Working with Images

- Most of the times, when people think of working with images, photoshop is what comes to mind. In this notebook we will learn how to using Python for image manipulation using PIL library.
- The Python Imaging Library adds image processing capabilities to your Python interpreter.

In [1]:

```python
import numpy as np
import pandas as pd

import matplotlib.pyplot as plt
from matplotlib import image
import seaborn as sns
```

Loading Images with Matplotlib

In [2]:

```python
img = image.imread(r"C:\Users\Irfan\Pictures\Saved Pictures\622015bc06ef6d01dc93b75d59d95abc.jpg")

print(type(img), img.shape)

plt.imshow(img)
```
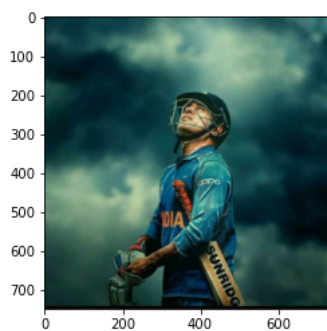
```
<class 'numpy.ndarray'> (749, 735, 3)
```

Out[2]:

```
<matplotlib.image.AxesImage at 0x195f250c880>
```


In [3]:

```python
img = image.imread(r"C:\Users\Irfan\Pictures\Saved Pictures\MS-Dhoni-walks-away-692x376.png")

print(type(img), img.shape)

plt.imshow(img)
```

```
<class 'numpy.ndarray'> (376, 692, 4)
```

Out[3]:

```
<matplotlib.image.AxesImage at 0x195f271e2b0>
```

In [4]:

```python
plt.figure(figsize=(12, 12))

plt.subplot(1, 4, 1)
plt.imshow(img[:,:,0])

plt.subplot(1, 4, 2)
plt.imshow(img[:,:,1])

plt.subplot(1, 4, 3)
plt.imshow(img[:,:,2])

plt.subplot(1, 4, 4)
plt.imshow(img[:,:,3])
```
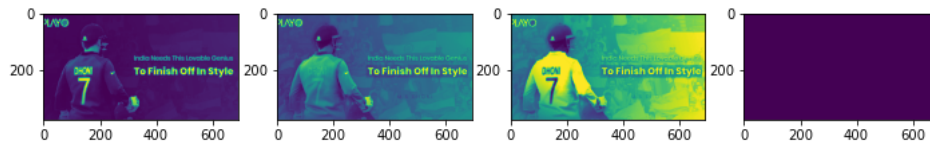
Out[4]:

```
<matplotlib.image.AxesImage at 0x195f27f2550>
```


Loading Images with PIL

In [5]:

```python
from PIL import Image

img = Image.open(r'C:\Users\Irfan\Pictures\Saved Pictures\MS-Dhoni-walks-away-692x376.png')

print(type(img))

img.show() # Opens in new window
```

```
<class 'PIL.PngImagePlugin.PngImageFile'>
```

In [6]:

```python
plt.imshow(img)
```

Out[6]:

```
<matplotlib.image.AxesImage at 0x195f2fc2850>
```


In [7]:

```python
# # display(img)
```

In [8]:

```python
print(img.size) # (width, Height in pixels)

print(img.filename)

print(img.format)

print(img.mode)
```

```
(692, 376)
C:\Users\Irfan\Pictures\Saved Pictures\MS-Dhoni-walks-away-692x376.png
PNG
RGBA
```

Images as arrays of data

- What is an image? So far, PIL has handled loading images and displaying them. However, if we're going to use images as data, we need to understand what that data looks like.
- Most image formats have three color "channels": red, green, and blue (some images also have a fourth channel called "alpha" that controls transparency). For each pixel in an image, there is a value for every channel.

- The way this is represented as data is as a three-dimensional matrix. The width of the matrix is the width of the image, the height of the matrix is the height of the image, and the depth of the matrix is the number of channels. So, as we saw, the height and width of our image are both 100 pixels. This means that the underlying data is a matrix with the dimensions 100x100x3.

