 x2048 -> 19 x 19 x 512 0.757 BF
115 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
116 conv 512 1 x 1/ 1 19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
117 conv 256 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 256 0.095 BF
118 upsample 2x 19 x 19 x 256 -> 38 x 38 x 256
119 route 85 -> 38 x 38 x 512
120 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
121 route 120 118 -> 38 x 38 x 512
122 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
123 conv 512 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
124 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
125 conv 512 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
126 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
127 conv 128 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 128 0.095 BF
128 upsample 2x 38 x 38 x 128 -> 76 x 76 x 128
129 route 54 -> 76 x 76 x 256

```

```

130 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
131 route   130 128
132 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
133 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
134 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
135 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
136 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
137 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
138 conv    24       1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 24 0.071 BF
139 yolo

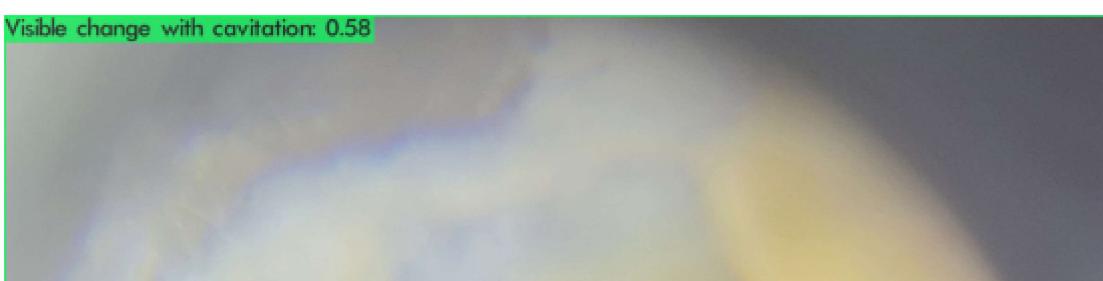
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route   136
141 conv    256      3 x 3/ 2      76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route   141 126
143 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo

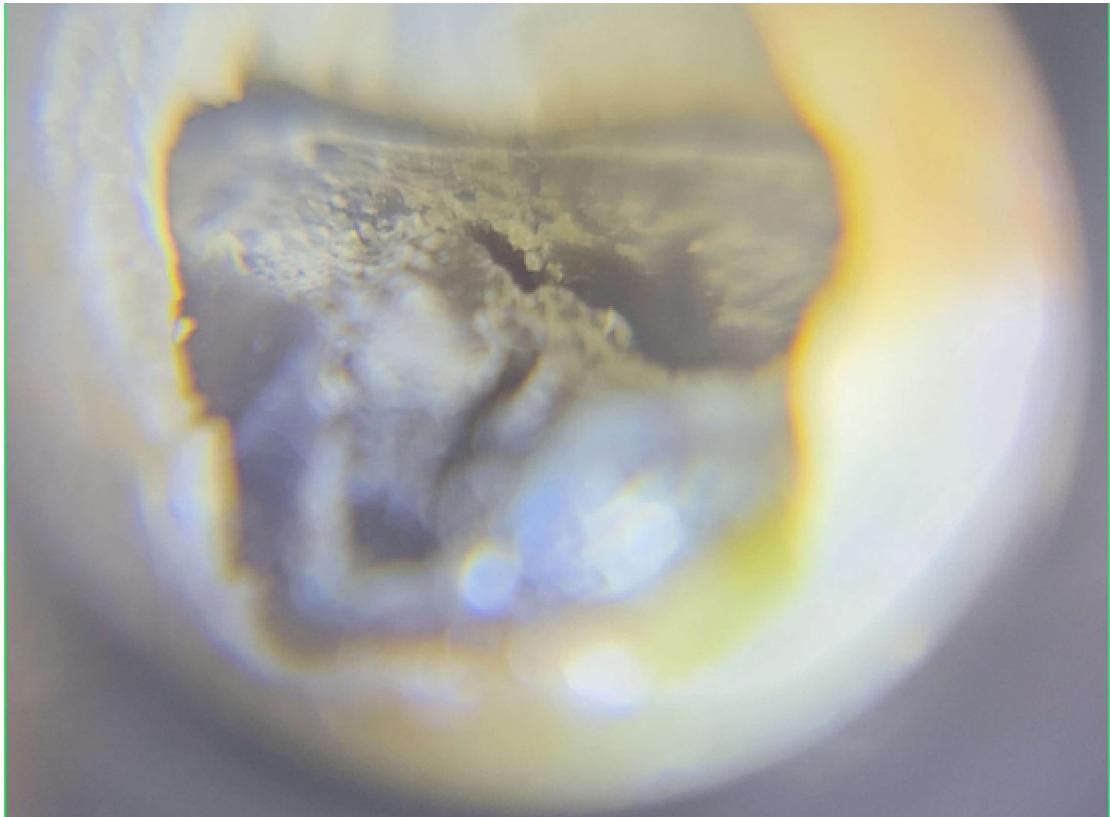
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route   147
152 conv    512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route   152 116
154 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x 19 x 1024 -> 19 x 19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S20/Figure 2.png: Predicted i
Visible change with cavitation: 58%
Unable to init server: Could not connect: Connection refused

(predictions:7734): Gtk-WARNING **: 10:31:19.916: cannot open display:
Visible change with cavitation: 0.58

```





```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
 0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer   filters   size/strd(dil)      input           output
 0 Create CUDA-stream - 0
Create cudnn-handle 0
conv     32       3 x 3/ 1      608 x 608 x    3 ->  608 x 608 x  32 0.639 BF
  1 conv     64       3 x 3/ 2      608 x 608 x  32 ->  304 x 304 x  64 3.407 BF
  2 conv     64       1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
  3 route   1                   ->  304 x 304 x  64
  4 conv     64       1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
  5 conv     32       1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  32 0.379 BF
  6 conv     64       3 x 3/ 1      304 x 304 x  32 ->  304 x 304 x  64 3.407 BF
  7 Shortcut Layer: 4,  wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
  8 conv     64       1 x 1/ 1      304 x 304 x  64 ->  304 x 304 x  64 0.757 BF
  9 route   8 2                   ->  304 x 304 x 128
 10 conv    64       1 x 1/ 1      304 x 304 x 128 ->  304 x 304 x  64 1.514 BF
 11 conv    128      3 x 3/ 2      304 x 304 x  64 ->  152 x 152 x 128 3.407 BF
 12 conv    64       1 x 1/ 1      152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
 13 route   11                  ->  152 x 152 x 128
 14 conv    64       1 x 1/ 1      152 x 152 x 128 ->  152 x 152 x  64 0.379 BF
 15 conv    64       1 x 1/ 1      152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
 16 conv    64       3 x 3/ 1      152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
 17 Shortcut Layer: 14,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
 18 conv    64       1 x 1/ 1      152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
 19 conv    64       3 x 3/ 1      152 x 152 x  64 ->  152 x 152 x  64 1.703 BF
 20 Shortcut Layer: 17,  wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
 21 conv    64       1 x 1/ 1      152 x 152 x  64 ->  152 x 152 x  64 0.189 BF
 22 route   21 12                  ->  152 x 152 x 128
 23 conv    128      1 x 1/ 1      152 x 152 x 128 ->  152 x 152 x 128 0.757 BF
 24 conv    256      3 x 3/ 2      152 x 152 x 128 ->  76 x  76 x 256 3.407 BF
 25 conv    128      1 x 1/ 1      76 x  76 x 256 ->  76 x  76 x 128 0.379 BF
 26 route   24                  ->  76 x  76 x 256
 27          100      1 x 1/ 1      76      76      256      ->  76      76      100 0.379 BF
```

