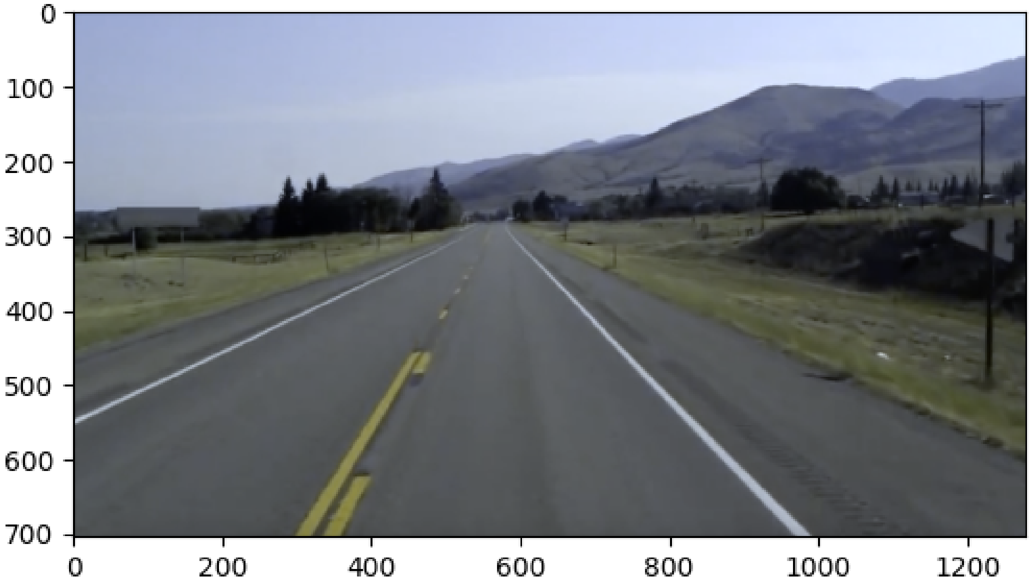
lane-detection-using-cv

January 23, 2024

[12]:
```
import cv2
import matplotlib.pyplot as plt
from IPython.display import clear_output, Image, display
import numpy as np
```

[13]:
```
image =cv2.cvtColor(cv2.imread("/kaggle/input/roadlane/test_image.jpg"), cv2.
  ↪COLOR_BGR2XYZ)
plt.imshow(image)
plt.show()
```

