

## Transfer-learning with object detection

Single-shot detector (SSD) trained on images of Android lawn statues using the bounding box detector and feature detector from pre-trained model configuration `ssd_resnet50_v1_fpn_640x640_coco17_tpu`.

There are 7 images containing a mix of android lawn statues.

class id	class name	#of images w/ class in it
0	cupcake :	4
1	euclair:	4
2	icecream:	3
3	gingerbread_man:	5
4	icecream_sandwich:	3
5	honeycomb:	2
6	kitkat:	2
7	jellybean:	2
8	donut:	2

see notebook at:

[https://github.com/nking/curvature-scale-space-corners-and-transformations/blob/master/src/duckies\\_and\\_statues%2C\\_interactive\\_eager\\_few\\_shot\\_obj\\_det\\_training\\_colab.ipynb](https://github.com/nking/curvature-scale-space-corners-and-transformations/blob/master/src/duckies_and_statues%2C_interactive_eager_few_shot_obj_det_training_colab.ipynb)

## Transfer-learning with object detection (cont.)

14 test frames were taken from a YouTube video.

```
ground_truth_labels_all=[3, 9, 2, 2, 3, 9, 5, 2, 2, 2, 2, 2, 3, 2, 8, 8, 2, 8, 8, 3, 8, 9, 9, 3, 6, 3, 5, 8, 9, 8, 0, 0, 9, 4, 9, 9, 9, 9, 8, 0, 0, 4, 0, 4, 4, 9, 9, 0, 9, 0, 9, 0, 3, 0, 3, 7, 1, 6, 9, 1, 9, 6]
```

```
pred_all=[3, 7, 0, 0, 3, 7, 5, 1, 0, 2, 0, 2, 3, 1, 8, 8, 2, 1, 8, 3, 1, 4, 7, 5, 4, 3, 5, 8, 7, 1, 0, 0, 0, 7, 0, 0, 7, 0, 0, 7, 7, 7, 0, 8, 7, 5, 0, 0, 7, 0, 4, 7, 3, 7, 8, 2, 1, 7, 1, 1, 7, 6]
```

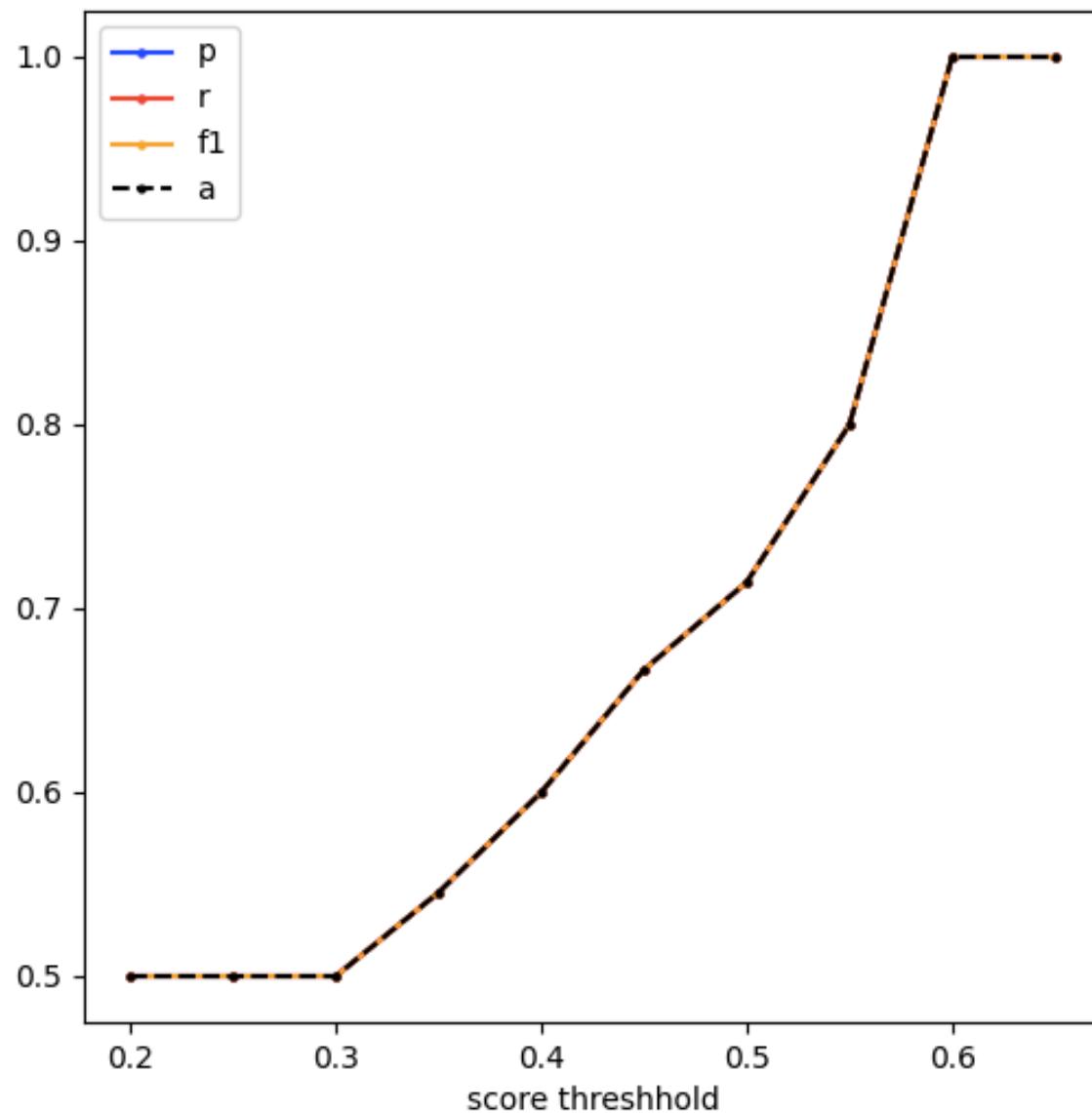
```
scores_all= ['0.29', '0.25', '0.55', '0.45', '0.39', '0.33', '0.32', '0.32', '0.30', '0.29', '0.25', '0.25', '0.53', '0.38', '0.29', '0.62', '0.32', '0.31', '0.66', '0.45', '0.43', '0.29', '0.28', '0.27', '0.32', '0.63', '0.47', '0.44', '0.42', '0.32', '0.29', '0.28', '0.26', '0.52', '0.48', '0.45', '0.37', '0.33', '0.30', '0.28', '0.28', '0.44', '0.34', '0.39', '0.36', '0.35', '0.33', '0.31', '0.31', '0.28', '0.27', '0.27', '0.61', '0.48', '0.35', '0.28', '0.35', '0.28', '0.50', '0.47', '0.38', '0.35']
```

