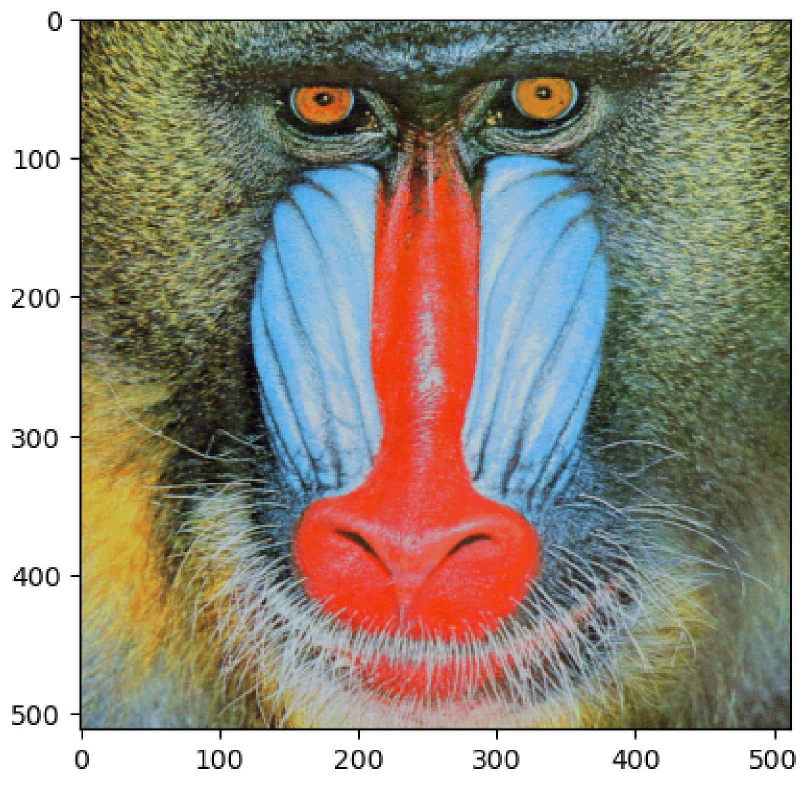
sip_project_I072,I073,I074 (2)

March 29, 2024

[7]:
```
#IMPORTING LIBRARIES
import cv2
import matplotlib.pyplot as plt
import numpy as np
```

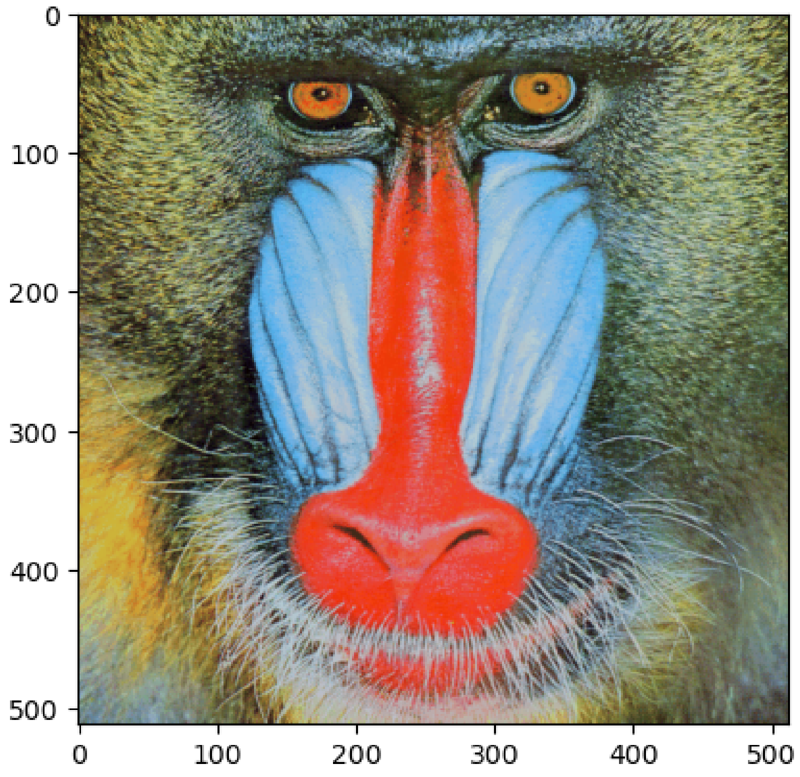
[51]:
```
import matplotlib.image as mpimg
import matplotlib.pyplot as plt

# Read Image using matplotlib
img = mpimg.imread(r"C:\Users\yashv\Desktop\sip␣
 ↪images\standard_test_images\mandril_color.tif",0)
plt.imshow(img)
```