```

27 conv    128      1 x 1/ 1      /6 x   /6 x 256 ->   /6 x   /6 x 128 0.3/9 BF
28 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
29 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
31 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
32 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
34 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
35 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
37 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
38 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
40 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
41 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
43 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
44 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
46 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
47 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
49 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
50 conv    128      3 x 3/ 1      76 x   76 x 128 ->   76 x   76 x 128 1.703 BF
51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
52 conv    128      1 x 1/ 1      76 x   76 x 128 ->   76 x   76 x 128 0.189 BF
53 route   52 25                               ->   76 x 76 x 256
54 conv    256      1 x 1/ 1      76 x   76 x 256 ->   76 x   76 x 256 0.757 BF
55 conv    512      3 x 3/ 2      76 x   76 x 256 ->   38 x   38 x 512 3.407 BF
56 conv    256      1 x 1/ 1      38 x   38 x 512 ->   38 x   38 x 256 0.379 BF
57 route   55                               ->   38 x 38 x 512
58 conv    256      1 x 1/ 1      38 x   38 x 512 ->   38 x   38 x 256 0.379 BF
59 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
60 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
62 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
63 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
65 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
66 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
68 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
69 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
71 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
72 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
74 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
75 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
77 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
78 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
80 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
81 conv    256      3 x 3/ 1      38 x   38 x 256 ->   38 x   38 x 256 1.703 BF
82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
83 conv    256      1 x 1/ 1      38 x   38 x 256 ->   38 x   38 x 256 0.189 BF
84 route   83 56                               ->   38 x 38 x 512
85 conv    512      1 x 1/ 1      38 x   38 x 512 ->   38 x   38 x 512 0.757 BF
86 conv    1024     3 x 3/ 2      38 x   38 x 512 ->   19 x   19 x 1024 3.407 BF
87 conv    512      1 x 1/ 1      19 x   19 x 1024 ->   19 x   19 x 512 0.379 RF

```

Op	Conv	Route	Input	Kernel	Stride	Output	Operations	Memory	Time
88	route	86					->	19 x 19 x 512 0.000 BF	
89	conv	512	1 x 1/ 1	19 x 19 x 1024	1	->	19 x 19 x 512 0.379 BF		
90	conv	512	1 x 1/ 1	19 x 19 x 512	1	->	19 x 19 x 512 0.189 BF		
91	conv	512	3 x 3/ 1	19 x 19 x 512	1	->	19 x 19 x 512 1.703 BF		
92	Shortcut Layer:	89, wt = 0, wn = 0, outputs: 98	19 x 19 x 512	0.000	BF				
93	conv	512	1 x 1/ 1	19 x 19 x 512	1	->	19 x 19 x 512 0.189 BF		
94	conv	512	3 x 3/ 1	19 x 19 x 512	1	->	19 x 19 x 512 1.703 BF		
95	Shortcut Layer:	92, wt = 0, wn = 0, outputs: 95	19 x 19 x 512	0.000	BF				
96	conv	512	1 x 1/ 1	19 x 19 x 512	1	->	19 x 19 x 512 0.189 BF		
97	conv	512	3 x 3/ 1	19 x 19 x 512	1	->	19 x 19 x 512 1.703 BF		
98	Shortcut Layer:	95, wt = 0, wn = 0, outputs: 101	19 x 19 x 512	0.000	BF				
99	conv	512	1 x 1/ 1	19 x 19 x 512	1	->	19 x 19 x 512 0.189 BF		
100	conv	512	3 x 3/ 1	19 x 19 x 512	1	->	19 x 19 x 512 1.703 BF		
101	Shortcut Layer:	98, wt = 0, wn = 0, outputs: 102	19 x 19 x 512	0.000	BF				
102	conv	512	1 x 1/ 1	19 x 19 x 512	1	->	19 x 19 x 512 0.189 BF		
103	route	102 87				->	19 x 19 x 1024		
104	conv	1024	1 x 1/ 1	19 x 19 x 1024	1	->	19 x 19 x 1024 0.757 BF		
105	conv	512	1 x 1/ 1	19 x 19 x 1024	1	->	19 x 19 x 512 0.379 BF		
106	conv	1024	3 x 3/ 1	19 x 19 x 512	1	->	19 x 19 x 1024 3.407 BF		
107	conv	512	1 x 1/ 1	19 x 19 x 1024	1	->	19 x 19 x 512 0.379 BF		
108	max		5x 5/ 1	19 x 19 x 512	1	->	19 x 19 x 512 0.005 BF		
109	route	107				->	19 x 19 x 512		
110	max		9x 9/ 1	19 x 19 x 512	1	->	19 x 19 x 512 0.015 BF		
111	route	107				->	19 x 19 x 512		
112	max		13x13/ 1	19 x 19 x 512	1	->	19 x 19 x 512 0.031 BF		
113	route	112 110 108 107				->	19 x 19 x 2048		
114	conv	512	1 x 1/ 1	19 x 19 x 2048	1	->	19 x 19 x 512 0.757 BF		
115	conv	1024	3 x 3/ 1	19 x 19 x 512	1	->	19 x 19 x 1024 3.407 BF		
116	conv	512	1 x 1/ 1	19 x 19 x 1024	1	->	19 x 19 x 512 0.379 BF		
117	conv	256	1 x 1/ 1	19 x 19 x 512	1	->	19 x 19 x 256 0.095 BF		
118	upsample		2x	19 x 19 x 256	1	->	38 x 38 x 256		
119	route	85				->	38 x 38 x 512		
120	conv	256	1 x 1/ 1	38 x 38 x 512	1	->	38 x 38 x 256 0.379 BF		
121	route	120 118				->	38 x 38 x 512		
122	conv	256	1 x 1/ 1	38 x 38 x 512	1	->	38 x 38 x 256 0.379 BF		
123	conv	512	3 x 3/ 1	38 x 38 x 256	1	->	38 x 38 x 512 3.407 BF		
124	conv	256	1 x 1/ 1	38 x 38 x 512	1	->	38 x 38 x 256 0.379 BF		
125	conv	512	3 x 3/ 1	38 x 38 x 256	1	->	38 x 38 x 512 3.407 BF		
126	conv	256	1 x 1/ 1	38 x 38 x 512	1	->	38 x 38 x 256 0.379 BF		
127	conv	128	1 x 1/ 1	38 x 38 x 256	1	->	38 x 38 x 128 0.095 BF		
128	upsample		2x	38 x 38 x 128	1	->	76 x 76 x 128		
129	route	54				->	76 x 76 x 256		
130	conv	128	1 x 1/ 1	76 x 76 x 256	1	->	76 x 76 x 128 0.379 BF		
131	route	130 128				->	76 x 76 x 256		
132	conv	128	1 x 1/ 1	76 x 76 x 256	1	->	76 x 76 x 128 0.379 BF		
133	conv	256	3 x 3/ 1	76 x 76 x 128	1	->	76 x 76 x 256 3.407 BF		
134	conv	128	1 x 1/ 1	76 x 76 x 256	1	->	76 x 76 x 128 0.379 BF		
135	conv	256	3 x 3/ 1	76 x 76 x 128	1	->	76 x 76 x 256 3.407 BF		
136	conv	128	1 x 1/ 1	76 x 76 x 256	1	->	76 x 76 x 128 0.379 BF		
137	conv	256	3 x 3/ 1	76 x 76 x 128	1	->	76 x 76 x 256 3.407 BF		
138	conv	24	1 x 1/ 1	76 x 76 x 256	1	->	76 x 76 x 24 0.071 BF		
139	yolo								
[yolo]	params:	iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedy nms (1), beta = 0.600000							
140	route	136				->	76 x 76 x 128		
141	conv	256	3 x 3/ 2	76 x 76 x 128	1	->	38 x 38 x 256 0.852 BF		
142	route	141 126				->	38 x 38 x 512		
143	conv	256	1 x 1/ 1	38 x 38 x 512	1	->	38 x 38 x 256 0.379 BF		
144	conv	512	3 x 3/ 1	38 x 38 x 256	1	->	38 x 38 x 512 3.407 BF		
145	conv	256	1 x 1/ 1	38 x 38 x 512	1	->	38 x 38 x 256 0.379 BF		

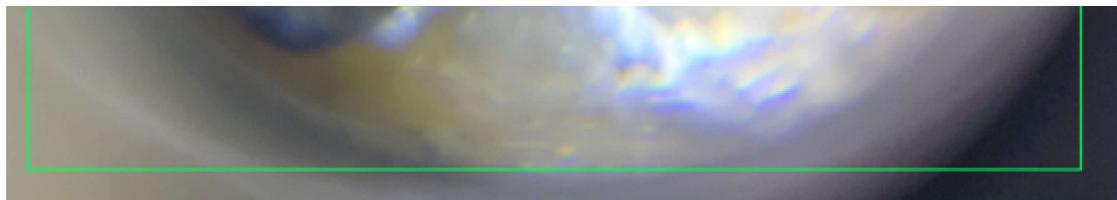
```