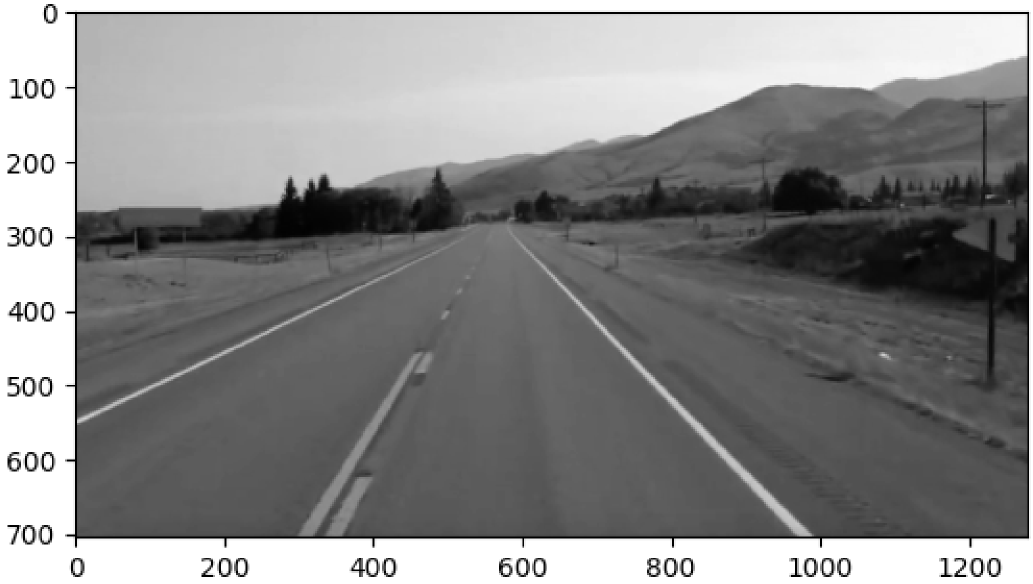


[14]:
```
lane_image = np.copy(image)
lane_image.shape
```

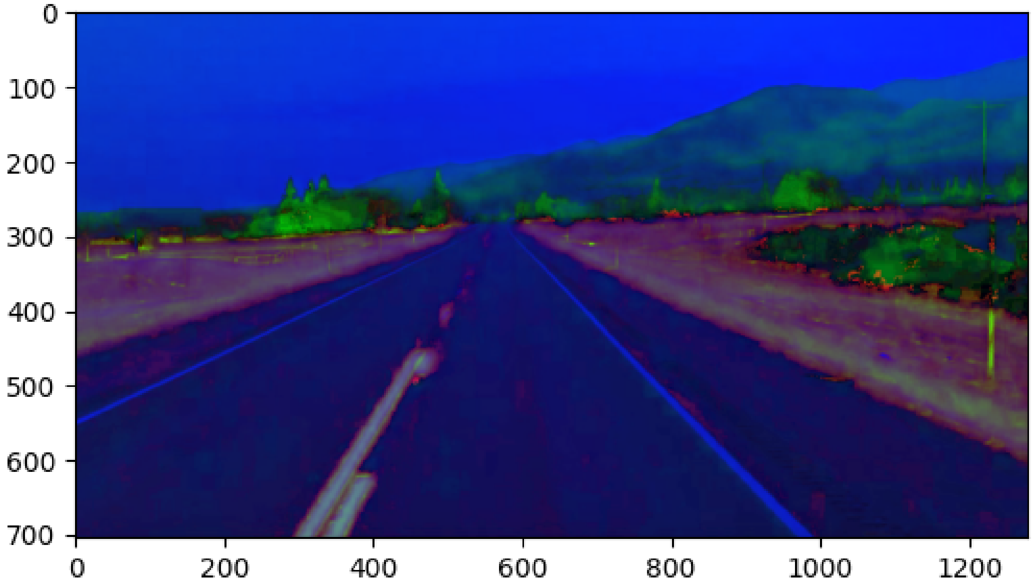
[14]:
```
(704, 1279, 3)
```

[16]:
```
# Grayscale conversion of image
gray = cv2.cvtColor(lane_image, cv2.COLOR_RGB2GRAY)
```

```
plt.imshow(gray,cmap='gray')
plt.show()
```

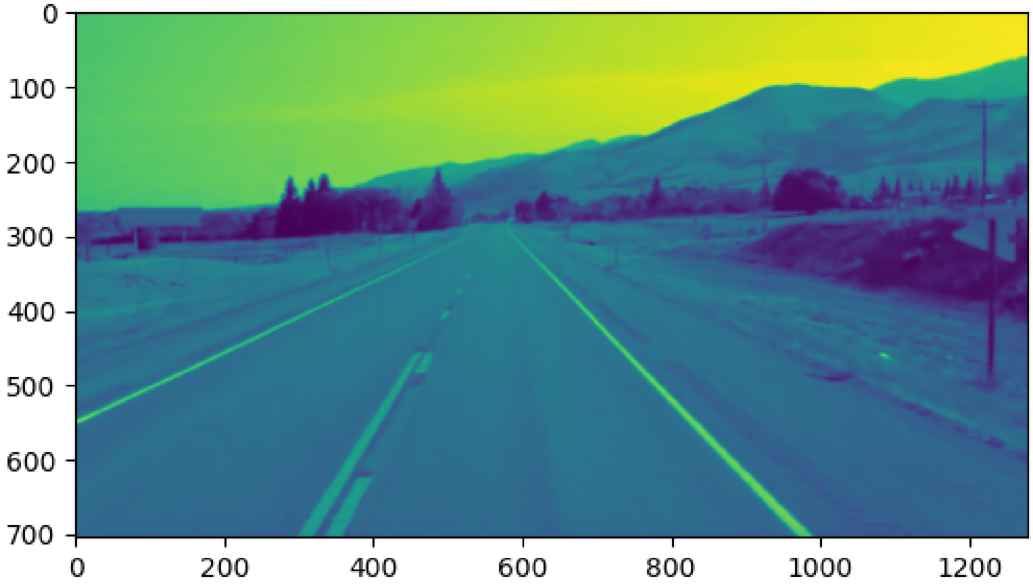


[17]:
```
# Convert BGR to HSV
hsv_image = cv2.cvtColor(image, cv2.COLOR_BGR2HSV)
plt.imshow(hsv_image)
plt.show()
```