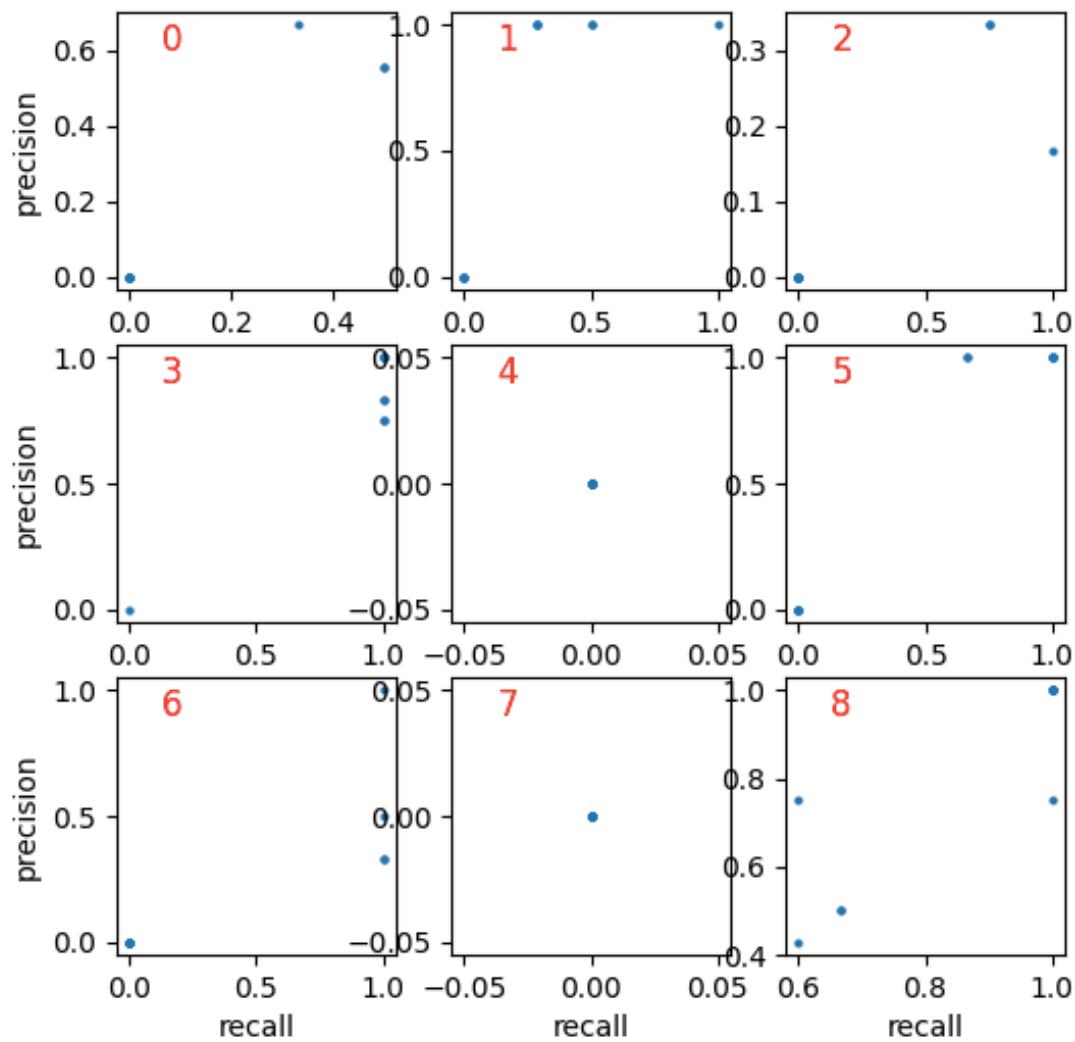
statistics were calculated for precision, recall, accuracy and f1 score and are plotted on the next 2 pages.

One can see that for identification threshold, we should set the score **threshold to 0.5 or 0.55**.

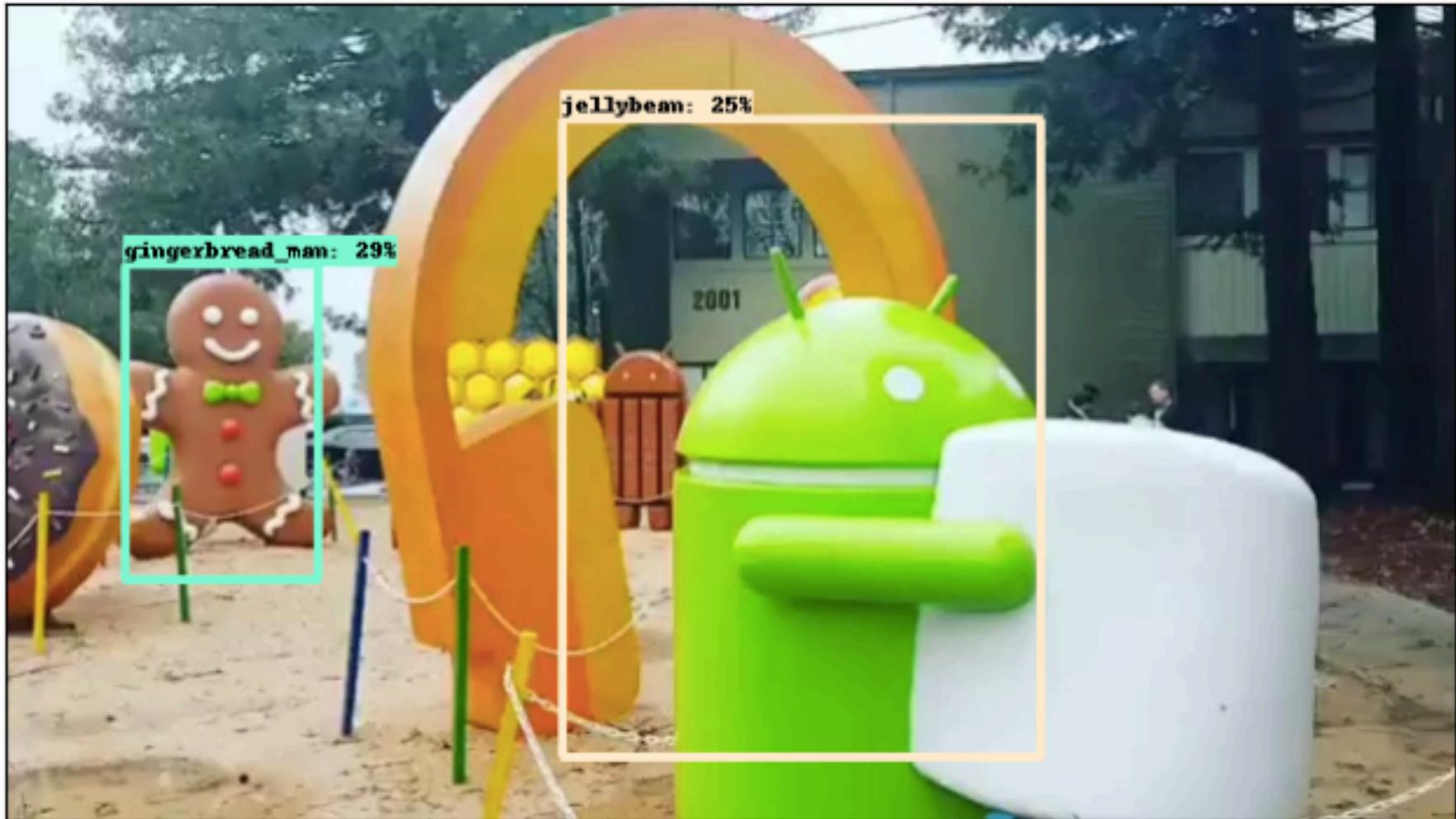
figures after the 2 plots are of the detection bounding boxes on 14 test frames labeled by their detection scores and labels. The detections plotted have scores from 20% to 100%.