146 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route   147
152 conv    512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route   152 116
154 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 24 0.018 BF
161 yolo
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S20/Figure 3.png: Predicted i
Visible change with cavitation: 58%
Unable to init server: Could not connect: Connection refused

```

(predictions:7748): Gtk-WARNING **: 10:31:27.920: cannot open display:





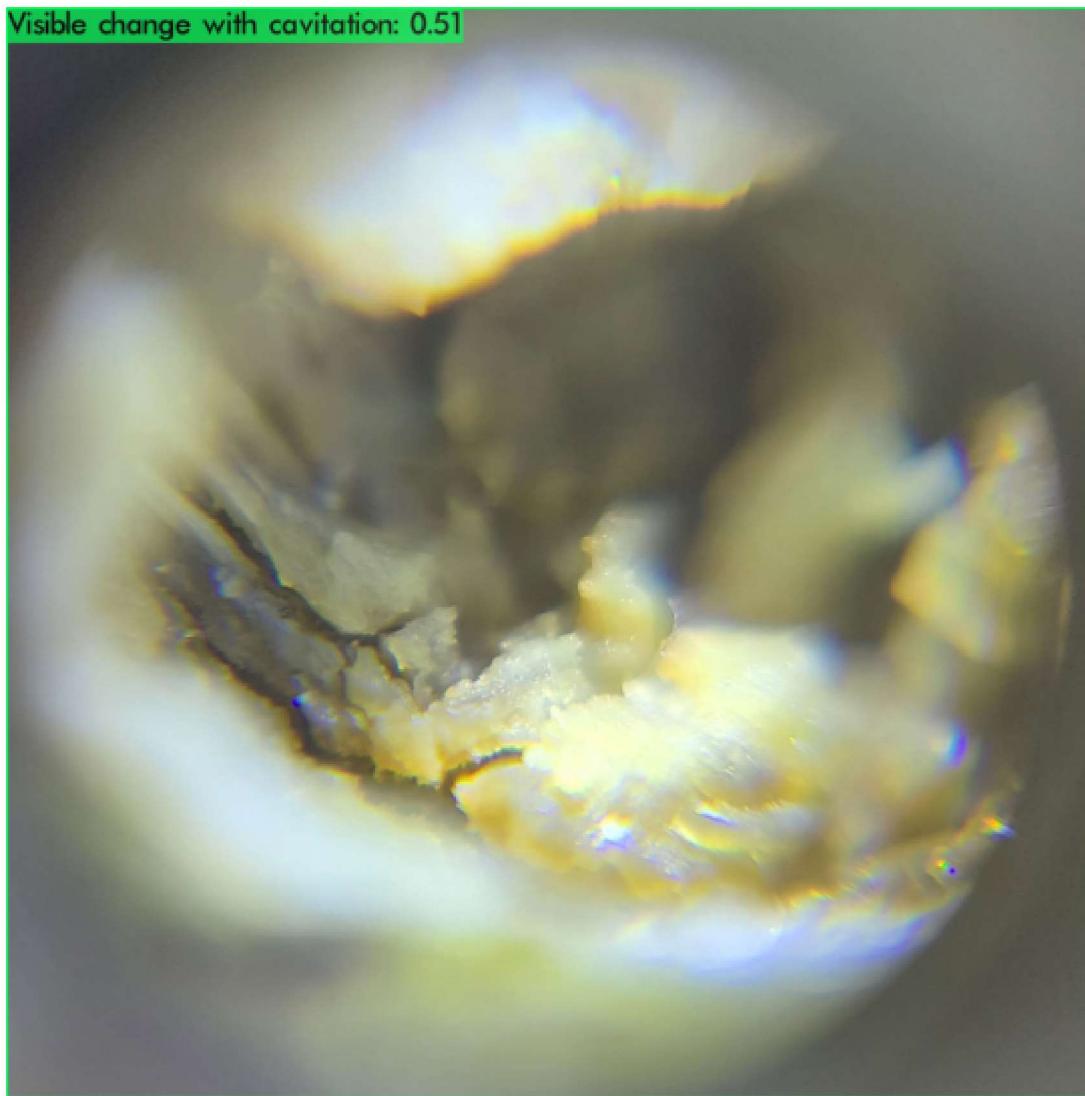
```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer filters size/strd(dil)      input           output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv    32      3 x 3/ 1      608 x 608 x   3 -> 608 x 608 x  32 0.639 BF
1 conv    64      3 x 3/ 2      608 x 608 x  32 -> 304 x 304 x  64 3.407 BF
2 conv    64      1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
3 route   1                  -> 304 x 304 x  64
4 conv    64      1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
5 conv    32      1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  32 0.379 BF
6 conv    64      3 x 3/ 1      304 x 304 x  32 -> 304 x 304 x  64 3.407 BF
7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
8 conv    64      1 x 1/ 1      304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
9 route   8 2                  -> 304 x 304 x 128
10 conv   64      1 x 1/ 1      304 x 304 x 128 -> 304 x 304 x  64 1.514 BF
11 conv   128     3 x 3/ 2      304 x 304 x  64 -> 152 x 152 x 128 3.407 BF
12 conv   64      1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
13 route   11                 -> 152 x 152 x 128
14 conv   64      1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
15 conv   64      1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
16 conv   64      3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
17 Shortcut Layer: 14, wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
18 conv   64      1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
19 conv   64      3 x 3/ 1      152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
20 Shortcut Layer: 17, wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
21 conv   64      1 x 1/ 1      152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
22 route  21 12                 -> 152 x 152 x 128
23 conv   128     1 x 1/ 1      152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
24 conv   256     3 x 3/ 2      152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
25 conv   128     1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
26 route  24                 -> 76 x 76 x 256
27 conv   128     1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
28 conv   128     1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
29 conv   128     3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
31 conv   128     1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
32 conv   128     3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
34 conv   128     1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
35 conv   128     3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
37 conv   128     1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
38 conv   128     3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
40 conv   128     1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
41 conv   128     3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
43 conv   128     1 x 1/ 1      76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
44 conv   128     3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
```

45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
46 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
47 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
49 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
50 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
53 route 52 25 -> 76 x 76 x 256
54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
57 route 55 -> 38 x 38 x 512
58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
84 route 83 56 -> 38 x 38 x 512
85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
88 route 86 -> 19 x 19 x 1024
89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
103 route 102 87 -> 19 x 19 x 1024
104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF

layer	name	in	out	operations	shape	size	norm	kind
106	conv	1024	3 x 3 / 1		19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
107	conv	512	1 x 1 / 1		19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
108	max		5x 5 / 1		19 x 19 x 512	->	19 x 19 x 512	0.005 BF
109	route	107				->	19 x 19 x 512	
110	max		9x 9 / 1		19 x 19 x 512	->	19 x 19 x 512	0.015 BF
111	route	107				->	19 x 19 x 512	
112	max		13x13 / 1		19 x 19 x 512	->	19 x 19 x 512	0.031 BF
113	route	112 110 108 107				->	19 x 19 x 2048	
114	conv	512	1 x 1 / 1		19 x 19 x 2048	->	19 x 19 x 512	0.757 BF
115	conv	1024	3 x 3 / 1		19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
116	conv	512	1 x 1 / 1		19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
117	conv	256	1 x 1 / 1		19 x 19 x 512	->	19 x 19 x 256	0.095 BF
118	upsample		2x		19 x 19 x 256	->	38 x 38 x 256	
119	route	85				->	38 x 38 x 512	
120	conv	256	1 x 1 / 1		38 x 38 x 512	->	38 x 38 x 256	0.379 BF
121	route	120 118				->	38 x 38 x 512	
122	conv	256	1 x 1 / 1		38 x 38 x 512	->	38 x 38 x 256	0.379 BF
123	conv	512	3 x 3 / 1		38 x 38 x 256	->	38 x 38 x 512	3.407 BF
124	conv	256	1 x 1 / 1		38 x 38 x 512	->	38 x 38 x 256	0.379 BF
125	conv	512	3 x 3 / 1		38 x 38 x 256	->	38 x 38 x 512	3.407 BF
126	conv	256	1 x 1 / 1		38 x 38 x 512	->	38 x 38 x 256	0.379 BF
127	conv	128	1 x 1 / 1		38 x 38 x 256	->	38 x 38 x 128	0.095 BF
128	upsample		2x		38 x 38 x 128	->	76 x 76 x 128	
129	route	54				->	76 x 76 x 256	
130	conv	128	1 x 1 / 1		76 x 76 x 256	->	76 x 76 x 128	0.379 BF
131	route	130 128				->	76 x 76 x 256	
132	conv	128	1 x 1 / 1		76 x 76 x 256	->	76 x 76 x 128	0.379 BF
133	conv	256	3 x 3 / 1		76 x 76 x 128	->	76 x 76 x 256	3.407 BF
134	conv	128	1 x 1 / 1		76 x 76 x 256	->	76 x 76 x 128	0.379 BF
135	conv	256	3 x 3 / 1		76 x 76 x 128	->	76 x 76 x 256	3.407 BF
136	conv	128	1 x 1 / 1		76 x 76 x 256	->	76 x 76 x 128	0.379 BF
137	conv	256	3 x 3 / 1		76 x 76 x 128	->	76 x 76 x 256	3.407 BF
138	conv	24	1 x 1 / 1		76 x 76 x 256	->	76 x 76 x 24	0.071 BF
139	yolo							
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedy_nms (1), beta = 0.600000								
140	route	136				->	76 x 76 x 128	
141	conv	256	3 x 3 / 2		76 x 76 x 128	->	38 x 38 x 256	0.852 BF
142	route	141 126				->	38 x 38 x 512	
143	conv	256	1 x 1 / 1		38 x 38 x 512	->	38 x 38 x 256	0.379 BF
144	conv	512	3 x 3 / 1		38 x 38 x 256	->	38 x 38 x 512	3.407 BF
145	conv	256	1 x 1 / 1		38 x 38 x 512	->	38 x 38 x 256	0.379 BF
146	conv	512	3 x 3 / 1		38 x 38 x 256	->	38 x 38 x 512	3.407 BF
147	conv	256	1 x 1 / 1		38 x 38 x 512	->	38 x 38 x 256	0.379 BF
148	conv	512	3 x 3 / 1		38 x 38 x 256	->	38 x 38 x 512	3.407 BF
149	conv	24	1 x 1 / 1		38 x 38 x 512	->	38 x 38 x 24	0.035 BF
150	yolo							
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d nms_kind: greedy_nms (1), beta = 0.600000								
151	route	147				->	38 x 38 x 256	
152	conv	512	3 x 3 / 2		38 x 38 x 256	->	19 x 19 x 512	0.852 BF
153	route	152 116				->	19 x 19 x 1024	
154	conv	512	1 x 1 / 1		19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
155	conv	1024	3 x 3 / 1		19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
156	conv	512	1 x 1 / 1		19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
157	conv	1024	3 x 3 / 1		19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
158	conv	512	1 x 1 / 1		19 x 19 x 1024	->	19 x 19 x 512	0.379 BF
159	conv	1024	3 x 3 / 1		19 x 19 x 512	->	19 x 19 x 1024	3.407 BF
160	conv	24	1 x 1 / 1		19 x 19 x 1024	->	19 x 19 x 24	0.018 BF
161	volo							

