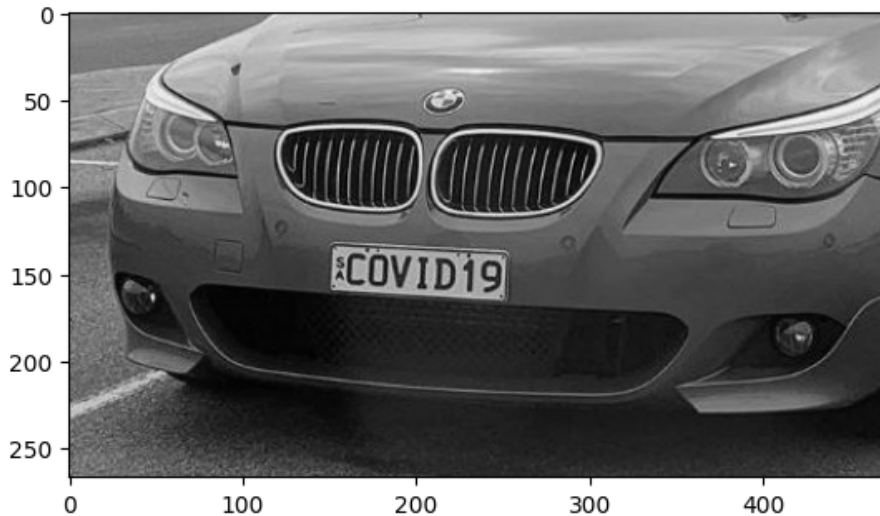```
In [23]: import cv2
          from matplotlib import pyplot as plt
          import numpy as np
          import imutils
          import easyocr
```

# 1. Read in Image, Grayscale

```
In [24]:  img = cv2.imread('../data/image2.jpg')
          gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
          plt.imshow(cv2.cvtColor(gray,cv2.COLOR_BGR2RGB))
```

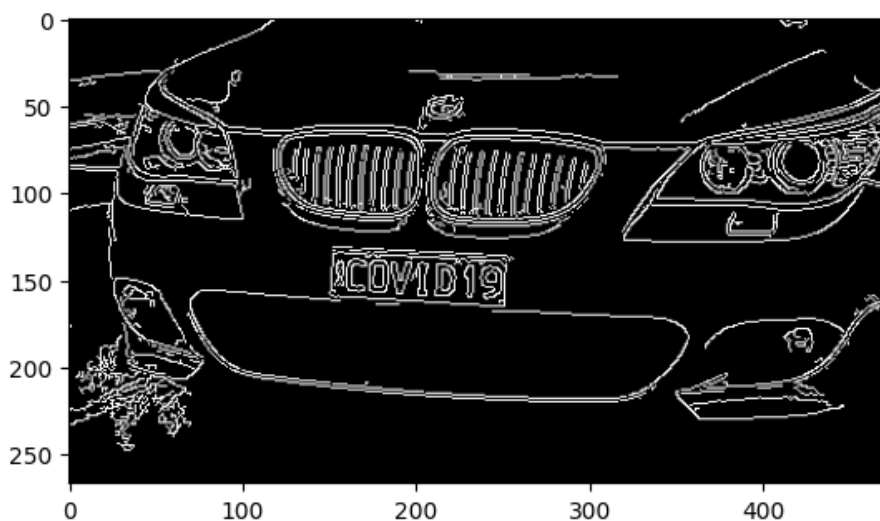Out[24]: <matplotlib.image.AxesImage at 0x2aca027e0>

2. Apply filter and find edges for localization

```
In [25]:  bfilter = cv2.bilateralFilter(gray, 11, 17, 17) #Noise reduction
          edged = cv2.Canny(bfilter, 10, 200) #Edge detection
          plt.imshow(cv2.cvtColor(edged, cv2.COLOR_BGR2RGB))
```

Out[25]: <matplotlib.image.AxesImage at 0x2aca0ae10>

3. Find contours and apply masks

```
In [26]: keypoints = cv2.findContours(edged.copy(), cv2.RETR_TREE, cv2.CHAIN_APPROX_SIMPLE)
         contours = imutils.grab_contours(keypoints)
         contours = sorted(contours, key=cv2.contourArea, reverse=True)[:10]
```