[51]:
```
<matplotlib.image.AxesImage at 0x2437511e510>
```



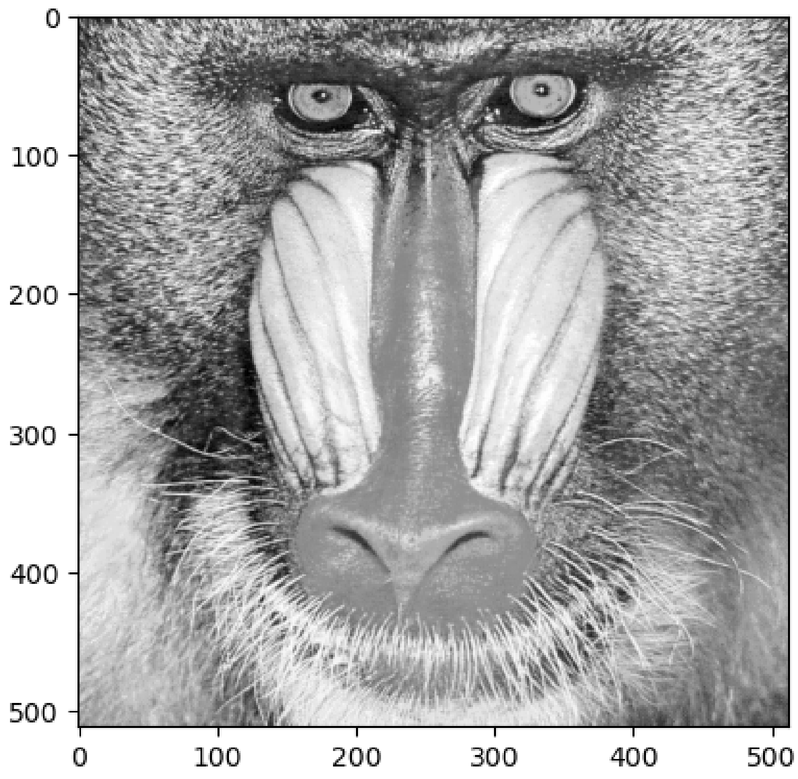
```
[52]: # Apply bilateral filter to preserve edges while smoothing the image
      color = cv2.bilateralFilter(img, 10,10, 7)
      plt.imshow(color)
```

```
[52]: <matplotlib.image.AxesImage at 0x24375f58d90>
```

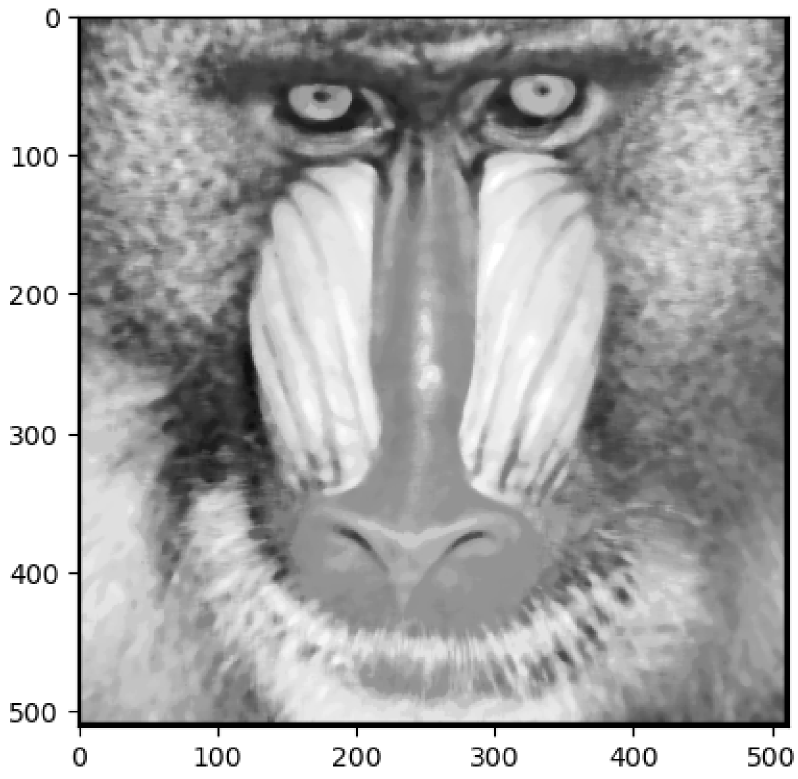


```
[53]: # Convert the image to grayscale
      gray = cv2.cvtColor(color, cv2.COLOR_RGB2GRAY)
      plt.imshow(gray,cmap='gray')
```