```
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyNMS (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S20/Figure 4.png: Predicted i
Visible change with cavitation: 51%
Unable to init server: Could not connect: Connection refused
```

(predictions:7762): Gtk-WARNING **: 10:31:36.785: cannot open display:



```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer filters size/strd(dil) input output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv 32 3 x 3/ 1 608 x 608 x 3 -> 608 x 608 x 32 0.639 BF
1 conv 64 3 x 3/ 2 608 x 608 x 32 -> 304 x 304 x 64 3.407 BF
2 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
```

3 route 1 -> 304 x 304 x 64
 4 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
 5 conv 32 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 32 0.379 BF
 6 conv 64 3 x 3/ 1 304 x 304 x 32 -> 304 x 304 x 64 3.407 BF
 7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x 64 0.006 BF
 8 conv 64 1 x 1/ 1 304 x 304 x 64 -> 304 x 304 x 64 0.757 BF
 9 route 8 2 -> 304 x 304 x 128
 10 conv 64 1 x 1/ 1 304 x 304 x 128 -> 304 x 304 x 64 1.514 BF
 11 conv 128 3 x 3/ 2 304 x 304 x 64 -> 152 x 152 x 128 3.407 BF
 12 conv 64 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 64 0.379 BF
 13 route 11 -> 152 x 152 x 128
 14 conv 64 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 64 0.379 BF
 15 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 16 conv 64 3 x 3/ 1 152 x 152 x 64 -> 152 x 152 x 64 1.703 BF
 17 Shortcut Layer: 14, wt = 0, wn = 0, outputs: 152 x 152 x 64 0.001 BF
 18 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 19 conv 64 3 x 3/ 1 152 x 152 x 64 -> 152 x 152 x 64 1.703 BF
 20 Shortcut Layer: 17, wt = 0, wn = 0, outputs: 152 x 152 x 64 0.001 BF
 21 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
 22 route 21 12 -> 152 x 152 x 128
 23 conv 128 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
 24 conv 256 3 x 3/ 2 152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
 25 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 26 route 24 -> 76 x 76 x 256
 27 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
 28 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 29 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 31 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 32 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 34 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 35 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 37 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 38 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 40 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 41 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 43 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 44 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 46 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 47 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 49 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 50 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
 51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
 52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
 53 route 52 25 -> 76 x 76 x 256
 54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
 55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
 56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 57 route 55 -> 38 x 38 x 512
 58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF

63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 80 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 81 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
 82 Shortcut Layer: 79, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
 83 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
 84 route 83 56 -> 38 x 38 x 512
 85 conv 512 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 512 0.757 BF
 86 conv 1024 3 x 3/ 2 38 x 38 x 512 -> 19 x 19 x 1024 3.407 BF
 87 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 88 route 86 -> 19 x 19 x 1024
 89 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 90 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 91 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 92 Shortcut Layer: 89, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 93 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 94 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 95 Shortcut Layer: 92, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 96 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 97 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 98 Shortcut Layer: 95, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 99 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 100 conv 512 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 512 1.703 BF
 101 Shortcut Layer: 98, wt = 0, wn = 0, outputs: 19 x 19 x 512 0.000 BF
 102 conv 512 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.189 BF
 103 route 102 87 -> 19 x 19 x 1024
 104 conv 1024 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 1024 0.757 BF
 105 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 106 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 107 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 108 max 5x 5/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.005 BF
 109 route 107 -> 19 x 19 x 512
 110 max 9x 9/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.015 BF
 111 route 107 -> 19 x 19 x 512
 112 max 13x13/ 1 19 x 19 x 512 -> 19 x 19 x 512 0.031 BF
 113 route 112 110 108 107 -> 19 x 19 x 2048
 114 conv 512 1 x 1/ 1 19 x 19 x 2048 -> 19 x 19 x 512 0.757 BF
 115 conv 1024 3 x 3/ 1 19 x 19 x 512 -> 19 x 19 x 1024 3.407 BF
 116 conv 512 1 x 1/ 1 19 x 19 x 1024 -> 19 x 19 x 512 0.379 BF
 117 conv 256 1 x 1/ 1 19 x 19 x 512 -> 19 x 19 x 256 0.095 BF
 118 upsample 2x 19 x 19 x 256 -> 38 x 38 x 256
 119 route 85 -> 38 x 38 x 512
 120 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 121 route 120 118 -> 38 x 38 x 512
 122 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
 123 -> 38 x 38 x 512 0.379 BF