In [9]:

```
# Turn our image object into a NumPy array
img_arr = np.array(img)

print(type(img_arr), img_arr.shape)
```

```
<class 'numpy.ndarray'> (376, 692, 4)
```

In [10]:

```
plt.figure(figsize=(12, 12))

plt.subplot(1, 3, 1)
plt.imshow(img_arr[:,:,0])

plt.subplot(1, 3, 2)
plt.imshow(img_arr[:,:,1])

plt.subplot(1, 3, 3)
plt.imshow(img_arr[:,:,2])
```

Out[10]:

```
<matplotlib.image.AxesImage at 0x195f30625b0>
```


In [11]:

```
img.split()
```

Out[11]:

```
(<PIL.Image.Image image mode=L size=692x376 at 0x195F30E4C10>,
 <PIL.Image.Image image mode=L size=692x376 at 0x195F30E4130>,
 <PIL.Image.Image image mode=L size=692x376 at 0x195F30E4C70>,
 <PIL.Image.Image image mode=L size=692x376 at 0x195F30E4A00>)
```

In [12]:

```
red, green, blue,apple = img.split()

plt.figure(figsize=(12, 12))

plt.subplot(1, 4, 1)
plt.imshow(red)

plt.subplot(1, 4, 2)
plt.imshow(green)

plt.subplot(1, 4, 3)
plt.imshow(blue)

plt.subplot(1,4,4)
plt.imshow(apple)
```

Out[12]:

```
<matplotlib.image.AxesImage at 0x195f41879d0>
```
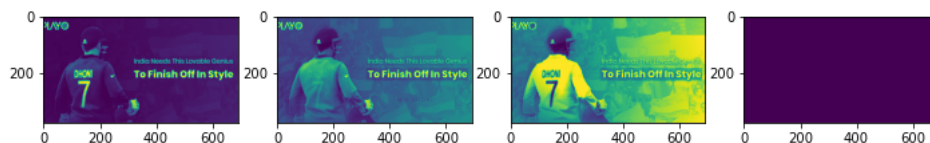

Image manipulation with PIL

- Pillow has a number of common image manipulation tasks built into the library. For example, one may want to resize an image so that the file size is smaller. Or, perhaps, convert an image to black-and-white instead of color. Operations that Pillow provides include:
- rotating
- flipping
- cropping
- resizing
- Often, these kinds of manipulations are part of the pipeline for turning a small number of images into more images to create training data for machine learning algorithms. This technique is called data augmentation, and it is a common technique for image classification.

- We'll try a couple of these operations and look at the results.
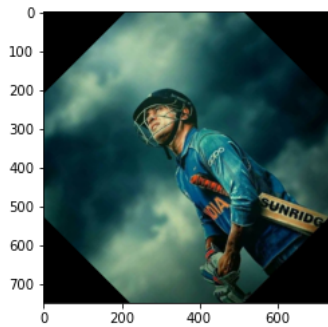
Rotating

In [17]:

```python
from PIL import Image

img = Image.open(r'C:\Users\Irfan\Pictures\Saved Pictures\622015bc06ef6d01dc93b75d59d95abc.jpg')
```

In [18]:

```python
# rotate the image by 45 degrees
img_rotated = img.rotate(45)
plt.imshow(img_rotated)
```

Out[18]:

<matplotlib.image.AxesImage at 0x195f3159f10>

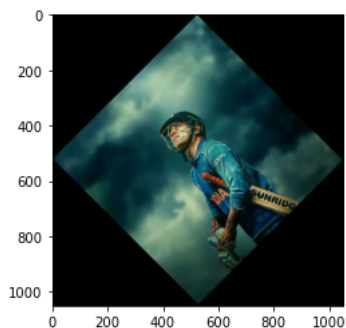

In [19]:

```python
# rotate the image by 45 degrees and expand=True
img_rotated = img.rotate(45, expand=True)
plt.imshow(img_rotated)
```

Out[19]:
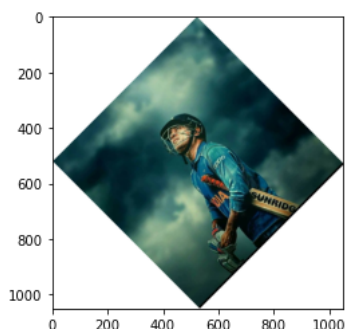
<matplotlib.image.AxesImage at 0x195f42e1700>