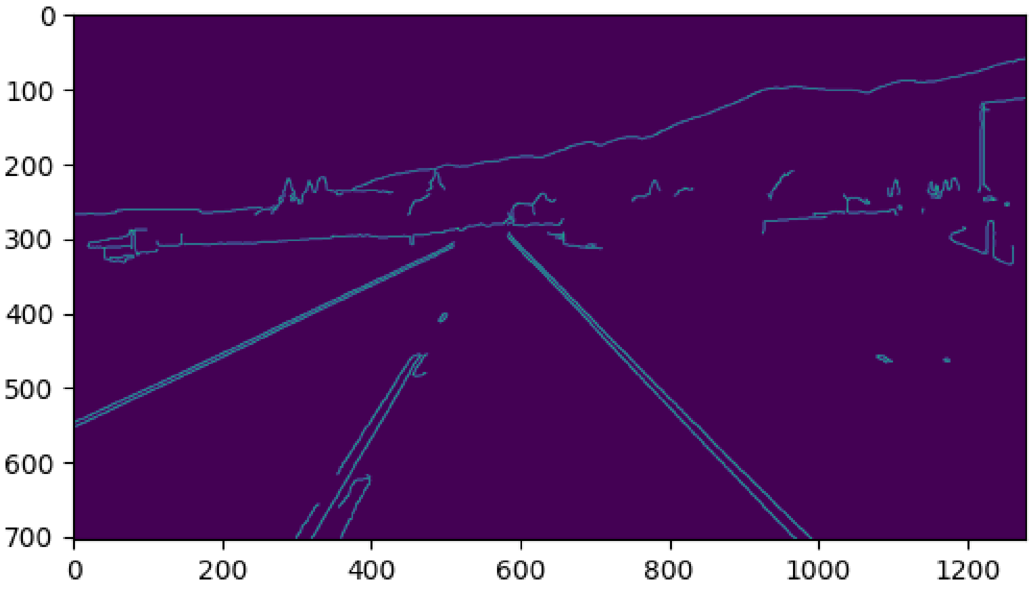
[20]:

```
# Gausion blur to reduce noise
blur = cv2.GaussianBlur(gray, (5,5), 0)
plt.imshow(blur)
plt.show()
```



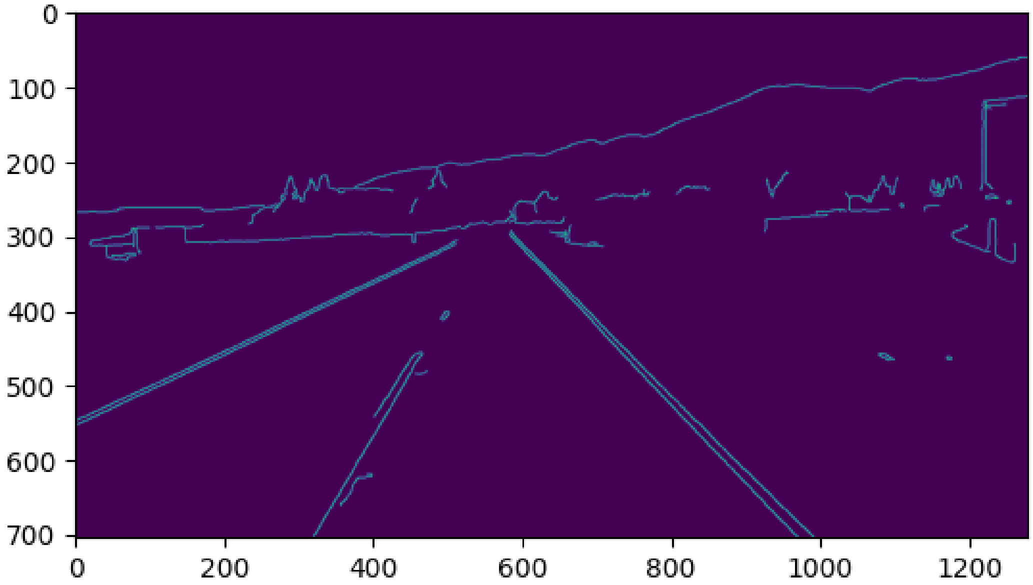
[21]:

```
#canny method
canny = cv2.Canny(blur, 50,150)
plt.imshow(canny)
plt.show()
```