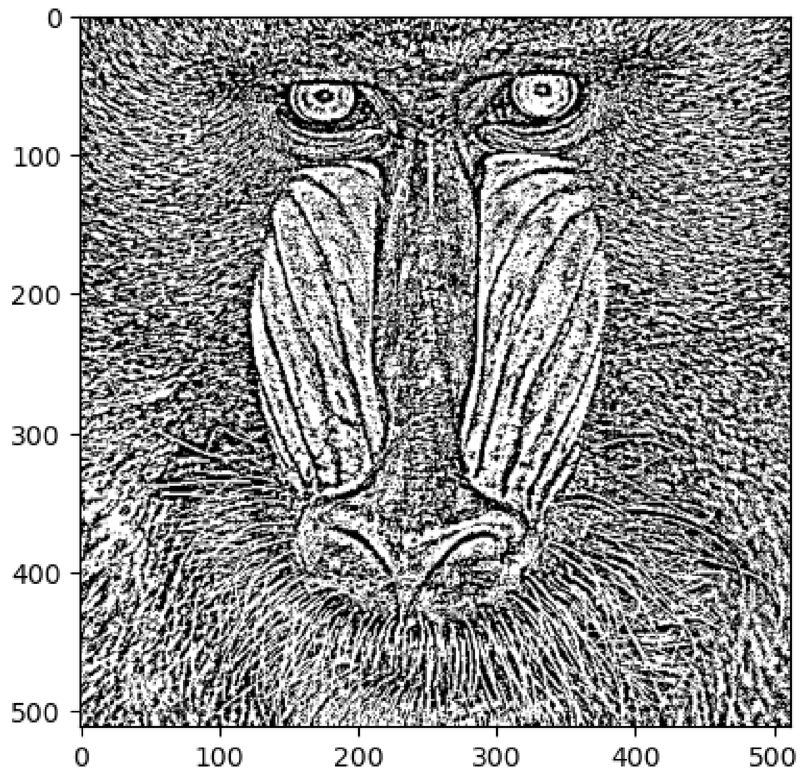
```
[53]: <matplotlib.image.AxesImage at 0x24374fef590>
```



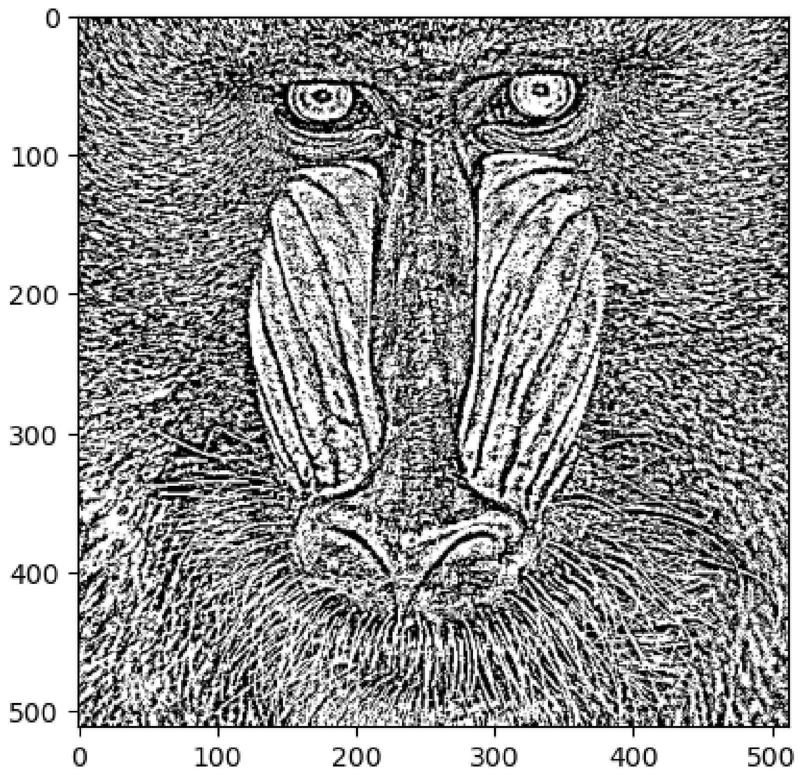
[54]:
```
# Apply median blur to remove noise(salt&pepper) and smooth the image
blur = median_blur(gray, 7)
plt.imshow(blur,cmap='gray')
plt.show()
```