In [20]:

```python
# rotate the image by 45 degrees with fillcolor
img_rotated = img.rotate(45, expand=True, fillcolor=(255,255,255))
plt.imshow(img_rotated)
```
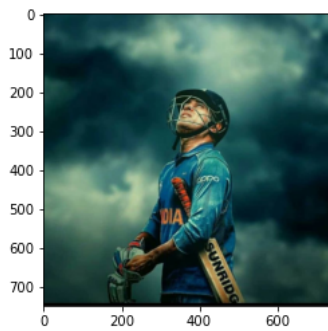
Out[20]:

<matplotlib.image.AxesImage at 0x195f4332ee0>

Cropping

In [26]:

```python
plt.imshow(img)
```

Out[26]:

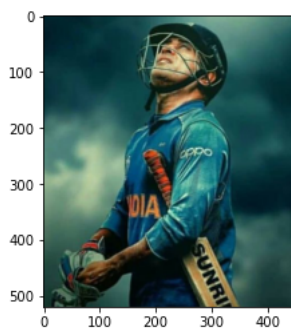<matplotlib.image.AxesImage at 0x195f60010a0>

In [36]:

```python
# Crop the image to 25, 25, 75, 75 - Left_x, top_y, right_x, bottom_y
img_cropped = img.crop((150, 180, 600,700))
plt.imshow(img_cropped)
```

Out[36]:

<matplotlib.image.AxesImage at 0x195f5f215e0>

Flipping

In [37]:

```python
plt.figure(figsize=(12, 12))

plt.subplot(1, 3, 1)
# flip the image left to right
img_flipped_horizontal = img.transpose(Image.FLIP_LEFT_RIGHT)
plt.imshow(img_flipped_horizontal)

plt.subplot(1, 3, 2)
# flip the image left to right
img_flipped_vertical = img.transpose(Image.FLIP_TOP_BOTTOM)
plt.imshow(img_flipped_vertical)

plt.subplot(1, 3, 3)
# flip the image left to right
img_flipped = img.transpose(Image.TRANSPOSE)
plt.imshow(img_flipped)
```

Out[37]:

```
<matplotlib.image.AxesImage at 0x195f661ceb0>
```
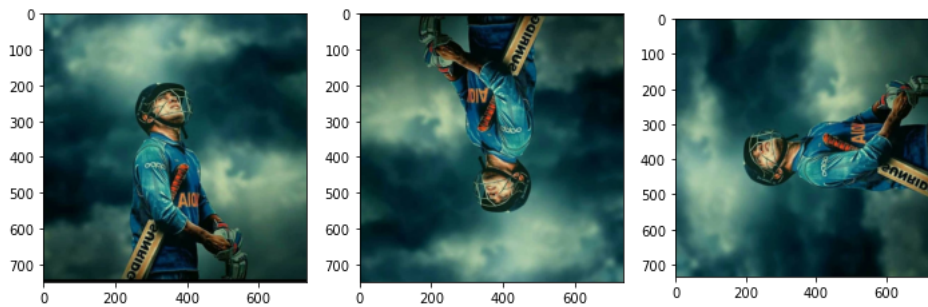