these are the  
same for  
multiclass classification

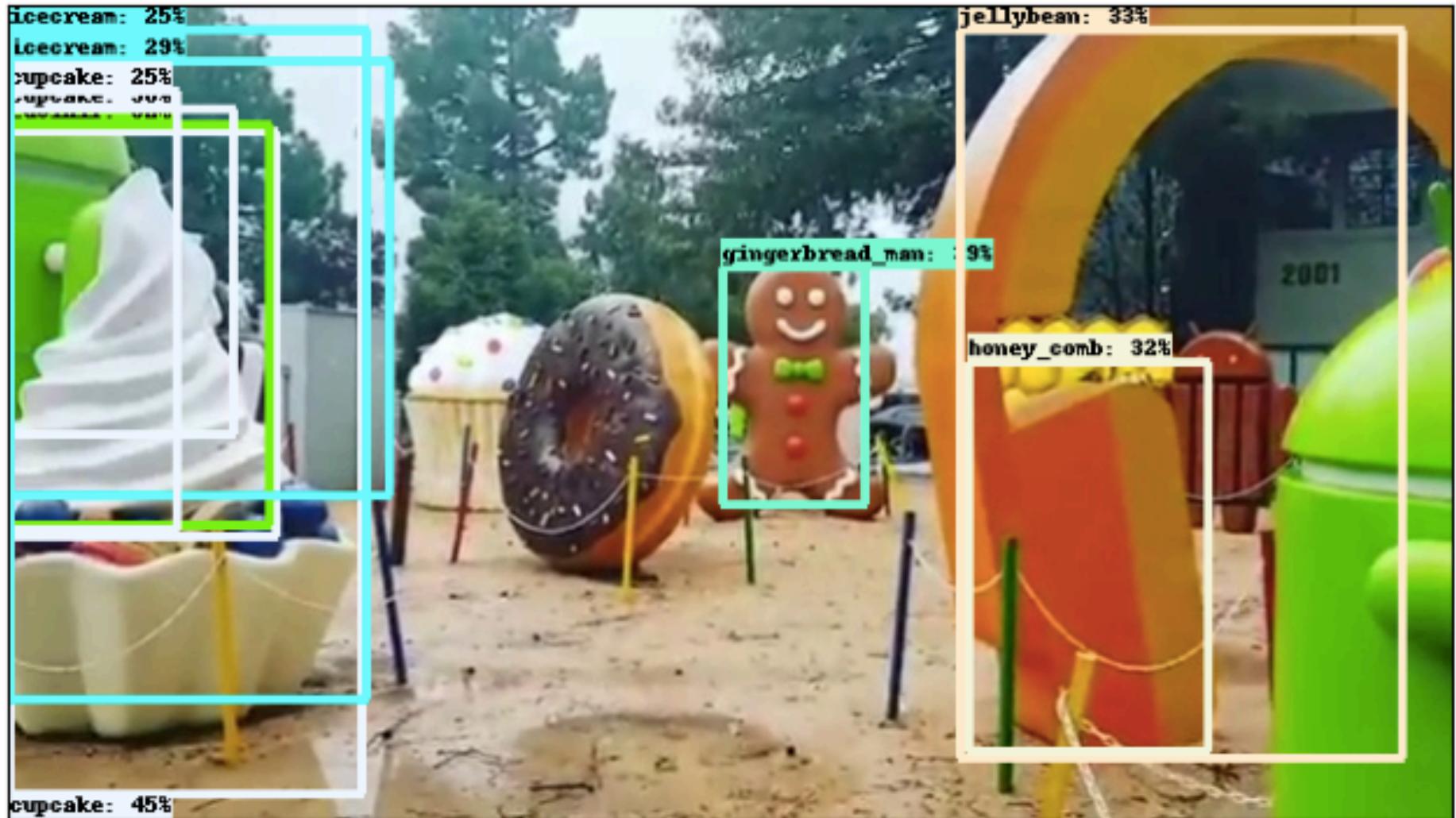




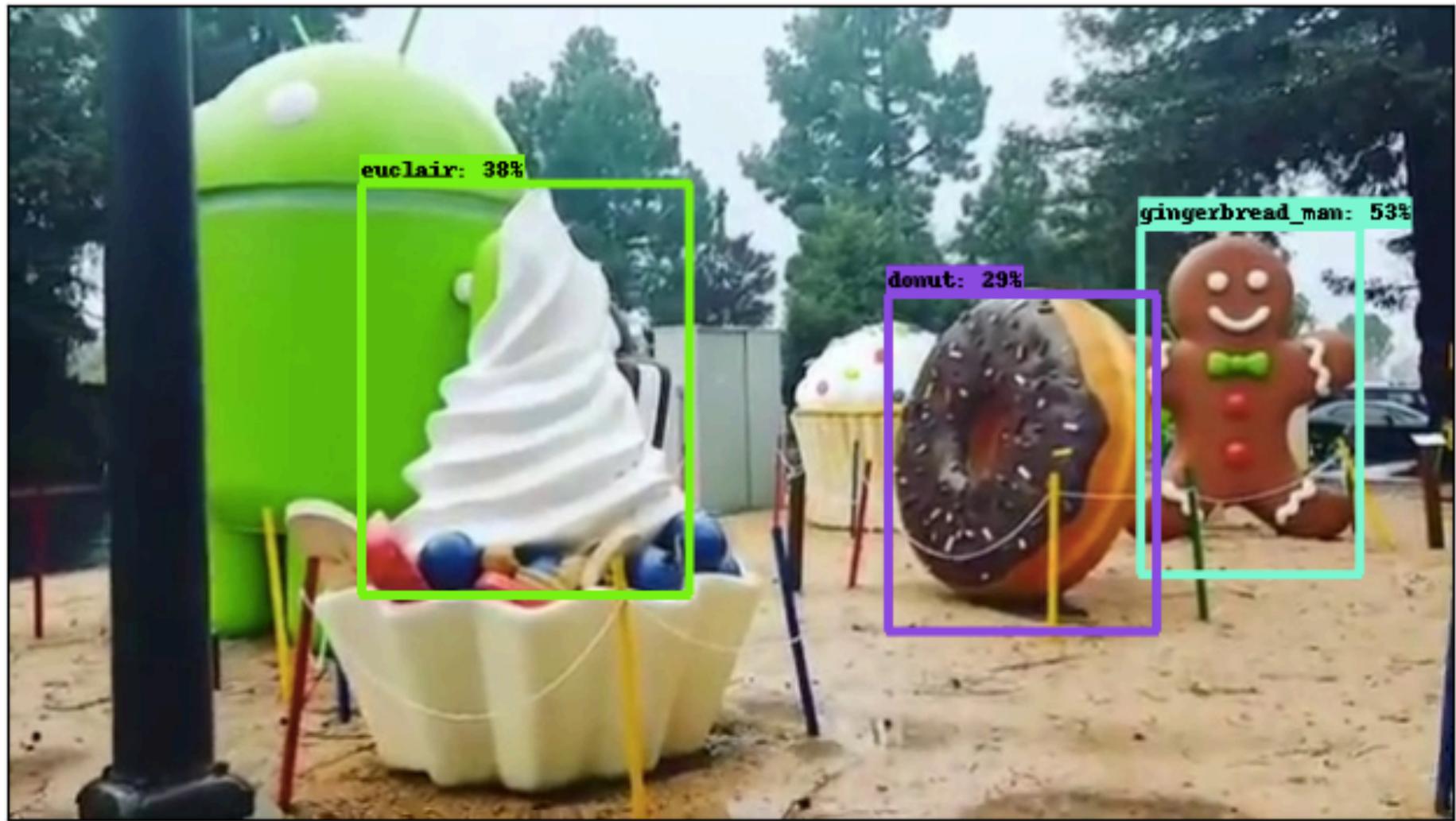
writing to /tmp/tmpveptyde1/1.jpg



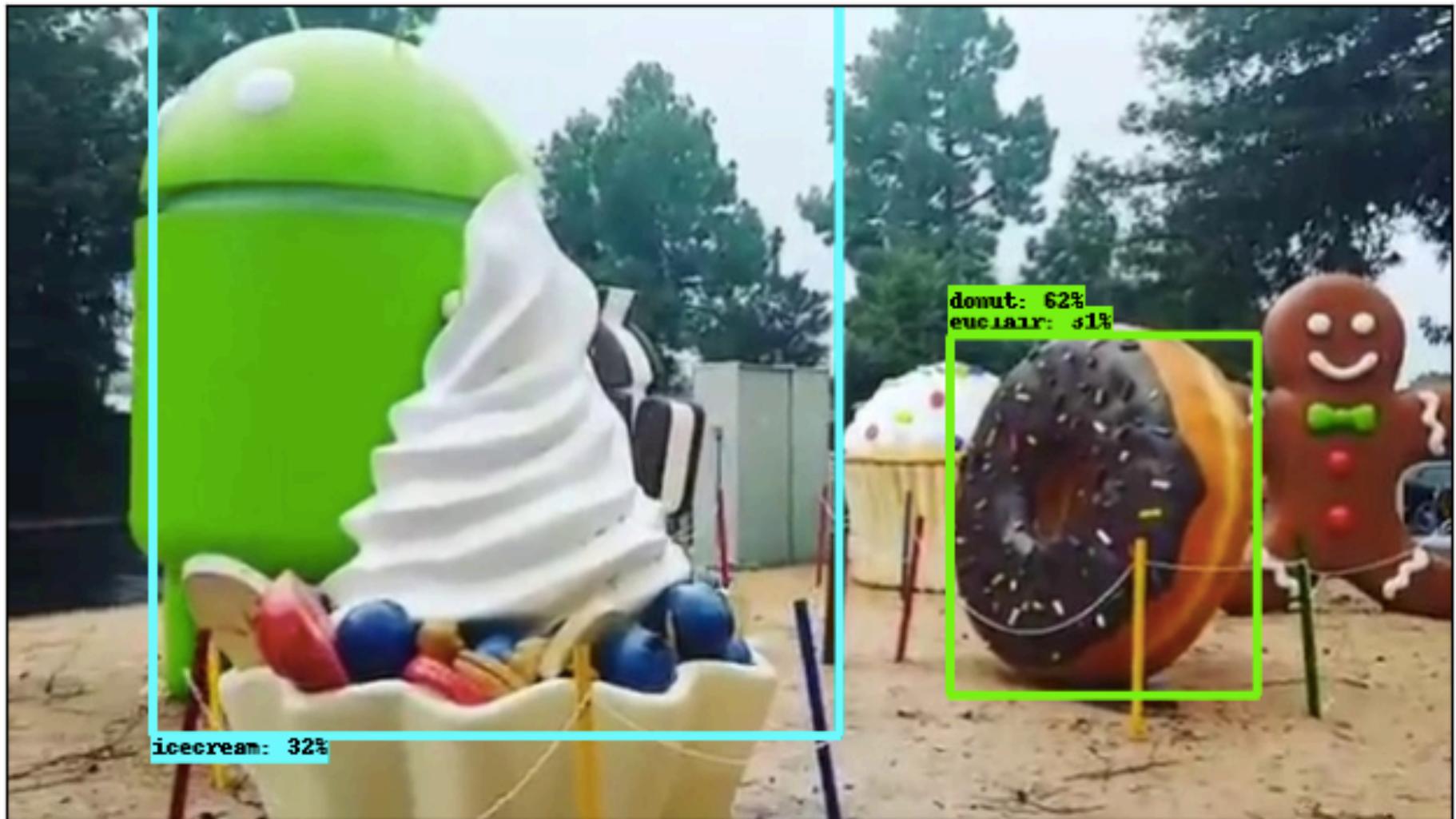
writing to /tmp/tmpveptyde1/2.jpg



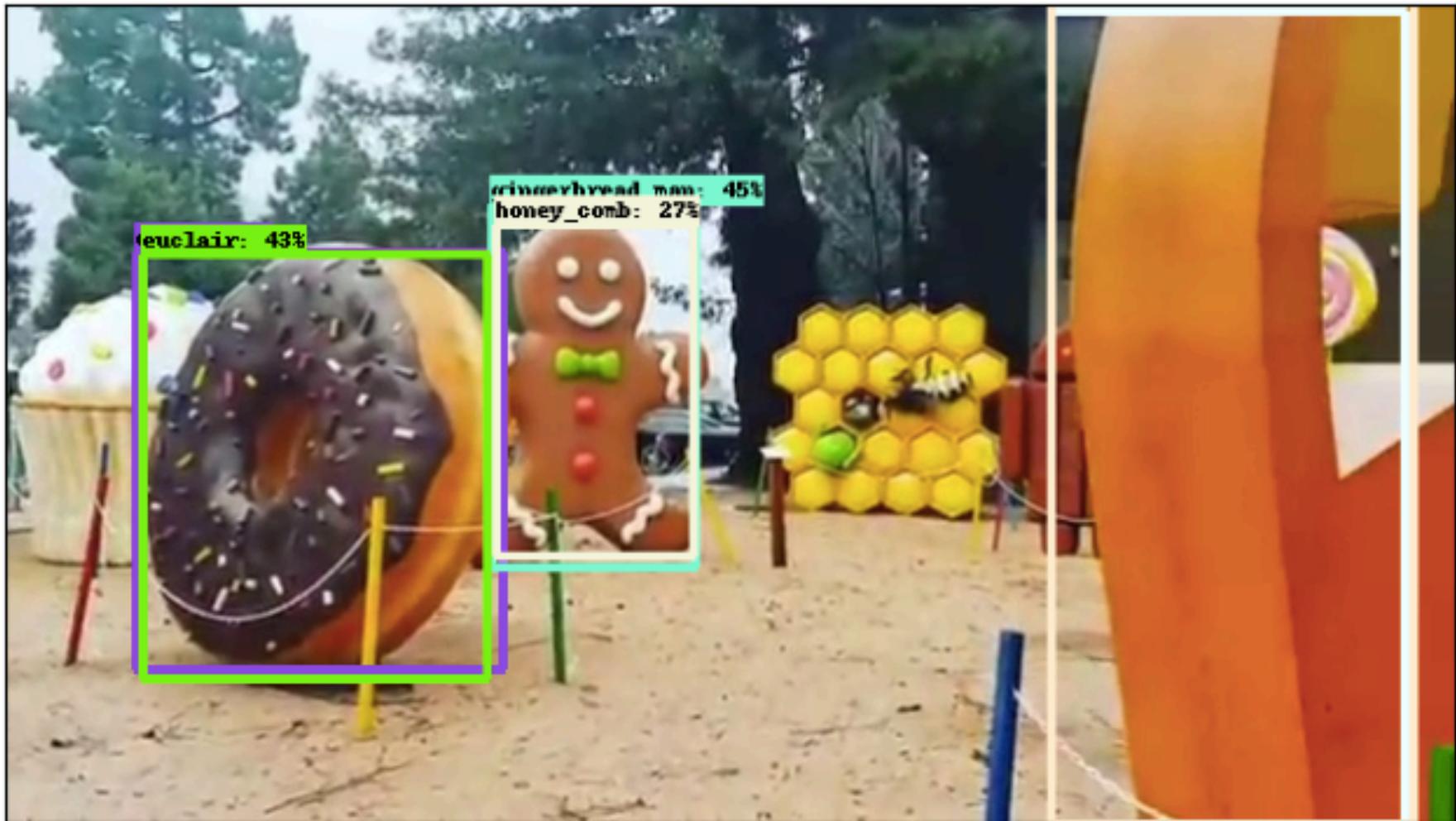
writing to /tmp/tmpveptyde1/3.jpg