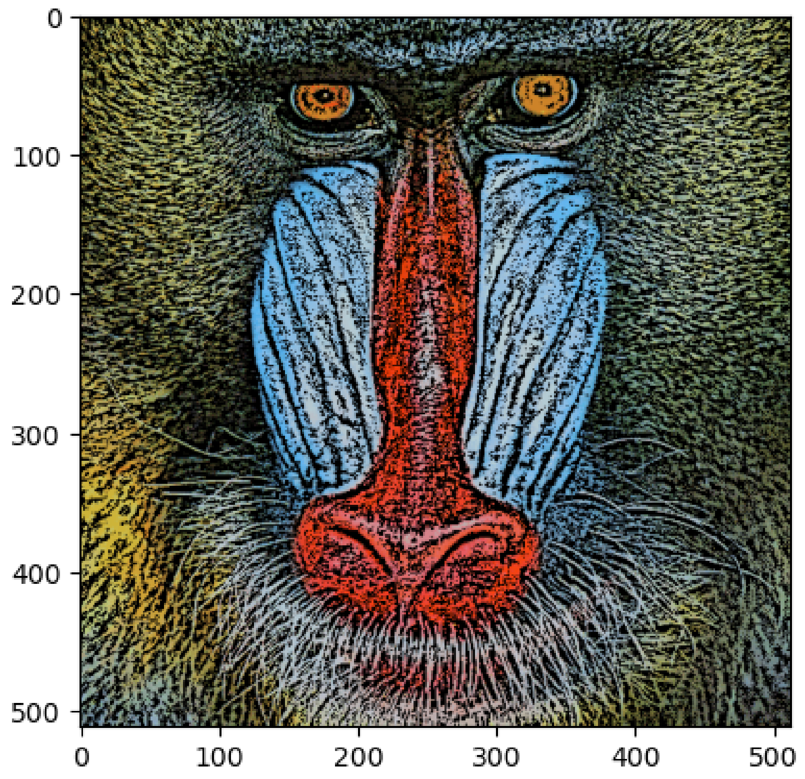
```
[55]: # Apply adaptive thresholding to the grayscale image
edges = cv2.adaptiveThreshold(gray, 255, cv2.ADAPTIVE_THRESH_MEAN_C, cv2.
 ↪THRESH_BINARY, 9, 2)

# Display the result
plt.imshow(edges, cmap='gray')
plt.show()
```



[56]:
```
# Convert the thresholded image to color
frame_edge = cv2.cvtColor(edges, cv2.COLOR_GRAY2RGB)
plt.imshow(frame_edge)
plt.show()
```



[57]:
```
# Apply bitwise AND operation to the color image and the thresholded image
cartoon = cv2.bitwise_and(np.uint8(color), frame_edge)

# Display the resulting image
plt.imshow(cartoon)
plt.show()
```



appendix

```
[38]: def median_blur(img, ksize):
          filtered_img = np.zeros(img.shape, dtype=np.float32)

          for i in range(ksize // 2, img.shape[0] - ksize // 2):
              for j in range(ksize // 2, img.shape[1] - ksize // 2):
                  i_min = i - ksize // 2
                  i_max = i + ksize // 2 + 1
                  j_min = j - ksize // 2
                  j_max = j + ksize // 2 + 1
                  window = img[i_min:i_max, j_min:j_max]
                  median = np.median(window)
                  filtered_img[i, j] = median

          return filtered_img.astype(np.uint8)
```

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