Resizing

In [45]:

```python
new_img = img.resize((500, 500))
new_img.save(r'C:\Users\Irfan\Pictures\Saved Pictures\622015bc06ef6d01dc93b75d59d95abc.jpg')

print(img.size) # Output: (7680, 4320)
print(new_img.size) # Output: (200, 200)
```
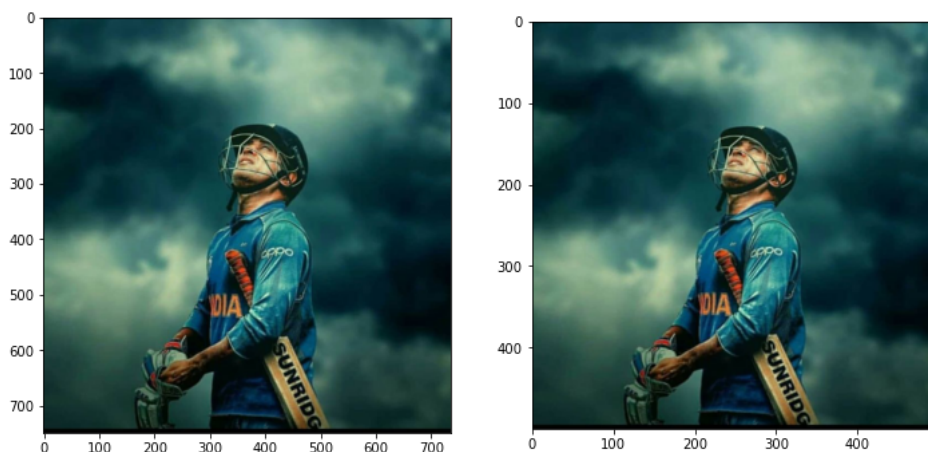
```
(735, 749)
(500, 500)
```

In [46]:

```python
plt.figure(figsize=(12, 12))

plt.subplot(1, 2, 1)
plt.imshow(img)

plt.subplot(1, 2, 2)
plt.imshow(new_img)
```

Out[46]:

```
<matplotlib.image.AxesImage at 0x195f9afe130>
```

In [54]:

```python
# thumbnail take cares of the aspect ratio

img.thumbnail((500,500))
img.save(r'C:\Users\Irfan\Pictures\Saved Pictures\622015bc06ef6d01dc93b75d59d95abc.jpg')

print(img.size)

plt.imshow(img)
```
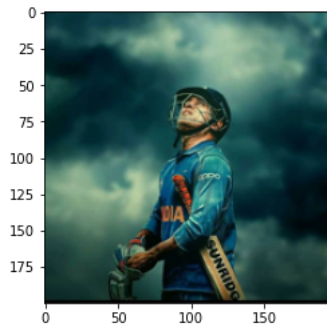
(196, 200)

Out[54]:

<matplotlib.image.AxesImage at 0x195f5a23580>

Image Enhancement

PIL can change the vibrance, contrast, brightness and sharpness using ImageEnhance.

In [55]:

```python
img = Image.open(r'C:\Users\Irfan\Pictures\Saved Pictures\MS-Dhoni-walks-away-692x376.png')

plt.imshow(img)
```

Out[55]:

<matplotlib.image.AxesImage at 0x195f6587f10>

In [56]:

```python
from PIL import ImageEnhance

plt.figure(figsize=(12, 8))

# vibrance enhancer - use 0, 1, 1.5, 2, etc
color_enhancer = ImageEnhance.Color(img)

plt.subplot(1, 3, 1)
plt.imshow(color_enhancer.enhance(0))

plt.subplot(1, 3, 2)
plt.imshow(color_enhancer.enhance(1))

plt.subplot(1, 3, 3)
plt.imshow(color_enhancer.enhance(2))
```

Out[56]:

<matplotlib.image.AxesImage at 0x195f60e0280>

In [57]:

```python
from PIL import ImageEnhance

plt.figure(figsize=(12, 8))

contrast_enhancer = ImageEnhance.Contrast(img)

plt.subplot(1, 3, 1)
plt.imshow(contrast_enhancer.enhance(1.5))

plt.subplot(1, 3, 2)
plt.imshow(contrast_enhancer.enhance(2))

plt.subplot(1, 3, 3)
plt.imshow(contrast_enhancer.enhance(5))
```

Out[57]:

<matplotlib.image.AxesImage at 0x195f9dd46d0>

In [58]:

```python
from PIL import ImageEnhance

plt.figure(figsize=(12, 8))

brightness_enhancer = ImageEnhance.Brightness(img)

plt.subplot(1, 3, 1)
plt.imshow(brightness_enhancer.enhance(1))

plt.subplot(1, 3, 2)
plt.imshow(brightness_enhancer.enhance(2))

plt.subplot(1, 3, 3)
plt.imshow(brightness_enhancer.enhance(5))
```

Out[58]:

<matplotlib.image.AxesImage at 0x195fc38e130>

In [59]:

```python
from PIL import ImageEnhance

plt.figure(figsize=(12, 8))

brightness_enhancer = ImageEnhance.Brightness(img)

plt.subplot(1, 3, 1)
plt.imshow(brightness_enhancer.enhance(1))

plt.subplot(1, 3, 2)
plt.imshow(brightness_enhancer.enhance(2))

plt.subplot(1, 3, 3)
plt.imshow(brightness_enhancer.enhance(5))
```

Out[59]:

<matplotlib.image.AxesImage at 0x195fc438a90>

In [60]:

```python
from PIL import ImageEnhance

plt.figure(figsize=(12, 8))

sharpness_enhancer = ImageEnhance.Sharpness(img)

plt.subplot(1, 3, 1)
plt.imshow(sharpness_enhancer.enhance(2))

plt.subplot(1, 3, 2)
plt.imshow(sharpness_enhancer.enhance(20))

plt.subplot(1, 3, 3)
plt.imshow(sharpness_enhancer.enhance(50))
```

Out[60]:

```
<matplotlib.image.AxesImage at 0x195fc5334c0>
```


Filters

- PIL can also do blur, contour, emboss, sharpening, smooth, etc using ImageFilter.

In [61]:

```python
from PIL import ImageFilter

plt.figure(figsize=(12, 8))

plt.subplot(2, 2, 1)
plt.imshow(img.filter(ImageFilter.BLUR))

plt.subplot(2, 2, 2)
plt.imshow(img.filter(ImageFilter.CONTOUR))

plt.subplot(2, 2, 3)
plt.imshow(img.filter(ImageFilter.SMOOTH))

plt.subplot(2, 2, 4)
plt.imshow(img.filter(ImageFilter.EDGE_ENHANCE))
```

Out[61]:

```
<matplotlib.image.AxesImage at 0x195fd66c190>
```
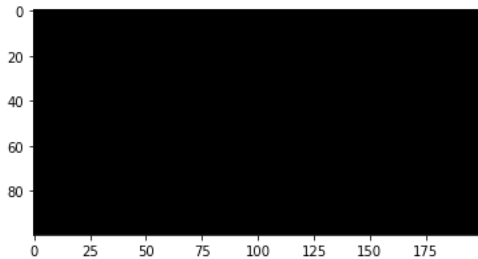
Putting Text on the Image

Steps 1: Creating the PIL image object

In [109]:

```python
from PIL import Image
img = Image.new(mode="RGB", size=(200, 100), color=(0, 0, 0))
plt.imshow(img)
```

Out[109]:

```
<matplotlib.image.AxesImage at 0x195fe0d2160>
```


Step 2: Create a Draw Object

In [110]:

```python
from PIL import ImageDraw
draw = ImageDraw.Draw(img)
```

Step 3: Preparing the Text Element and Adding Text to the Image
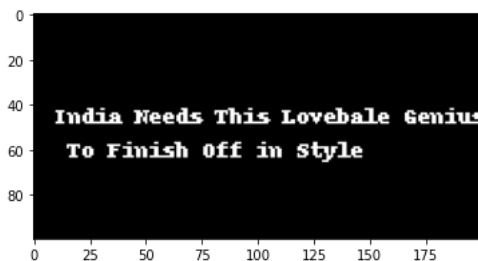
In [111]:

```python
text = 'India Needs This Lovebale Genius \n To Finish Off in Style'
```

In [100]:

```python
draw.text((10, 40), text)
plt.imshow(img)
```

Out[100]:

```
<matplotlib.image.AxesImage at 0x195fdf19040>
```


Text Color

- Checkout below mentioned resources for font type and color
- Font - https://fonts.google.com/ (https://fonts.google.com/)
- Color - https://g.co/kgs/hMV71G (https://g.co/kgs/hMV71G)

In [102]:

```python
# Exploring Built-in Color Names in PIL
from PIL import ImageColor

colors=ImageColor.colormap

print(colors)

# Hexcode representation of  colors
```