```

123 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.40/ BF
124 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
125 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
126 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
127 conv    128      1 x 1/ 1      38 x 38 x 256 -> 38 x 38 x 128 0.095 BF
128 upsample          2x      38 x 38 x 128 -> 76 x 76 x 128
129 route   54                  -> 76 x 76 x 256
130 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
131 route   130 128          -> 76 x 76 x 256
132 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
133 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
134 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
135 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
136 conv    128      1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
137 conv    256      3 x 3/ 1      76 x 76 x 128 -> 76 x 76 x 256 3.407 BF
138 conv    24       1 x 1/ 1      76 x 76 x 256 -> 76 x 76 x 24 0.071 BF
139 yolo

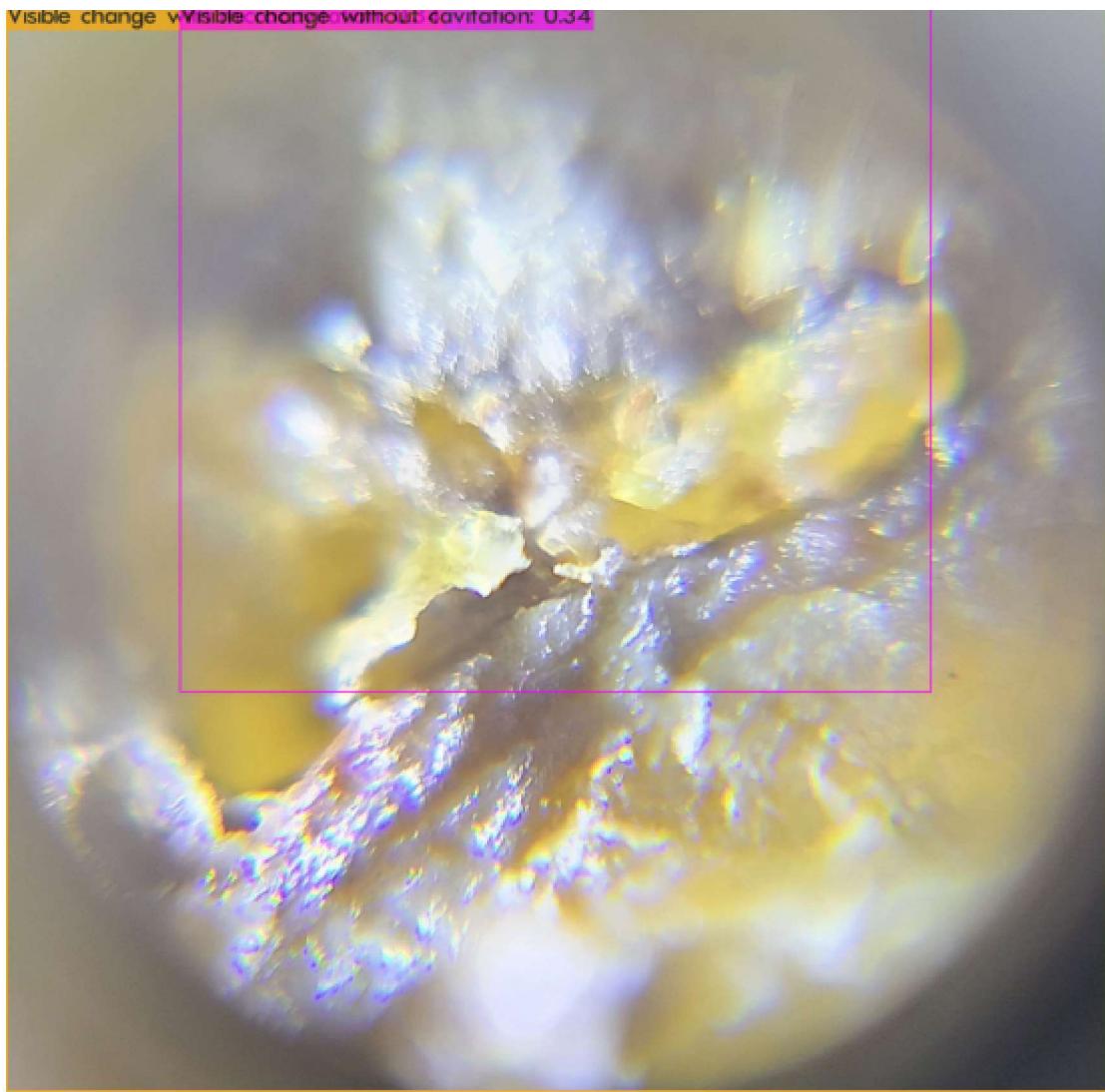
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route   136          -> 76 x 76 x 128
141 conv    256      3 x 3/ 2      76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route   141 126          -> 38 x 38 x 512
143 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv    256      1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv    512      3 x 3/ 1      38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv    24       1 x 1/ 1      38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route   147          -> 38 x 38 x 256
152 conv    512      3 x 3/ 2      38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route   152 116          -> 19 x 19 x1024
154 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
155 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
156 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
157 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
158 conv    512      1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
159 conv    1024     3 x 3/ 1      19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
160 conv    24       1 x 1/ 1      19 x 19 x1024 -> 19 x 19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S20/Figure 5.png: Predicted i
Visible change with microcavitation: 34%
Visible change without cavitation: 34%
Unable to init server: Could not connect: Connection refused

