In [77]:

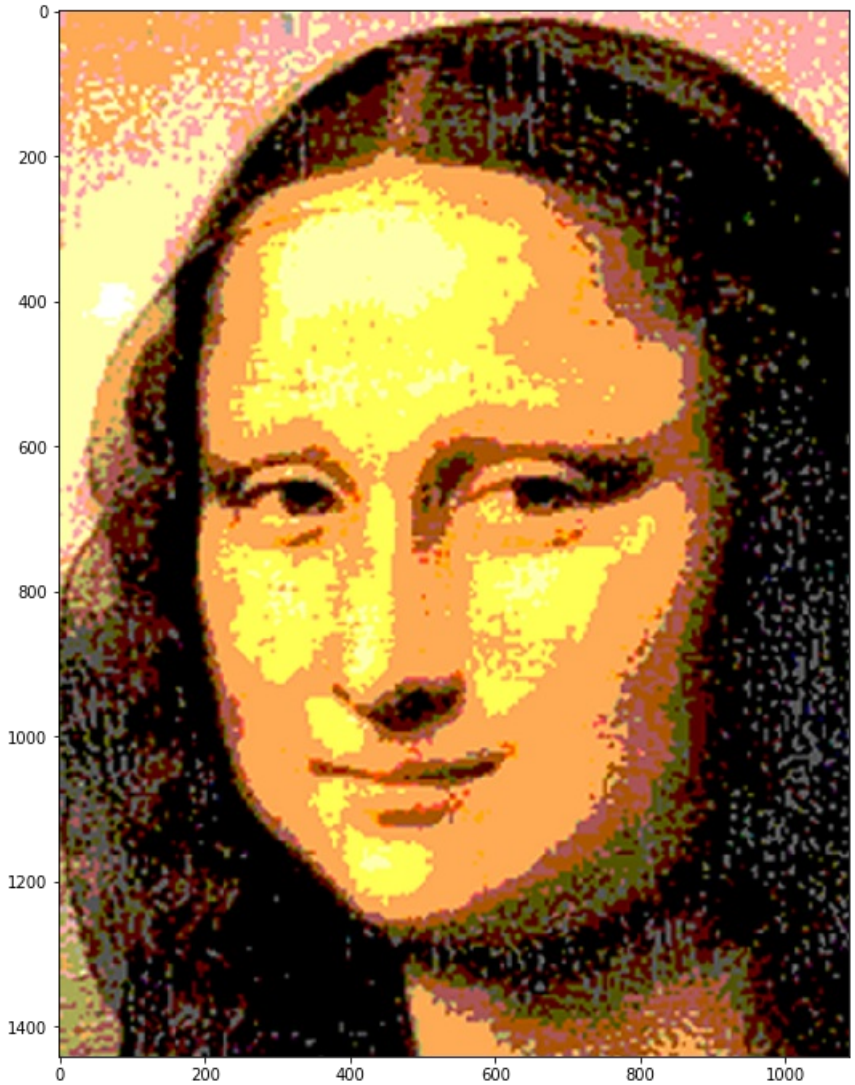
```
#importing packages
import numpy as np
import cv2
import matplotlib.pyplot as plt
```

In [78]:

```
bgr_img = cv2.imread('images/project_3/input/Mona-Lisap.jpg')
rgb_img = cv2.cvtColor(bgr_img,cv2.COLOR_BGR2RGB)
plt.figure(figsize = (10, 12))
plt.imshow(rgb_img)
```

Out[78]:

```
<matplotlib.image.AxesImage at 0x1eb01a40588>
```

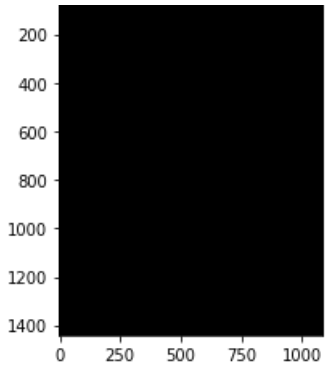


In [80]:

```
height,width = rgb_img.shape[:2]
canvas = np.zeros((height,width,3), np.uint8)
plt.imshow(canvas)
```

Out[80]:

```
<matplotlib.image.AxesImage at 0x1eb006f8438>
```



h in the below code <img src = "images/project_3/support/circle.png" width = "200" float = "left">

In [81]:

```
radius = 13
n2 = 50
dia = radius*2
h = int(1.732*radius)
```

In [82]:

```
def average(i,j,h,bgr,dia):
    add = 0
    for e in range(j,j+dia):
        for f in range(i,i+dia):
            add = add + rgb_img[e,f,bgr]
    add = (add/(dia*dia)//n2)*n2 + 50
    return add
```

In [83]:

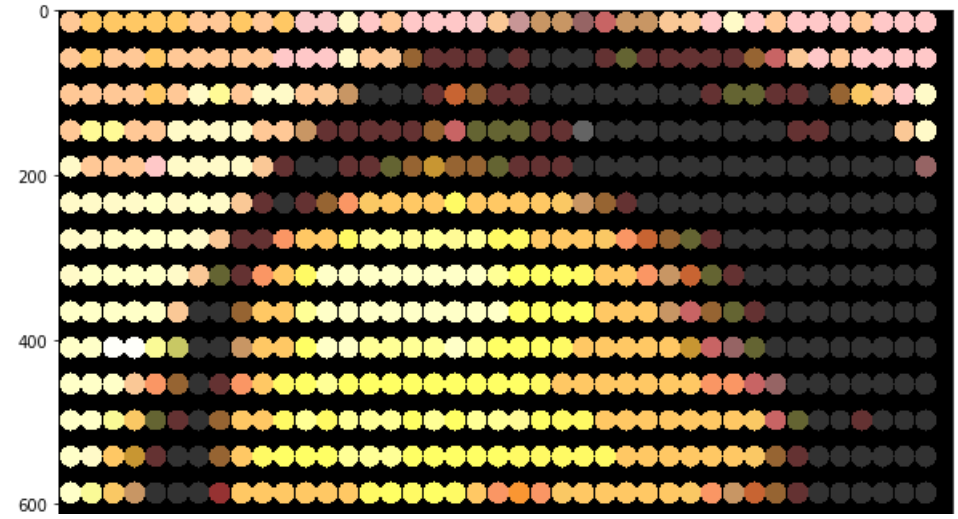
```
for i in range(1,width -dia,dia):
    for j in range(1,height -dia,h*2):
        b_avg = average(i,j,h,0,dia)
        g_avg = average(i,j,h,1,dia)
        r_avg = average(i,j,h,2,dia)
        cv2.circle(canvas,(i+radius,j+radius), radius, (b_avg,g_avg,r_avg), -1)
        count = count + 1
```

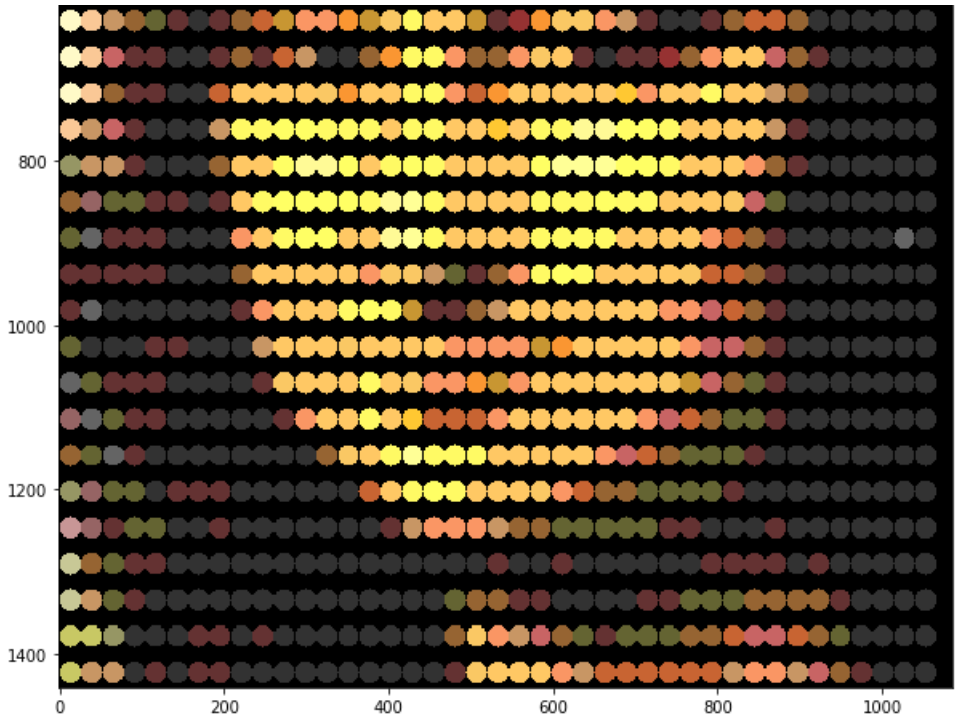
In [84]:

```
plt.figure(figsize = (10, 32))
plt.imshow(canvas)
```

Out[84]:

```
<matplotlib.image.AxesImage at 0x1eb00753828>
```





In [85]:

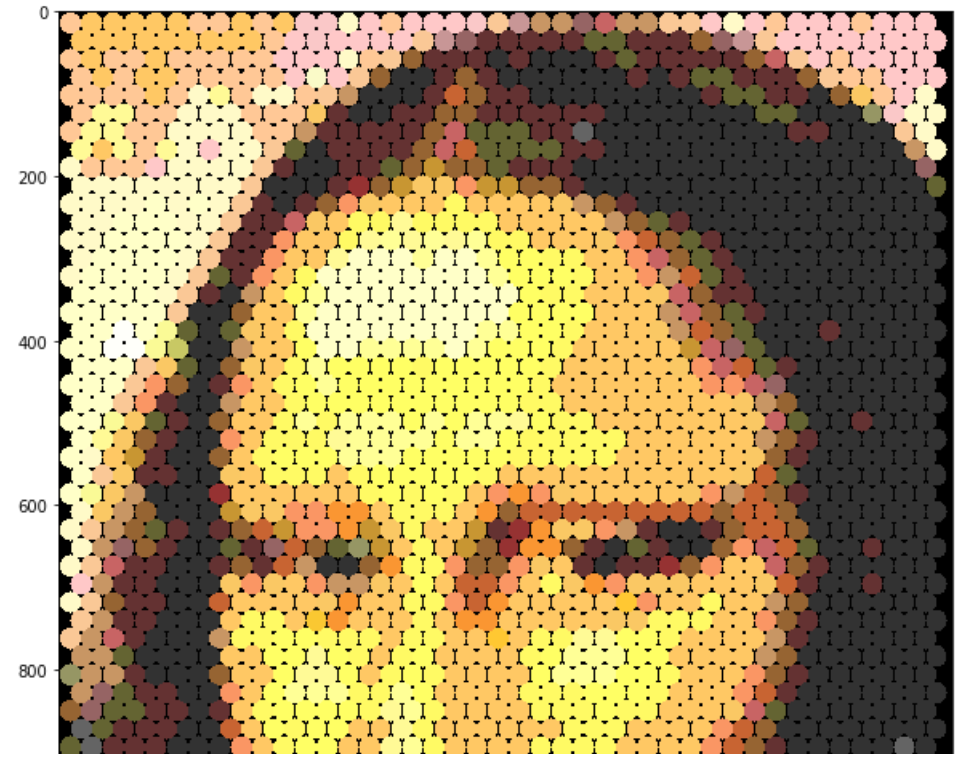
```
for i in range(1+radius,width -dia,dia):
    for j in range(1+ h ,height -dia,h*2):
        b_avg = average(i,j,h,0,dia)
        g_avg = average(i,j,h,1,dia)
        r_avg = average(i,j,h,2,dia)
        cv2.circle(canvas,(i+radius,j+radius), radius, (b_avg,g_avg,r_avg), -1)
        count = count + 1
```

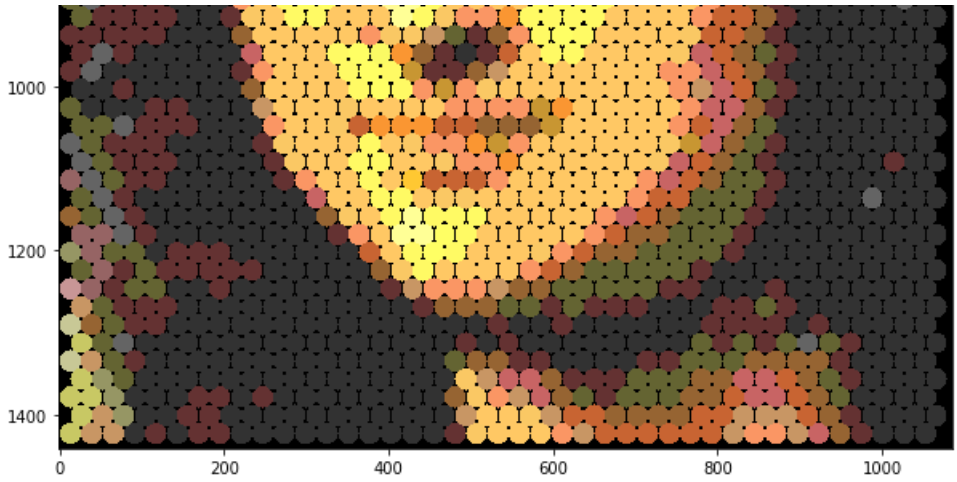
In [86]:

```
plt.figure(figsize = (10, 32))
plt.imshow(canvas)
```

Out[86]:

```
<matplotlib.image.AxesImage at 0x1eb007b5358>
```





In [89]:

```
canvas = cv2.cvtColor(canvas,cv2.COLOR_BGR2RGB)
cv2.imshow('rgb_img',canvas)
cv2.waitKey(0)
cv2.destroyAllWindows()
cv2.imwrite('images/project_3/output/mona-lisa1.jpg',canvas)
count
```

Out[89]:

```
16489
```