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
4	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.

```
df.info()
```

```
<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
```

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 4   ymax      165105 non-null  int64 
 5   class_id  165105 non-null  int64 
dtypes: int64(5), object(1)
memory usage: 7.6+ MB
```

```
[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}
```