(predictions:7776): Gtk-WARNING **: 10:31:44.444: cannot open display:

```



```
CUDA-version: 11010 (11020), cuDNN: 7.6.5, CUDNN_HALF=1, GPU count: 1
CUDNN_HALF=1
OpenCV version: 3.2.0
0 : compute_capability = 370, cudnn_half = 0, GPU: Tesla K80
net.optimized_memory = 0
mini_batch = 1, batch = 32, time_steps = 1, train = 0
layer    filters   size/strd(dil)      input           output
0 Create CUDA-stream - 0
Create cudnn-handle 0
conv      32        3 x 3/ 1       608 x 608 x   3 -> 608 x 608 x  32 0.639 BF
1 conv      64        3 x 3/ 2       608 x 608 x  32 -> 304 x 304 x  64 3.407 BF
2 conv      64        1 x 1/ 1       304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
3 route    1          -> 304 x 304 x  64
4 conv      64        1 x 1/ 1       304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
5 conv      32        1 x 1/ 1       304 x 304 x  64 -> 304 x 304 x  32 0.379 BF
6 conv      64        3 x 3/ 1       304 x 304 x  32 -> 304 x 304 x  64 3.407 BF
7 Shortcut Layer: 4, wt = 0, wn = 0, outputs: 304 x 304 x  64 0.006 BF
8 conv      64        1 x 1/ 1       304 x 304 x  64 -> 304 x 304 x  64 0.757 BF
9 route    8 2          -> 304 x 304 x 128
10 conv     64        1 x 1/ 1       304 x 304 x 128 -> 304 x 304 x  64 1.514 BF
11 conv     128       3 x 3/ 2       304 x 304 x  64 -> 152 x 152 x 128 3.407 BF
12 conv     64        1 x 1/ 1       152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
13 route    11         -> 152 x 152 x 128
14 conv     64        1 x 1/ 1       152 x 152 x 128 -> 152 x 152 x  64 0.379 BF
15 conv     64        1 x 1/ 1       152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
16 conv     64        3 x 3/ 1       152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
17 Shortcut Layer: 14, wt = 0, wn = 0, outputs: 152 x 152 x  64 0.001 BF
18 conv     64        1 x 1/ 1       152 x 152 x  64 -> 152 x 152 x  64 0.189 BF
19 conv     64        3 x 3/ 1       152 x 152 x  64 -> 152 x 152 x  64 1.703 BF
```

20 Shortcut Layer: 17, wt = 0, wn = 0, outputs: 152 x 152 x 64 0.001 BF
21 conv 64 1 x 1/ 1 152 x 152 x 64 -> 152 x 152 x 64 0.189 BF
22 route 21 12 -> 152 x 152 x 128
23 conv 128 1 x 1/ 1 152 x 152 x 128 -> 152 x 152 x 128 0.757 BF
24 conv 256 3 x 3/ 2 152 x 152 x 128 -> 76 x 76 x 256 3.407 BF
25 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
26 route 24 -> 76 x 76 x 256
27 conv 128 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 128 0.379 BF
28 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
29 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
30 Shortcut Layer: 27, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
31 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
32 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
33 Shortcut Layer: 30, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
34 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
35 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
36 Shortcut Layer: 33, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
37 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
38 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
39 Shortcut Layer: 36, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
40 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
41 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
42 Shortcut Layer: 39, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
43 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
44 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
45 Shortcut Layer: 42, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
46 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
47 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
48 Shortcut Layer: 45, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
49 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
50 conv 128 3 x 3/ 1 76 x 76 x 128 -> 76 x 76 x 128 1.703 BF
51 Shortcut Layer: 48, wt = 0, wn = 0, outputs: 76 x 76 x 128 0.001 BF
52 conv 128 1 x 1/ 1 76 x 76 x 128 -> 76 x 76 x 128 0.189 BF
53 route 52 25 -> 76 x 76 x 256
54 conv 256 1 x 1/ 1 76 x 76 x 256 -> 76 x 76 x 256 0.757 BF
55 conv 512 3 x 3/ 2 76 x 76 x 256 -> 38 x 38 x 512 3.407 BF
56 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
57 route 55 -> 38 x 38 x 512
58 conv 256 1 x 1/ 1 38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
59 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
60 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
61 Shortcut Layer: 58, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
62 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
63 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
64 Shortcut Layer: 61, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
65 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
66 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
67 Shortcut Layer: 64, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
68 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
69 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
70 Shortcut Layer: 67, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
71 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
72 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
73 Shortcut Layer: 70, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
74 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
75 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
76 Shortcut Layer: 73, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF
77 conv 256 1 x 1/ 1 38 x 38 x 256 -> 38 x 38 x 256 0.189 BF
78 conv 256 3 x 3/ 1 38 x 38 x 256 -> 38 x 38 x 256 1.703 BF
79 Shortcut Layer: 76, wt = 0, wn = 0, outputs: 38 x 38 x 256 0.000 BF

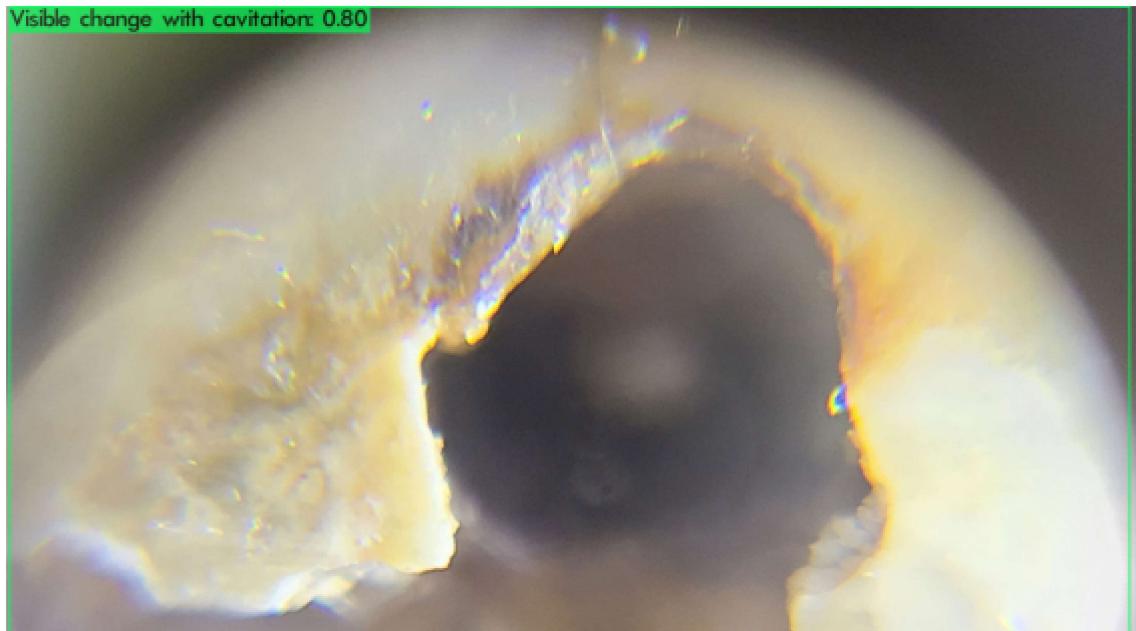
80	conv	256	$1 \times 1 / 1$	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
81	conv	256	$3 \times 3 / 1$	38 x 38 x 256	->	38 x 38 x 256	1.703	BF
82	Shortcut	Layer: 79,	wt = 0, wn = 0, outputs:	38 x 38 x 256	0.000	BF		
83	conv	256	$1 \times 1 / 1$	38 x 38 x 256	->	38 x 38 x 256	0.189	BF
84	route	83 56			->	38 x 38 x 512		
85	conv	512	$1 \times 1 / 1$	38 x 38 x 512	->	38 x 38 x 512	0.757	BF
86	conv	1024	$3 \times 3 / 2$	38 x 38 x 512	->	19 x 19 x 1024	3.407	BF
87	conv	512	$1 \times 1 / 1$	19 x 19 x 1024	->	19 x 19 x 512	0.379	BF
88	route	86			->	19 x 19 x 1024		
89	conv	512	$1 \times 1 / 1$	19 x 19 x 1024	->	19 x 19 x 512	0.379	BF
90	conv	512	$1 \times 1 / 1$	19 x 19 x 512	->	19 x 19 x 512	0.189	BF
91	conv	512	$3 \times 3 / 1$	19 x 19 x 512	->	19 x 19 x 512	1.703	BF
92	Shortcut	Layer: 89,	wt = 0, wn = 0, outputs:	19 x 19 x 512	0.000	BF		
93	conv	512	$1 \times 1 / 1$	19 x 19 x 512	->	19 x 19 x 512	0.189	BF
94	conv	512	$3 \times 3 / 1$	19 x 19 x 512	->	19 x 19 x 512	1.703	BF
95	Shortcut	Layer: 92,	wt = 0, wn = 0, outputs:	19 x 19 x 512	0.000	BF		
96	conv	512	$1 \times 1 / 1$	19 x 19 x 512	->	19 x 19 x 512	0.189	BF
97	conv	512	$3 \times 3 / 1$	19 x 19 x 512	->	19 x 19 x 512	1.703	BF
98	Shortcut	Layer: 95,	wt = 0, wn = 0, outputs:	19 x 19 x 512	0.000	BF		
99	conv	512	$1 \times 1 / 1$	19 x 19 x 512	->	19 x 19 x 512	0.189	BF
100	conv	512	$3 \times 3 / 1$	19 x 19 x 512	->	19 x 19 x 512	1.703	BF
101	Shortcut	Layer: 98,	wt = 0, wn = 0, outputs:	19 x 19 x 512	0.000	BF		
102	conv	512	$1 \times 1 / 1$	19 x 19 x 512	->	19 x 19 x 512	0.189	BF
103	route	102 87			->	19 x 19 x 1024		
104	conv	1024	$1 \times 1 / 1$	19 x 19 x 1024	->	19 x 19 x 1024	0.757	BF
105	conv	512	$1 \times 1 / 1$	19 x 19 x 1024	->	19 x 19 x 512	0.379	BF
106	conv	1024	$3 \times 3 / 1$	19 x 19 x 512	->	19 x 19 x 1024	3.407	BF
107	conv	512	$1 \times 1 / 1$	19 x 19 x 1024	->	19 x 19 x 512	0.379	BF
108	max		$5 \times 5 / 1$	19 x 19 x 512	->	19 x 19 x 512	0.005	BF
109	route	107			->	19 x 19 x 512		
110	max		$9 \times 9 / 1$	19 x 19 x 512	->	19 x 19 x 512	0.015	BF
111	route	107			->	19 x 19 x 512		
112	max		$13 \times 13 / 1$	19 x 19 x 512	->	19 x 19 x 512	0.031	BF
113	route	112 110 108 107			->	19 x 19 x 2048		
114	conv	512	$1 \times 1 / 1$	19 x 19 x 2048	->	19 x 19 x 512	0.757	BF
115	conv	1024	$3 \times 3 / 1$	19 x 19 x 512	->	19 x 19 x 1024	3.407	BF
116	conv	512	$1 \times 1 / 1$	19 x 19 x 1024	->	19 x 19 x 512	0.379	BF
117	conv	256	$1 \times 1 / 1$	19 x 19 x 512	->	19 x 19 x 256	0.095	BF
118	upsample		2x	19 x 19 x 256	->	38 x 38 x 256		
119	route	85			->	38 x 38 x 512		
120	conv	256	$1 \times 1 / 1$	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
121	route	120 118			->	38 x 38 x 512		
122	conv	256	$1 \times 1 / 1$	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
123	conv	512	$3 \times 3 / 1$	38 x 38 x 256	->	38 x 38 x 512	3.407	BF
124	conv	256	$1 \times 1 / 1$	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
125	conv	512	$3 \times 3 / 1$	38 x 38 x 256	->	38 x 38 x 512	3.407	BF
126	conv	256	$1 \times 1 / 1$	38 x 38 x 512	->	38 x 38 x 256	0.379	BF
127	conv	128	$1 \times 1 / 1$	38 x 38 x 256	->	38 x 38 x 128	0.095	BF
128	upsample		2x	38 x 38 x 128	->	76 x 76 x 128		
129	route	54			->	76 x 76 x 256		
130	conv	128	$1 \times 1 / 1$	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
131	route	130 128			->	76 x 76 x 256		
132	conv	128	$1 \times 1 / 1$	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
133	conv	256	$3 \times 3 / 1$	76 x 76 x 128	->	76 x 76 x 256	3.407	BF
134	conv	128	$1 \times 1 / 1$	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
135	conv	256	$3 \times 3 / 1$	76 x 76 x 128	->	76 x 76 x 256	3.407	BF
136	conv	128	$1 \times 1 / 1$	76 x 76 x 256	->	76 x 76 x 128	0.379	BF
137	conv	256	$3 \times 3 / 1$	76 x 76 x 128	->	76 x 76 x 256	3.407	BF
138	conv	24	$1 \times 1 / 1$	76 x 76 x 256	->	76 x 76 x 24	0.071	BF
139	yolo							

