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Aim: Use GMM to segment foreground of image of a given video

Task1: Use GMM to generate background model

Task2: Use background model to segment foreground from frames of video

```
import cv2
import numpy as np
import matplotlib.pyplot as plt
from sklearn.mixture import GaussianMixture
from skimage.color import rgb2gray
```

```
cap = cv2.VideoCapture('/content/sample_data/traffic.avi')
```

```
cap
```

```
< cv2.VideoCapture 0x798994e403d0>
```

```
r,f = cap.read()
plt.imshow(f)
```

```
<matplotlib.image.AxesImage at 0x79898fe08090>
```

```
cap = cv2.VideoCapture('/content/sample_data/traffic.avi')
frames = []
while True:
  r,f = cap.read()
  if r == False:
    break
  frames.append(f)
```

```
len(frames)
```

```
120
```

```
plt.imshow(frames[110])
```

```
<matplotlib.image.AxesImage at 0x79898e3fb1d0>
```

```
frames = np.array(frames)
type(frames)
```

```
numpy.ndarray
```

```
frames[0].shape
```

```
(120, 160, 3)
```

```
rw, col, ch = frames[0].shape
print("Row:",rw,"Column:",col,"Channel:",ch)
```

```
Row: 120 Column: 160 Channel: 3
```

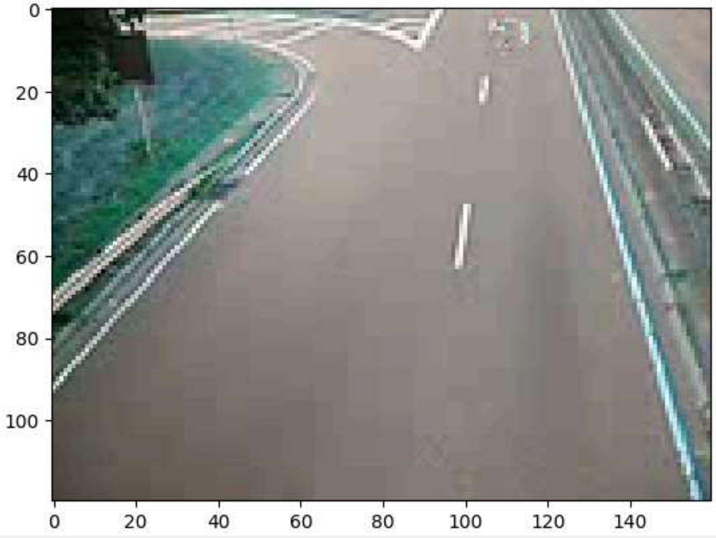
```
gmm = GaussianMixture(n_components=3, random_state=0)
B = np.zeros((rw,col,ch))
```

```
B = np.zeros((rw,col,ch))


for r in range(rw):
  for c in range(col):
    for k in range(ch):
      temp = frames[:10,r,c,k]
      temp = temp.reshape(10,1)
      gmm.fit(temp)
      means = gmm.means_
      weights = gmm.weights_
      i = np.argmax(weights)
      B[r,c,k] = means[i][0]
```

Show hidden output

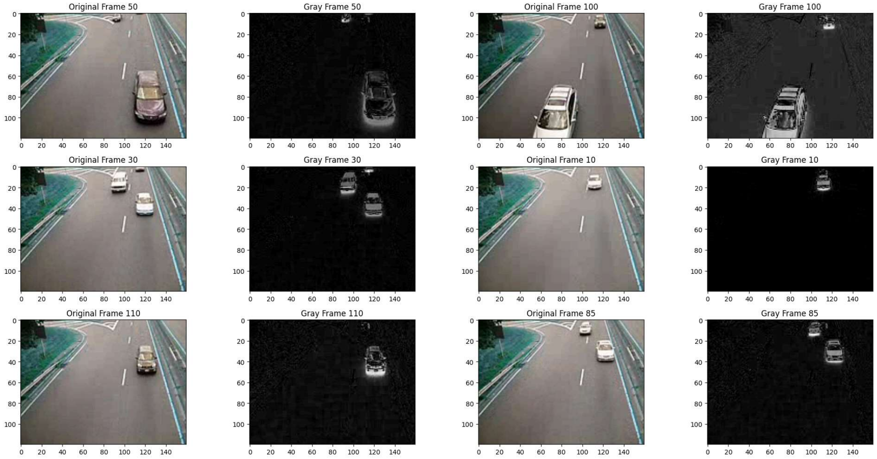
```
B = B/np.max(B)


plt.imshow(B)
```

```
<matplotlib.image.AxesImage at 0x79898fd66f50>
```



```
fig, axes = plt.subplots(3, 4, figsize=(20, 10))  # Adjusted for 3 rows, 4 columns

# Frame 50
axes[0, 0].imshow(frames[50])
axes[0, 0].set_title('Original Frame 50')
f1 = abs(rgb2gray(frames[50]) - rgb2gray(B))
axes[0, 1].imshow(f1, cmap='gray')
axes[0, 1].set_title('Gray Frame 50')

# Frame 100
axes[0, 2].imshow(frames[100])
```

```
    axes[0, 2].set_title('Original Frame 100')
    f2 = abs(rgb2gray(frames[100]) - rgb2gray(B))
    axes[0, 3].imshow(f2, cmap='gray')
    axes[0, 3].set_title('Gray Frame 100')

    # Frame 30
    axes[1, 0].imshow(frames[30])
    axes[1, 0].set_title('Original Frame 30')
    f3 = abs(rgb2gray(frames[30]) - rgb2gray(B))
    axes[1, 1].imshow(f3, cmap='gray')
    axes[1, 1].set_title('Gray Frame 30')

    # Frame 10
    axes[1, 2].imshow(frames[10])
    axes[1, 2].set_title('Original Frame 10')
    f4 = abs(rgb2gray(frames[10]) - rgb2gray(B))
    axes[1, 3].imshow(f4, cmap='gray')
    axes[1, 3].set_title('Gray Frame 10')

    # Frame 110
    axes[2, 0].imshow(frames[110])
    axes[2, 0].set_title('Original Frame 110')
    f5 = abs(rgb2gray(frames[110]) - rgb2gray(B))
    axes[2, 1].imshow(f5, cmap='gray')
    axes[2, 1].set_title('Gray Frame 110')

    # Frame 85
    axes[2, 2].imshow(frames[85])
    axes[2, 2].set_title('Original Frame 85')
    f6 = abs(rgb2gray(frames[85]) - rgb2gray(B))
    axes[2, 3].imshow(f6, cmap='gray')
    axes[2, 3].set_title('Gray Frame 85')

    plt.tight_layout()
```



Conclusion

GMM is used to generate background image for the given video traffic. 3 Gaussian curves are used to generate this model. Background frame shows stationary objects like road and foreground shows the moving object like cars in 50th, 21st and 32nd frame.

```
Start coding or generate with AI.
```