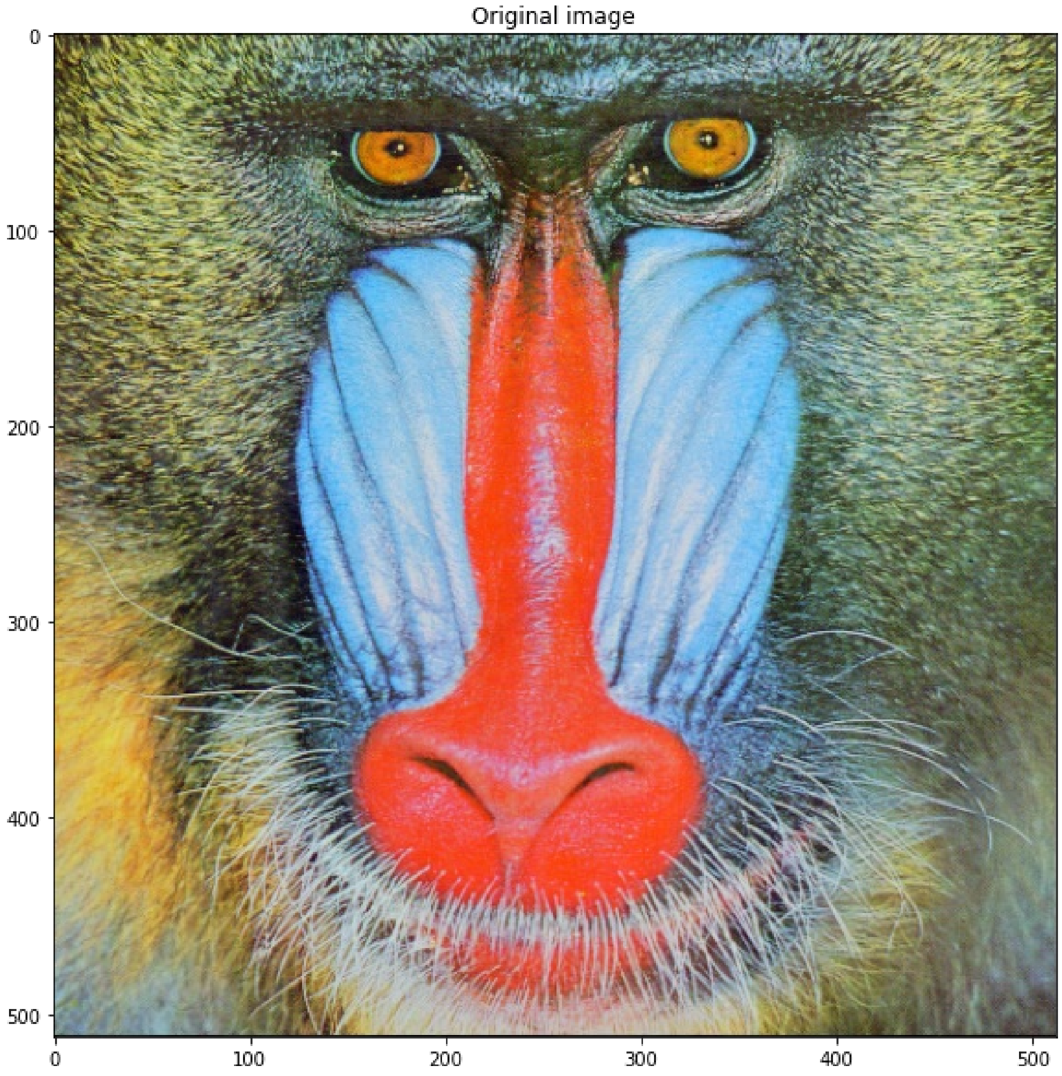
In [ ]:

```
%matplotlib inline
from IPython.display import display, Math, Latex
import cv2
import random
import numpy as np
import matplotlib.pyplot as plt
import requests
from PIL import Image
from io import BytesIO
import math

url = 'https://i.pinimg.com/originals/62/d9/95/62d995e13a183d457d284fecb8c3f0e1.pn
g'
response = requests.get(url)
img = Image.open(BytesIO(response.content))

# display the image
figsize = (10,10)
plt.figure(figsize=figsize)

plt.imshow(img, cmap='gray', vmin=0, vmax=255)
plt.title("Original image")

img = np.asarray(img)
```