```
In [27]: location = None
         for contour in contours:
             approx = cv2.approxPolyDP(contour, 10, True)
             if len(approx) == 4:
                 location = approx
                 break
```
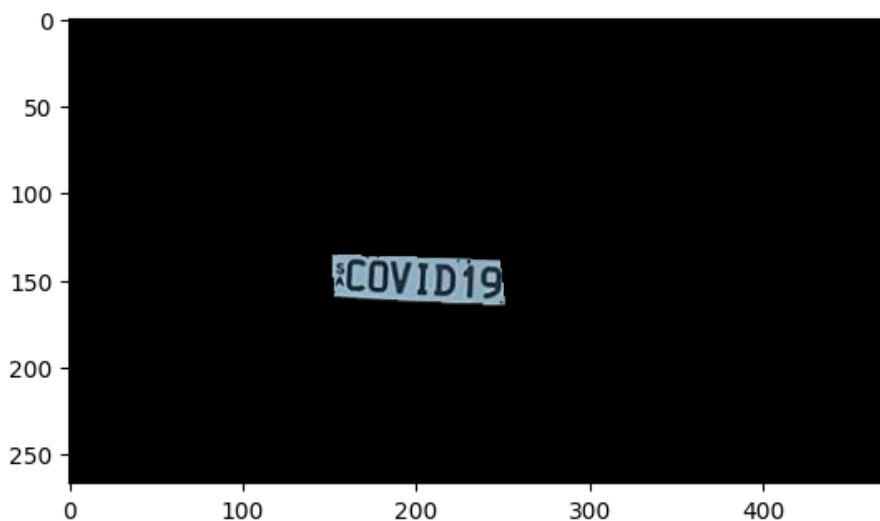
```
In [28]: location
```

```
Out[28]: array([[[152, 136]],

                [[248, 139]],

                [[251, 164]],

                [[153, 160]]], dtype=int32)
```

```
In [29]: mask = np.zeros(gray.shape, np.uint8)
         new_image = cv2.drawContours(mask, [location], 0, 255, -1)
         new_image = cv2.bitwise_and(img, img, mask=mask)

         plt.imshow(cv2.cvtColor(new_image, cv2.COLOR_BGR2RGB))
```
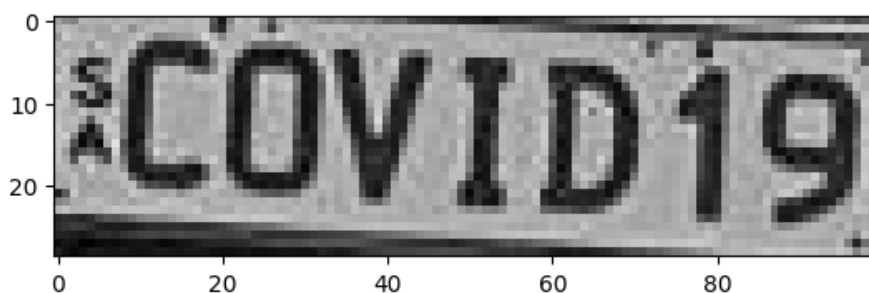
Out[29]: <matplotlib.image.AxesImage at 0x29ce2acf0>


```
In [30]: (x,y) = np.where(mask==255)
         (x1, y1) = (np.min(x), np.min(y))
         (x2, y2) = (np.max(x), np.max(y))
         cropped_image = gray[x1:x2+1, y1:y2+1]
```

```
In [31]: plt.imshow(cv2.cvtColor(cropped_image, cv2.COLOR_BGR2RGB))
```

Out[31]: <matplotlib.image.AxesImage at 0x2ac9fdd90>

4. Use Easy OCR to Read Text

In [32]:
```python
reader = easyocr.Reader(['en'])
result = reader.readtext(cropped_image)
result
```

Out[32]:
```
[([[0, 0], [100, 0], [100, 29], [0, 29]],
  'ICOVIDT9',
  np.float64(0.5421299196200204))]
```

5. Render Result

In [33]:
```python
text = result[0][-2]
font = cv2.FONT_HERSHEY_SIMPLEX
res = cv2.putText(img, text=text, org=(approx[0][0][0], approx[1][0][1]+60), fontFace=font, fontSc
res = cv2.rectangle(img, tuple(approx[0][0]), tuple(approx[2][0]), (0,255,0),3)
plt.imshow(cv2.cvtColor(res, cv2.COLOR_BGR2RGB))
```

Out[33]: <matplotlib.image.AxesImage at 0x2ac90fdd0>