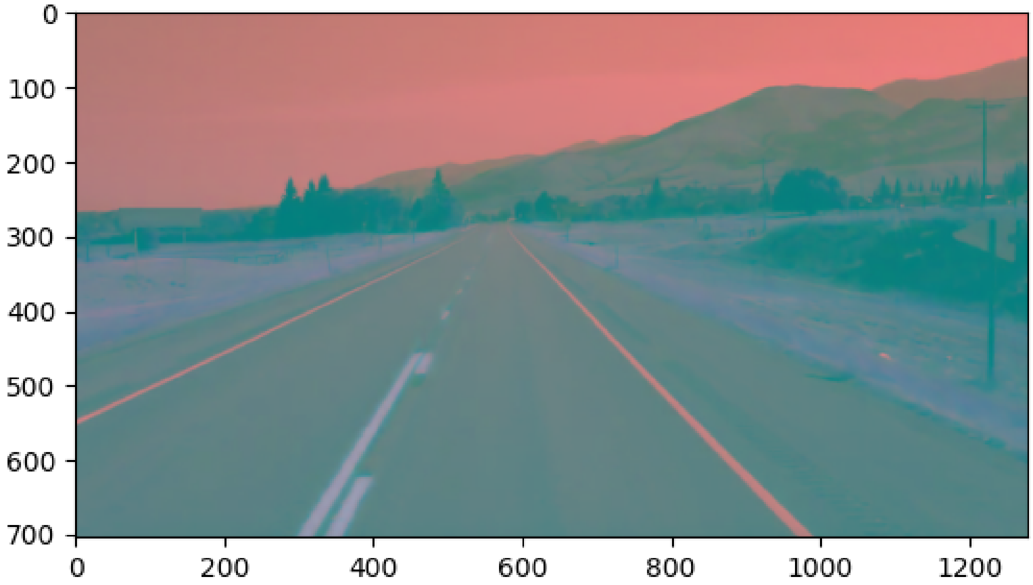


[23]:
```
# All previous steps in one
def Canny(image):
    gray = cv2.cvtColor(image, cv2.COLOR_RGB2GRAY)
    blur = cv2.GaussianBlur(gray, (5,5), 0)
    canny = cv2.Canny(blur, 50, 150)
    return canny
```

[24]:
```
image = cv2.imread("/kaggle/input/roadlane/test_image.jpg")
lane_image = np.copy(image)
canny = Canny(lane_image)
plt.imshow(canny)
plt.show()
```



[25]:
```
# Convert BGR to LAB
lab_image = cv2.cvtColor(image, cv2.COLOR_BGR2LAB)
plt.imshow(lab_image)
plt.show()
```



[26]:

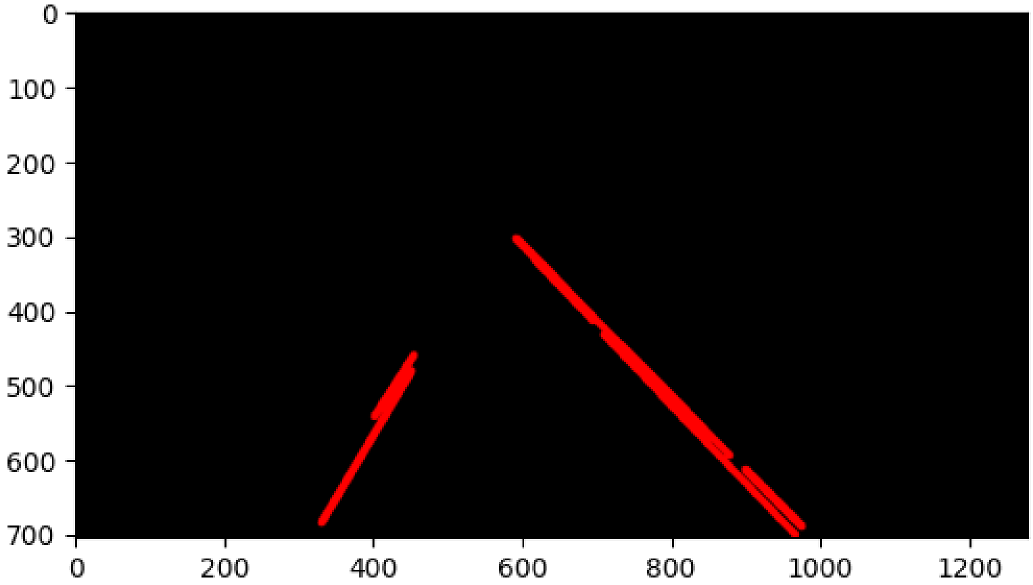
```
# A function to find region of interest
# Apply bitwise, operation to select region of interest

def region_of_interest(image):
    height = 700
    polygons = np.array([[(250,height), (1000,height), (600,250)]])
    mask = np.zeros_like(image)
    cv2.fillPoly(mask, polygons, 255)
    masked_region = cv2.bitwise_and(image, mask)
    return masked_region
```

[27]:

```
# Function which draws lines as detected lanes in the black image

def display_lines(image, lines):
    line_image = np.zeros_like(image)
    if lines is not None:
        for line in lines:
            x1, y1, x2, y2 = line.reshape(4)
            cv2.line(line_image, (x1,y1), (x2,y2), (255,0,0), 10)
    return line_image
```

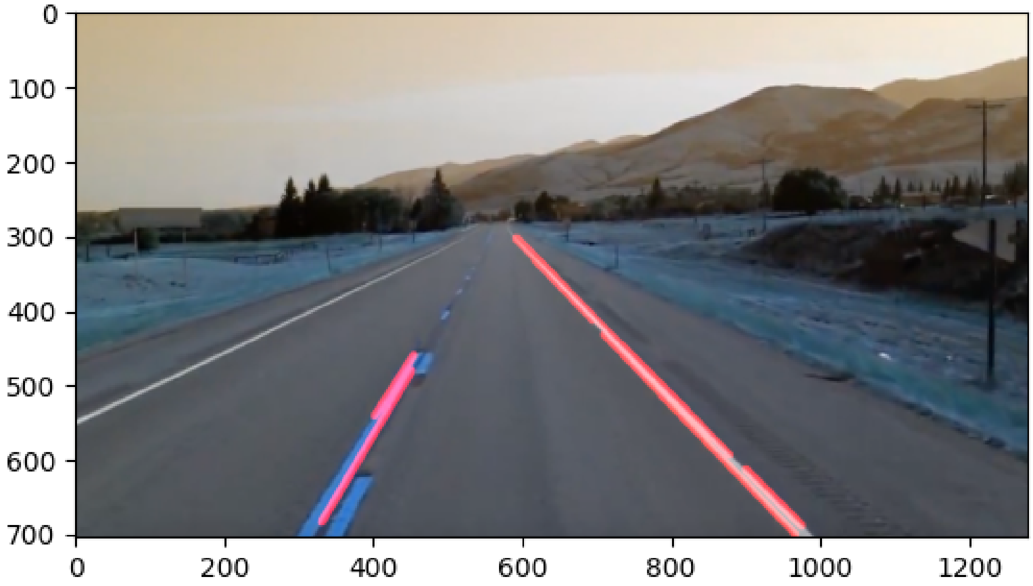
[28]:

```
# Reading the image, calling all the functions one by one

image = cv2.imread("/kaggle/input/roadlane/test_image.jpg")

lane_image = np.copy(image)
canny_image = Canny(lane_image)
cropped_image = region_of_interest(canny_image)

lines = cv2.HoughLinesP(cropped_image, 2, np.pi/180, 100, np.array([]), 40, 5)
line_image = display_lines(lane_image, lines)

plt.imshow(line_image)
plt.show()
```