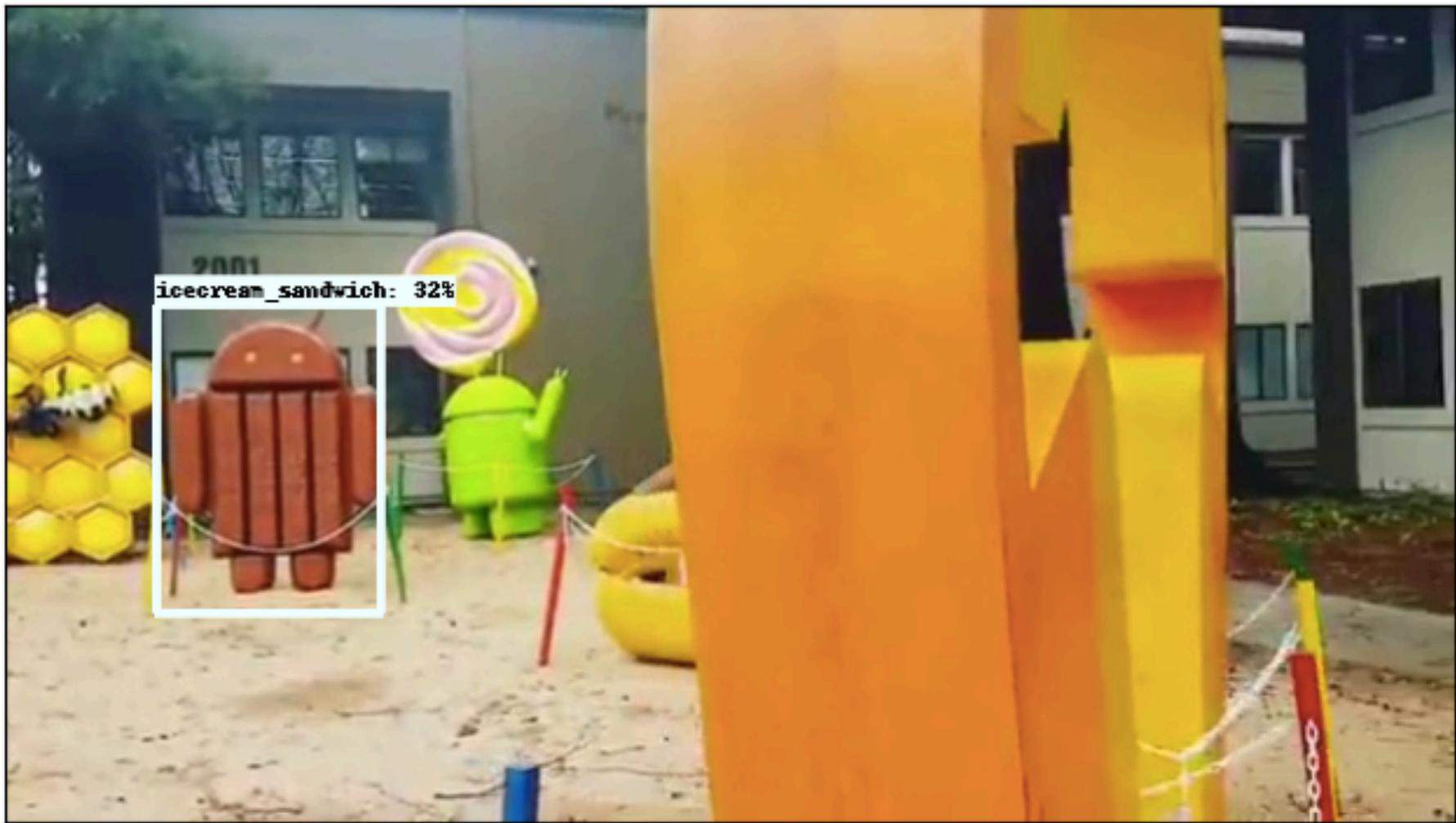
writing to /tmp/tmpveptyde1/4.jpg



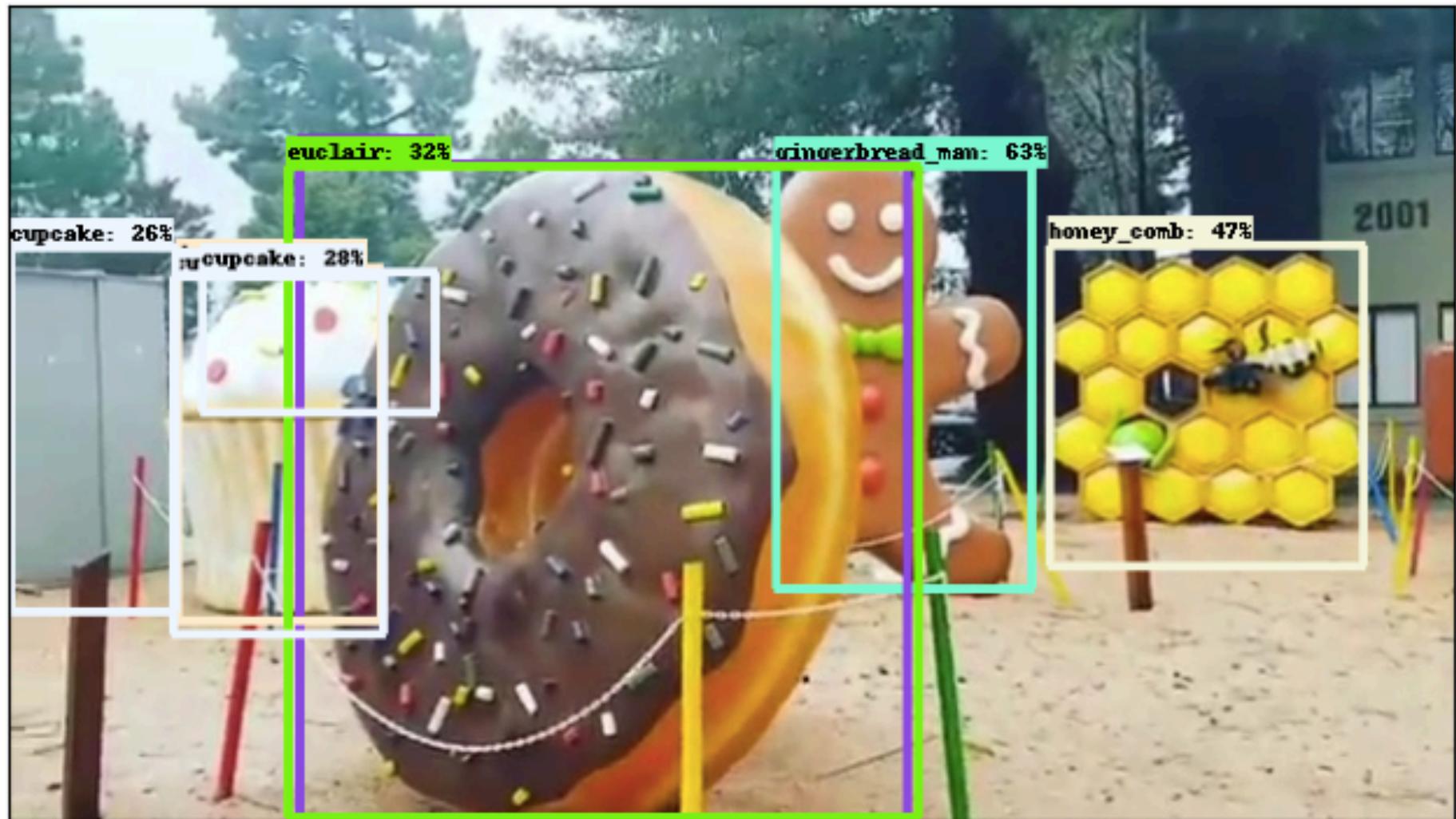
writing to /tmp/tmpveptyde1/5.jpg



writing to /tmp/tmpveptyde1/6.jpg



writing to /tmp/tmpveptyde1/7.jpg



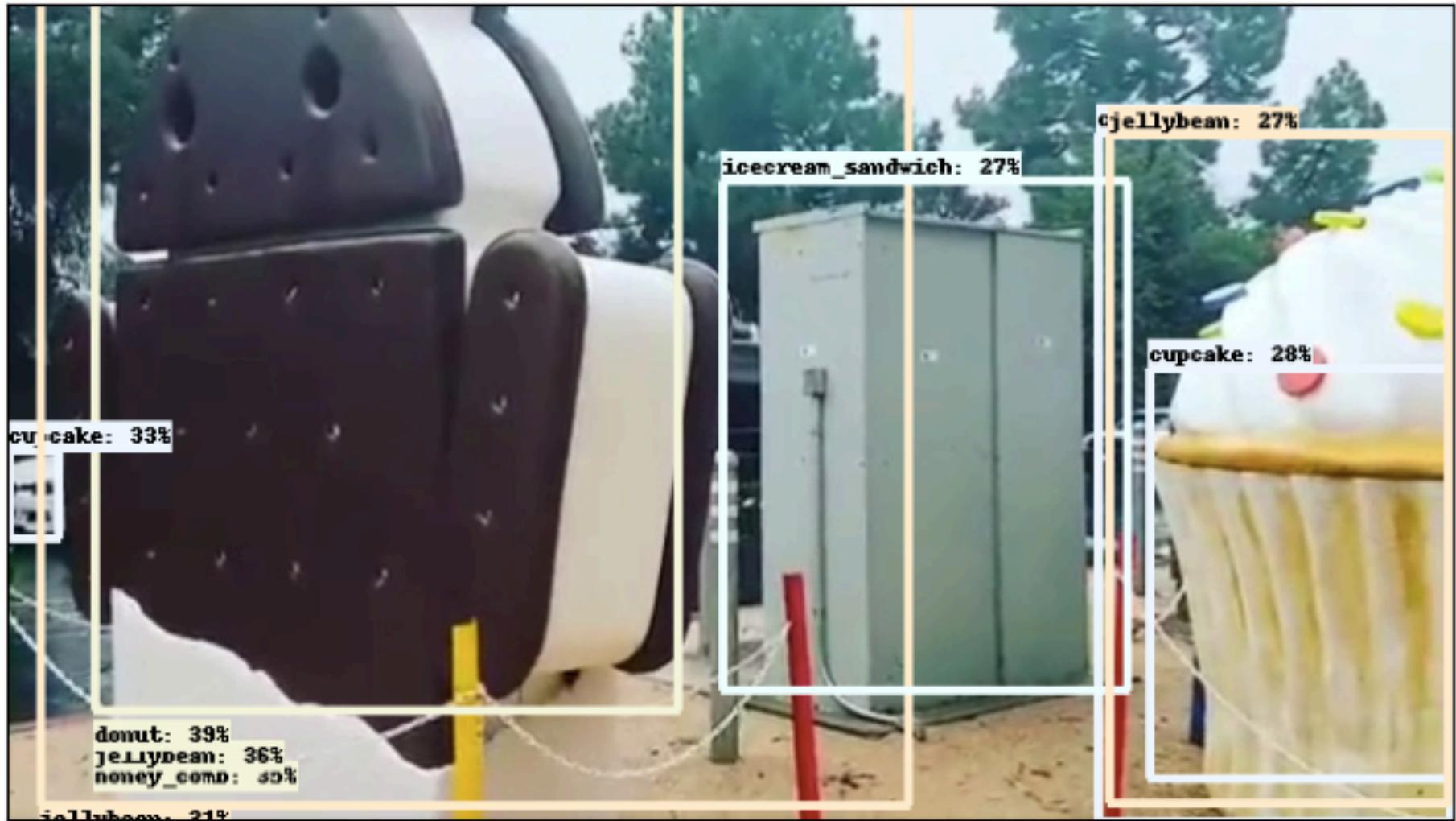
writing to /tmp/tmpveptyde1/8.jpg



