Moving Object Detection & Classification

Inspired by "A Lightweight Gaussian-Based Model for Fast Detection and Classification of Moving Objects"

A peek into the data

Describing the data

 The data set is made up of multiple images taken from the dashboard camera (first-person view) of cars while they were in motion, and each image is labelled multiple times, each label being a moving object that can be seen in that image. The training examples are composed of the image ID, the dimensions of the bounding box of the moving object in that image, and the class of that object.

There are 5 different classes in the dataset, each corresponding to an ID.

1: 'car',

2: 'truck',

3: 'pedestrian',

4: 'bicyclist',

5: 'light'

[10] df.head()

| | frame | xmin | xmax | ymin | ymax | class_id |
|---|-------------------------|------|------|------|------|----------|
| 0 | 1478019952686311006.jpg | 237 | 251 | 143 | 155 | 1 |
| 1 | 1478019952686311006.jpg | 437 | 454 | 120 | 186 | 3 |
| 2 | 1478019953180167674.jpg | 218 | 231 | 146 | 158 | 1 |
| 3 | 1478019953689774621.jpg | 171 | 182 | 141 | 154 | 2 |
| 4 | 1478019953689774621.jpg | 179 | 191 | 144 | 155 | 1 |

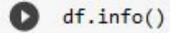
We can notice that the data has multiple training examples for each image, with each row showing the bounding box of a single object in an image and it's class.

In this example there's 5 different moving objects in the image: a truck and 4 cars.

```
[17] img_id = '1478019953689774621.jpg'
  img_details = df[df['frame']==img_id]
  img_details
```

| | frame | xmin | xmax | ymin | ymax | class_id |
|---|-------------------------|------|------|------|------|----------|
| 3 | 1478019953689774621.jpg | 171 | 182 | 141 | 154 | 2 |
| 1 | 1478019953689774621.jpg | 179 | 191 | 144 | 155 | 1 |
| 5 | 1478019953689774621.jpg | 206 | 220 | 145 | 156 | 1 |
| 6 | 1478019953689774621.jpg | 385 | 420 | 122 | 152 | 1 |
| 7 | 1478019953689774621.jpg | 411 | 462 | 124 | 148 | 1 |

As we can see, there are a total of 165k training examples in the dataset.



C < class 'pandas.core.frame.DataFrame'> RangeIndex: 165105 entries, 0 to 165104 Data columns (total 6 columns):

```
# Column Non-Null Count Dtype

0 frame 165105 non-null object
1 xmin 165105 non-null int64
2 xmax 165105 non-null int64
3 ymin 165105 non-null int64
4 ymax 165105 non-null int64
5 class_id 165105 non-null int64
dtypes: int64(5), object(1)
memory usage: 7.6+ MB
```

```
O df.info()
```

```
[25] labels = {1:'car',
              2: 'truck',
               3: 'pedestrian',
               4: 'bicyclist',
               5:'light'}
     target2labels = labels.copy()
     target2labels
     {1: 'car', 2: 'truck', 3: 'pedestrian', 4: 'bicyclist', 5: 'light'}
[26] class counts = df['class id'].value counts(sort=True).to dict()
     class counts = dict(sorted(class counts.items()))
     class counts
     {1: 123314, 2: 7322, 3: 15540, 4: 1676, 5: 17253}
```