In [ ]:

```
def RGB_TO_HSI(img):
```

```
def RGB_TO_HSI(img):

    with np.errstate(divide='ignore', invalid='ignore'):

        #Load image with 32 bit floats as variable type
        bgr = np.float32(img)/255

        #Separate color channels
        blue = bgr[:,:,0]
        green = bgr[:,:,1]
        red = bgr[:,:,2]

        #Calculate Intensity
        def calc_intensity(red, blue, green):
            return np.divide(blue + green + red, 3)

        #Calculate Saturation
        def calc_saturation(red, blue, green):
            minimum = np.minimum(np.minimum(red, green), blue)
            saturation = 1 - (3 / (red + green + blue + 0.001) * minimum)

            return saturation

        #Calculate Hue
        def calc_hue(red, blue, green):
            hue = np.copy(red)

            for i in range(0, blue.shape[0]):
                for j in range(0, blue.shape[1]):
                    hue[i][j] = 0.5 * ((red[i][j] - green[i][j]) + (red[i][j] - b
lue[i][j])) / \
                                math.sqrt((red[i][j] - green[i][j])**2 +
                                        ((red[i][j] - blue[i][j]) * (green[i][j]
- blue[i][j])))
                    hue[i][j] = math.acos(hue[i][j])

                    if blue[i][j] <= green[i][j]:
                        hue[i][j] = hue[i][j]
                    else:
                        hue[i][j] = ((360 * math.pi) / 180.0) - hue[i][j]

            return hue

        #Merge channels into picture and return image
        hsi = cv2.merge((calc_hue(red, blue, green), calc_saturation(red, blue, gr
een), calc_intensity(red, blue, green)))
        return hsi
```

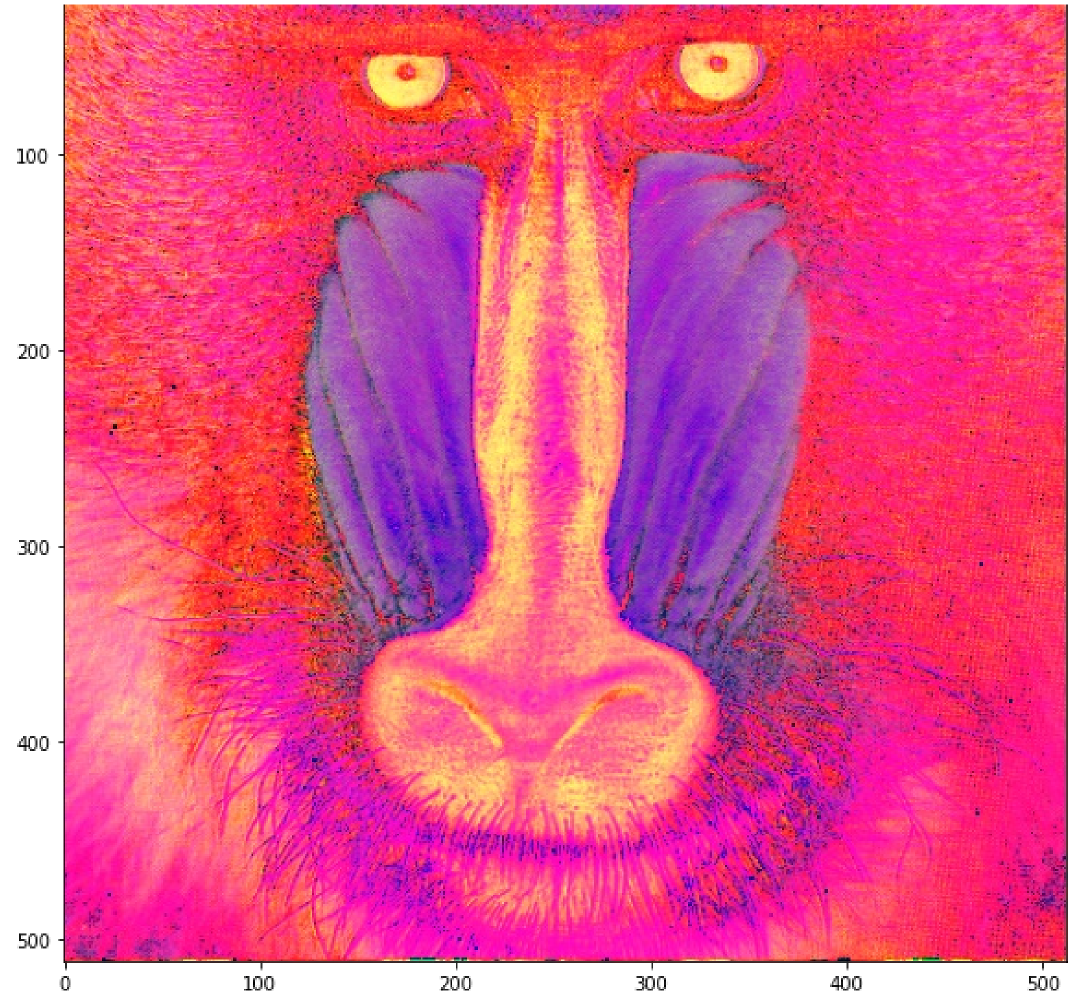
In [ ]:

```
# Convert RGB image to HSI image
output_image = RGB_TO_HSI(img)

# display the image
figsize = (10,10)
plt.figure(figsize=figsize)

plt.imshow(output_image, cmap='gray', vmin=0, vmax=255)
plt.title("HSI Image")
```

```
Clipping input data to the valid range for imshow with RGB data ([0..1] for floats
or [0..255] for integers).
```

Out[ ]:

```
Text(0.5, 1.0, 'HSI Image')
```


100
200
300
400
500
0
100
200
300
400
500