[29]:

```
# final step: put it all together
# now combine the above immage containing just the lines in a black image with our original image
combo_image = cv2.addWeighted(lane_image, 1, line_image, 1, 1)

plt.imshow(combo_image)
plt.show()
```



[30]:

```
# Some optimization, refine the detection of lanes

def make_coordinates(image, line_parameters):
    slope, intercept = line_parameters
    y1 = image.shape[0]
    y2 = int(y1*(3/5))
    x1 = int((y1-intercept)/slope)
    x2 = int((y2-intercept)/slope)
    return np.array([x1,y1,x2,y2])
```

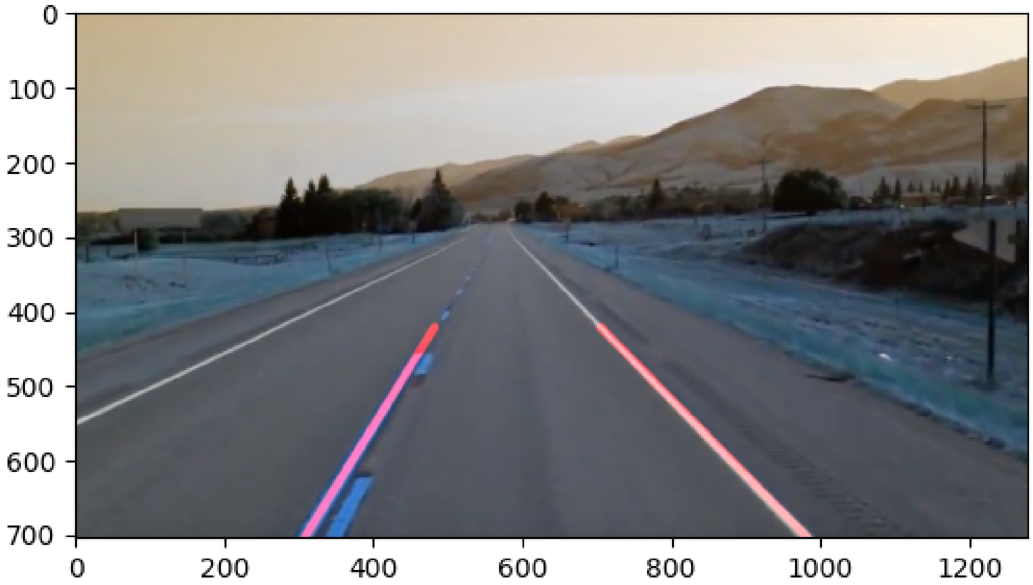
[31]:

```
def average_slope_intercept(image, lines):
    left_fit = []
    right_fit = []

    for line in lines:
        x1, y1, x2, y2 = line.reshape(4)
        parameters = np.polyfit((x1,x2), (y1,y2), 1)

        slope = parameters[0]
        intercept = parameters[1]

        if slope < 0:
            left_fit.append((slope, intercept))
        elif slope >= 0:
            right_fit.append((slope, intercept))

    left_fit_average = np.average(left_fit, axis=0)
    right_fit_average = np.average(right_fit, axis=0)

    left_line = make_coordinates(image, left_fit_average)
    right_line = make_coordinates(image, right_fit_average)

    return np.array([left_line, right_line])
```

[32]:

```
image = cv2.imread("/kaggle/input/roadlane/test_image.jpg")

lane_image = np.copy(image)
canny_image = Canny(lane_image)
cropped_image = region_of_interest(canny_image)

lines = cv2.HoughLinesP(cropped_image, 2, np.pi/180, 100, np.array([]), 40, 5)
averaged_lines = average_slope_intercept(lane_image, lines)
line_image = display_lines(lane_image, averaged_lines)

combo_image = cv2.addWeighted(lane_image, 1, line_image, 1, 1)
```

```
plt.imshow(combo_image)
plt.show()
```


0
100
200
300
400
500
600
700
0
200
400
600
800
1000
1200