```
[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
140 route 136                                     -> 76 x 76 x 128
141 conv 256      3 x 3/ 2       76 x 76 x 128 -> 38 x 38 x 256 0.852 BF
142 route 141 126                                -> 38 x 38 x 512
143 conv 256      1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
144 conv 512      3 x 3/ 1       38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
145 conv 256      1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
146 conv 512      3 x 3/ 1       38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
147 conv 256      1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 256 0.379 BF
148 conv 512      3 x 3/ 1       38 x 38 x 256 -> 38 x 38 x 512 3.407 BF
149 conv 24       1 x 1/ 1       38 x 38 x 512 -> 38 x 38 x 24 0.035 BF
150 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
151 route 147                                     -> 38 x 38 x 256
152 conv 512      3 x 3/ 2       38 x 38 x 256 -> 19 x 19 x 512 0.852 BF
153 route 152 116                                -> 19 x 19 x1024
154 conv 512      1 x 1/ 1       19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
155 conv 1024     3 x 3/ 1       19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
156 conv 512      1 x 1/ 1       19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
157 conv 1024     3 x 3/ 1       19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
158 conv 512      1 x 1/ 1       19 x 19 x1024 -> 19 x 19 x 512 0.379 BF
159 conv 1024     3 x 3/ 1       19 x 19 x 512 -> 19 x 19 x1024 3.407 BF
160 conv 24       1 x 1/ 1       19 x 19 x1024 -> 19 x 19 x 24 0.018 BF
161 yolo

[yolo] params: iou loss: ciou (4), iou_norm: 0.07, obj_norm: 1.00, cls_norm: 1.00, d
nms_kind: greedyrnms (1), beta = 0.600000
Total BFLOPS 127.263
avg_outputs = 1046775
Allocate additional workspace_size = 6.65 MB
Loading weights from /mydrive/yolov4/training/yolov4-custom_best.weights...
seen 64, trained: 139 K-images (2 Kilo-batches_64)
Done! Loaded 162 layers from weights-file
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
/content/gdrive/MyDrive/tooth/Processed images/Samsung S20/Figure 6.png: Predicted i
Visible change with cavitation: 80%
Unable to init server: Could not connect: Connection refused
```

(predictions:7788): Gtk-WARNING **: 10:31:53.193: cannot open display:





```
def mse(imageA, imageB):  
    imgA = np.asarray(imageA)  
    imgB = np.asarray(imageB)  
  
    err = np.sum((imgA - imgB)**2) / float(imgA.shape[0] * imgA.shape[1])  
    return err  
  
import numpy as np  
import cv2  
from PIL import Image  
import os  
import PIL  
import glob  
import sys  
from skimage.metrics import structural_similarity as ssim  
  
# Structural similarity index  
def ssim_n(imageA, imageB):  
    imgA = np.asarray(imageA)  
    imgB = np.asarray(imageB)  
  
    return ssim(imgA, imgB, data_range=imgB.max() - imgB.min())  
  
#for image 1  
print(mse(cv2.imread('/content/gdrive/MyDrive/tooth/Processed images/Google Pixel 3/1. Roc  
  
folders = os.listdir('/content/gdrive/MyDrive/tooth/Processed images/')  
print(folders)  
  