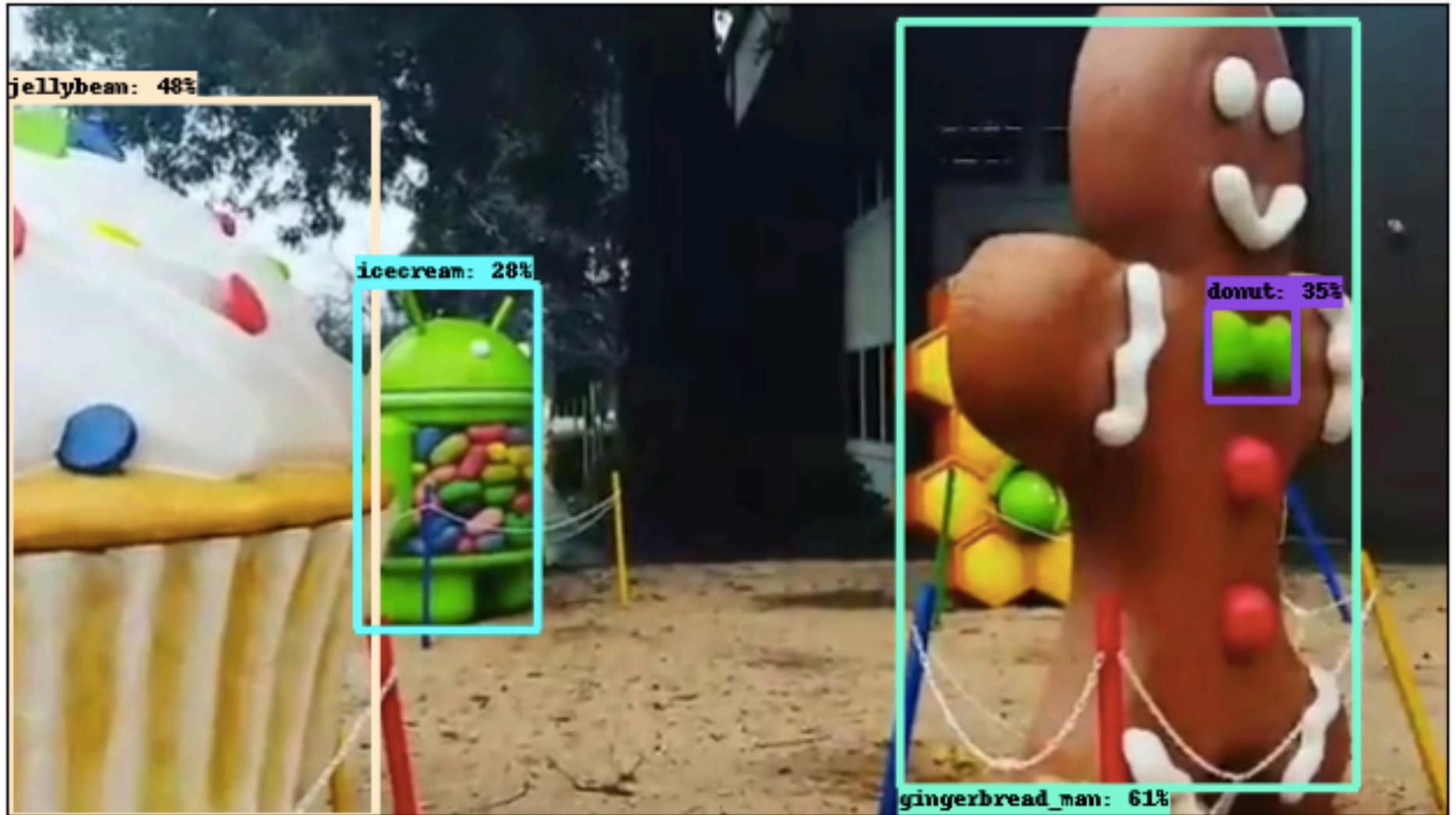
writing to /tmp/tmpveptyde1/9.jpg



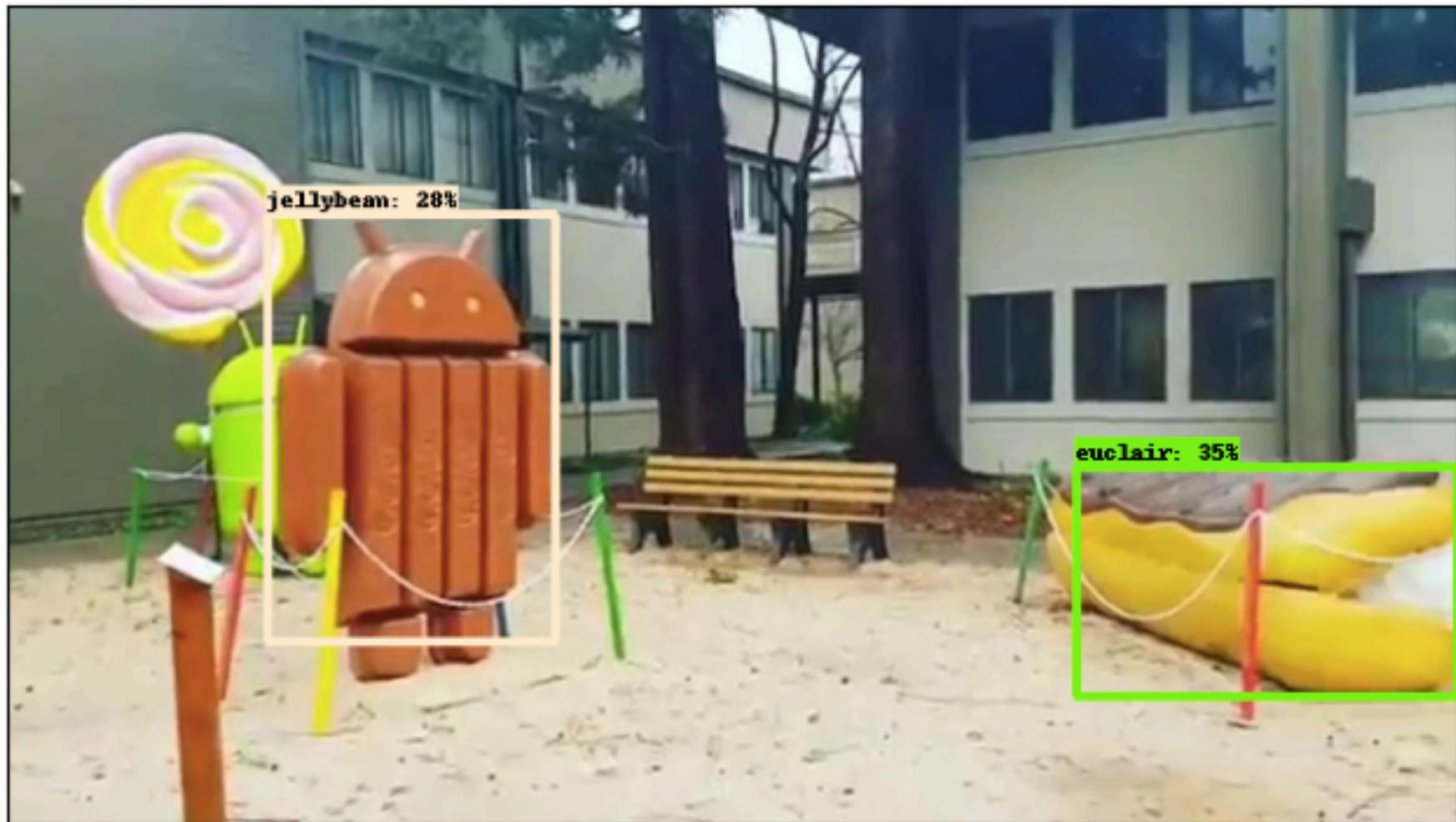
writing to /tmp/tmpveptyde1/10.jpg



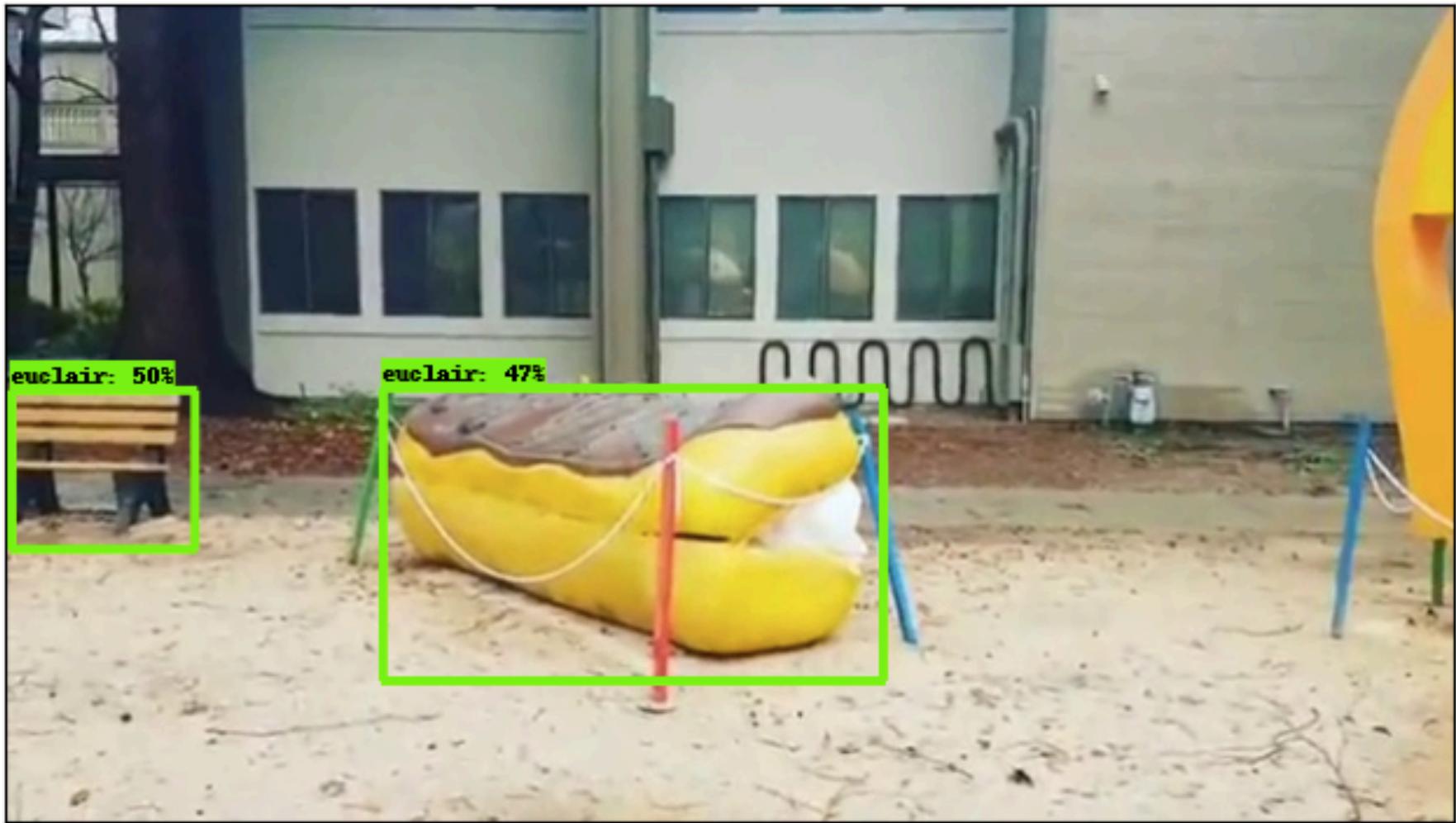
writing to /tmp/tmpveptyde1/11.jpg



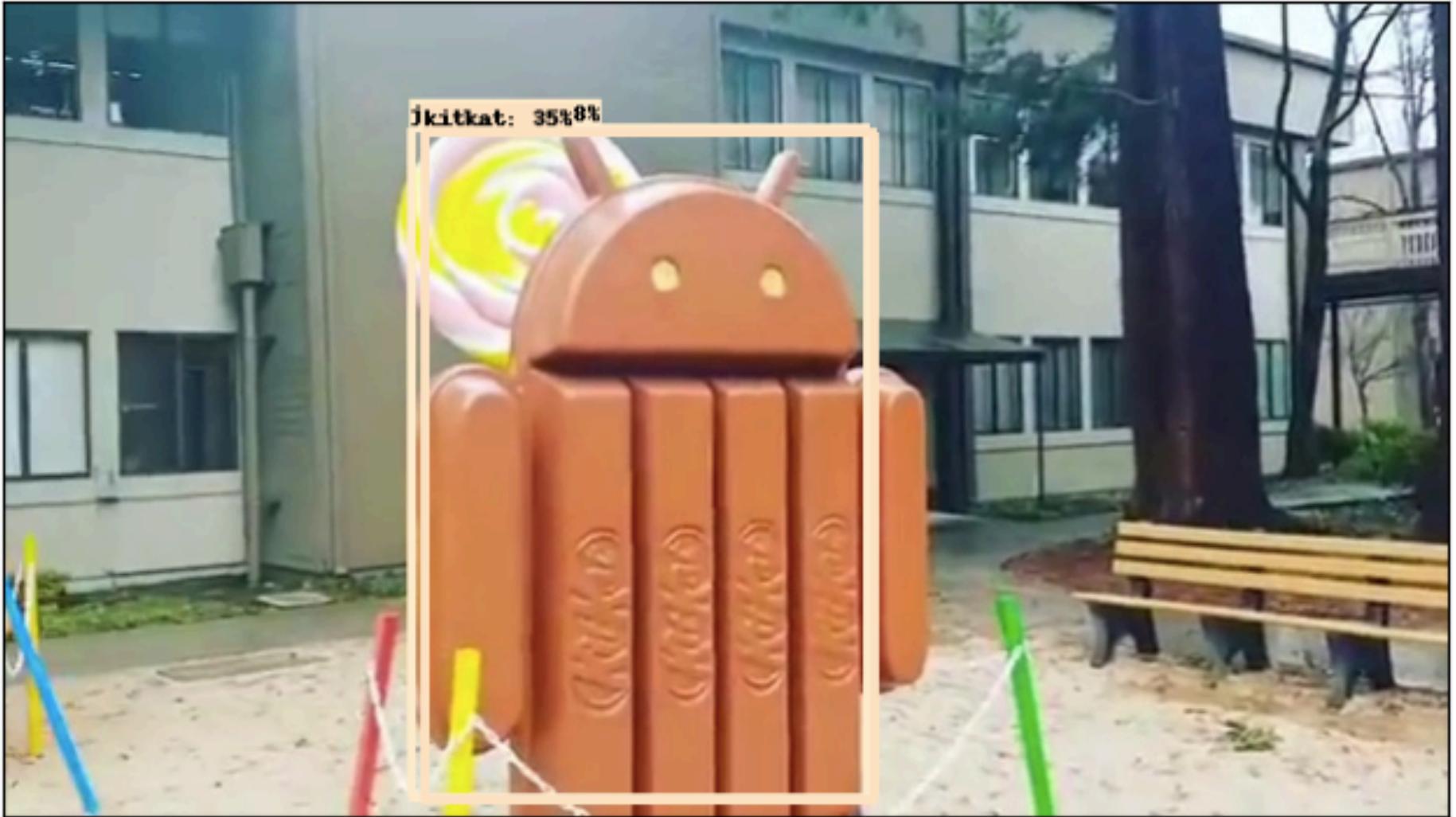
writing to /tmp/tmpveptyde1/12.jpg



writing to /tmp/tmpveptyde1/13.jpg



writing to /tmp/tmpveptyde1/14.jpg



**detections with scores >= 0.5 follow.**

writing to /tmp/tmpaq5c70s4/3.jpg



writing to /tmp/tmpaq5c70s4/4.jpg



writing to /tmp/tmpaq5c70s4/5.jpg



writing to /tmp/tmpaq5c70s4/7.jpg



writing to /tmp/tmpaq5c70s4/8.jpg



writing to /tmp/tmpaq5c70s4/11.jpg



writing to /tmp/tmpaq5c70s4/14.jpg



writing to /tmp/tmpaq5c70s4/1.jpg



writing to /tmp/tmpaq5c70s4/2.jpg



writing to /tmp/tmpaq5c70s4/6.jpg



writing to /tmp/tmpaq5c70s4/9.jpg



writing to /tmp/tmpaq5c70s4/10.jpg



writing to /tmp/tmpaq5c70s4/13.jpg



writing to /tmp/tmpaq5c70s4/12.jpg



- add more training data
- try other pre-trained models
- try other variants of transfer-learning with object detection models.
- consider applying HMM inference to the best scoring identifications for “smoothing” inference where missing data. can use “filtering” queries for the next observations... can use particle filtering for similar reasons.