['Samsung S20', 'Samsung S10e', 'Samsung S10 5G', 'Samsung S10', 'Samsung A31', 'Iph  
◀ ▶  
pixel_fig1 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Google Pixel 3/1.  
size = pixel_fig1.size  
iphone_6s_fig1 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Iphone 6s/Figu  
iphone_6s_fig1 = iphone_6s_fig1.resize((size[0],size[1]))  
  
S_A12 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung A12/Figure 1.pr  
S_A12 = S_A12.resize((size[0],size[1]))
```

```
S_A31 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung A31/Figure 1.pr
S_A31 = S_A31.resize((size[0],size[1]))

S_S10 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10/Figure 1.pr
S_S10 = S_S10.resize((size[0],size[1]))

S_S10_5g = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10 5G/Figur
S_S10_5g = S_S10_5g.resize((size[0],size[1]))

S_S10e = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10e/Figure 1.
S_S10e = S_S10e.resize((size[0],size[1]))

S_S20 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S20/Figure 1.pr
S_S20 = S_S20.resize((size[0],size[1]))

figure_1 =[mse(pixel_fig1, pixel_fig1), mse(pixel_fig1, iphone_6s_fig1), mse(pixel_fig1, s
print(figure_1)
#print(ssim_n(pixel_fig1, pixel_fig1), ssim_n(pixel_fig1, iphone_6s_fig1), ssim_n(pixel_fi
[0.0, 321.26354207634967, 314.6748798938689, 320.2342755099217, 315.10550345622215,
[<-->]

pixel_fig1 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Google Pixel 3/2.
size = pixel_fig1.size
iphone_6s_fig1 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Iphone 6s/Figu
iphone_6s_fig1 = iphone_6s_fig1.resize((size[0],size[1]))

S_A12 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung A12/Figure 2.pr
S_A12 = S_A12.resize((size[0],size[1]))

S_A31 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung A31/Figure 2.pr
S_A31 = S_A31.resize((size[0],size[1]))

S_S10 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10/Figure 2.pr
S_S10 = S_S10.resize((size[0],size[1]))

S_S10_5g = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10 5G/Figur
S_S10_5g = S_S10_5g.resize((size[0],size[1]))

S_S10e = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10e/Figure 2.
S_S10e = S_S10e.resize((size[0],size[1]))

S_S20 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S20/Figure 2.pr
S_S20 = S_S20.resize((size[0],size[1]))

figure_2 =[mse(pixel_fig1, pixel_fig1), mse(pixel_fig1, iphone_6s_fig1), mse(pixel_fig1, s
print(figure_2)
[0.0, 297.6247641782351, 307.35261990233846, 299.592520359875, 300.8290554950968, 30
[<-->]

pixel_fig1 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Google Pixel 3/3.
size = pixel_fig1.size
iphone_6s_fig1 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Iphone 6s/Figu
```

```
iphone_6s_fig1 = iphone_6s_fig1.resize((size[0],size[1]))  
  
S_A12 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung A12/Figure 3.pr  
S_A12 = S_A12.resize((size[0],size[1]))  
  
S_A31 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung A31/Figure 3.pr  
S_A31 = S_A31.resize((size[0],size[1]))  
  
S_S10 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10/Figure 3.pr  
S_S10 = S_S10.resize((size[0],size[1]))  
  
S_S10_5g = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10 5G/Figur  
S_S10_5g = S_S10_5g.resize((size[0],size[1]))  
  
S_S10e = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10e/Figure 3.  
S_S10e = S_S10e.resize((size[0],size[1]))  
  
S_S20 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S20/Figure 3.pr  
S_S20 = S_S20.resize((size[0],size[1]))  
  
figure_3 =[mse(pixel_fig1, pixel_fig1), mse(pixel_fig1, iphone_6s_fig1), mse(pixel_fig1, s  
print(figure_3)  
  
[0.0, 316.7209050240881, 311.1367869159593, 318.2873642655043, 309.5951073449568, 30  
◀ ▶  
  
pixel_fig1 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Google Pixel 3/4.  
size = pixel_fig1.size  
iphone_6s_fig1 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Iphone 6s/Figu  
iphone_6s_fig1 = iphone_6s_fig1.resize((size[0],size[1]))  
  
S_A12 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung A12/Figure 4.pr  
S_A12 = S_A12.resize((size[0],size[1]))  
  
S_A31 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung A31/Figure 4.pr  
S_A31 = S_A31.resize((size[0],size[1]))  
  
S_S10 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10/Figure 4.pr  
S_S10 = S_S10.resize((size[0],size[1]))  
  
S_S10_5g = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10 5G/Figur  
S_S10_5g = S_S10_5g.resize((size[0],size[1]))  
  
S_S10e = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10e/Figure 4.  
S_S10e = S_S10e.resize((size[0],size[1]))  
  
S_S20 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S20/Figure 4.pr  
S_S20 = S_S20.resize((size[0],size[1]))  
  
figure_4 =[mse(pixel_fig1, pixel_fig1), mse(pixel_fig1, iphone_6s_fig1), mse(pixel_fig1, s  
print(figure_4)
```

[0.0, 309.56273933070645, 311.03835653152026, 315.2005642643695, 307.2345694720613,

```
pixel_fig1 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Google Pixel 3/5.  
size = pixel_fig1.size  
iphone_6s_fig1 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Iphone 6s/Figu  
iphone_6s_fig1 = iphone_6s_fig1.resize((size[0],size[1]))  
  
S_A12 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung A12/Figure 5.pr  
S_A12 = S_A12.resize((size[0],size[1]))  
  
S_A31 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung A31/Figure 5.pr  
S_A31 = S_A31.resize((size[0],size[1]))  
  
S_S10 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10/Figure 5.pr  
S_S10 = S_S10.resize((size[0],size[1]))  
  
S_S10_5g = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10 5G/Figur  
S_S10_5g = S_S10_5g.resize((size[0],size[1]))  
  
S_S10e = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10e/Figure 5.  
S_S10e = S_S10e.resize((size[0],size[1]))  
  
S_S20 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S20/Figure 5.pr  
S_S20 = S_S20.resize((size[0],size[1]))  
  
figure_5 =[mse(pixel_fig1, pixel_fig1), mse(pixel_fig1, iphone_6s_fig1), mse(pixel_fig1, S  
print(figure_5)
```

```
[0.0, 328.09400913732867, 323.5777350174684, 324.4665876914808, 309.44200505240525,
```

```
pixel_fig1 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Google Pixel 3/6.  
size = pixel_fig1.size  
iphone_6s_fig1 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Iphone 6s/Figu  
iphone_6s_fig1 = iphone_6s_fig1.resize((size[0],size[1]))  
  
S_A12 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung A12/Figure 6.pr  
S_A12 = S_A12.resize((size[0],size[1]))  
  
S_A31 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung A31/Figure 6.pr  
S_A31 = S_A31.resize((size[0],size[1]))  
  
S_S10 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10/Figure 6.pr  
S_S10 = S_S10.resize((size[0],size[1]))  
  
S_S10_5g = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10 5G/Figur  
S_S10_5g = S_S10_5g.resize((size[0],size[1]))  
  
S_S10e = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S10e/Figure 6.  
S_S10e = S_S10e.resize((size[0],size[1]))  
  
S_S20 = Image.open('/content/gdrive/MyDrive/tooth/Processed images/Samsung S20/Figure 6.pr  
S_S20 = S_S20.resize((size[0],size[1]))
```

```
figure_6 =[mse(pixel_fig1, pixel_fig1), mse(pixel_fig1, iphone_6s_fig1), mse(pixel_fig1, s
print(figure_6)

[0.0, 315.7965317699343, 316.7587262997655, 321.00052873575135, 310.82323076550915,

```

✓ 1s completed at 18:01 ✖