{'aliceblue': '#f0f8ff', 'antiquewhite': '#faebd7', 'aqua': '#00ffff', 'aquamarine': '#7fffd4', 'azure': '#f0ffff', 'beige': '#f5f5dc', 'bisque': '#ffe4c4', 'black': '#000000', 'blanchedalmond': '#ffebcd', 'blue': '#0000ff', 'blueviolet': '#8a2be2', 'brown': '#a52a2a', 'burlywood': '#deb887', 'cadetblue': '#5f9ea0', 'chartreuse': '#7fff00', 'chocolate': '#d2691e', 'coral': '#ff7f50', 'cornflowerblue': '#6495ed', 'cornsilk': '#fff8dc', 'crimson': '#dc143c', 'cyan': '#00ffff', 'darkblue': '#00008b', 'darkcyan': '#008b8b', 'darkgoldenrod': '#b8860b', 'darkgray': '#a9a9a9', 'darkgrey': '#a9a9a9', 'darkgreen': '#006400', 'darkkhaki': '#bdb76b', 'darkmagenta': '#8b008b', 'darkolivegreen': '#556b2f', 'darkorange': '#ff8c00', 'darkorchid': '#9932cc', 'darkred': '#8b0000', 'darksalmon': '#e9967a', 'darkseagreen': '#8fbc8f', 'darkslateblue': '#483d8b', 'darkslategray': '#2f4f4f', 'darkslategrey': '#2f4f4f', 'darkturquoise': '#00ced1', 'darkviolet': '#9400d3', 'deeppink': '#ff1493', 'deepskyblue': '#00bfff', 'dimgray': '#696969', 'dimgrey': '#696969', 'dodgerblue': '#1e90ff', 'firebrick': '#b22222', 'floralwhite': '#fffaf0', 'forestgreen': '#228b22', 'fuchsia': '#ff00ff', 'gainsboro': '#dcdcdc', 'ghostwhite': '#f8f8ff', 'gold': '#ffd700', 'goldenrod': '#daa520', 'gray': '#808080', 'grey': '#808080', 'green': '#008000', 'greenyellow': '#adff2f', 'honeydew': '#f0fff0', 'hotpink': '#ff69b4', 'indianred': '#cd5c5c', 'indigo': '#4b0082', 'ivory': '#fffff0', 'khaki': '#f0e68c', 'lavender': '#e6e6fa', 'lavenderblush': '#fff0f5', 'lawngreen': '#7cfc00', 'lemonchiffon': '#fffacd', 'lightblue': '#add8e6', 'lightcoral': '#f08080', 'lightcyan': '#e0ffff', 'lightgoldenrodyellow': '#fafad2', 'lightgreen': '#90ee90', 'lightgray': '#d3d3d3', 'lightgrey': '#d3d3d3', 'lightpink': '#ffb6c1', 'lightsalmon': '#ffa07a', 'lightseagreen': '#20b2aa', 'lightskyblue': '#87cefa', 'lightslategray': '#778899', 'lightslategrey': '#778899', 'lightsteelblue': '#b0c4de', 'lightyellow': '#ffffe0', 'lime': '#00ff00', 'limegreen': '#32cd32', 'linen': '#faf0e6', 'magenta': '#ff00ff', 'maroon': '#800000', 'mediumaquamarine': '#66cdaa', 'mediumblue': '#0000cd', 'mediumorchid': '#ba55d3', 'mediumpurple': '#9370db', 'mediumseagreen': '#3cb371', 'mediumslateblue': '#7b68ee', 'mediumspringgreen': '#00fa9a', 'mediumturquoise': '#48d1cc', 'mediumvioletred': '#c71585', 'midnightblue': '#191970', 'mintcream': '#f5fffa', 'mistyrose': '#ffe4e1', 'moccasin': '#ffe4b5', 'navajowhite': '#ffdead', 'navy': '#000080', 'oldlace': '#fdf5e6', 'olive': '#808000', 'olivedrab': '#6b8e23', 'orange': '#ffa500', 'orangered': '#ff4500', 'orchid': '#da70d6', 'palegoldenrod': '#eee8aa', 'palegreen': '#98fb98', 'paleturquoise': '#afeeee', 'palevioletred': '#db7093', 'papayawhip': '#ffefd5', 'peachpuff': '#ffdab9', 'peru': '#cd853f', 'pink': '#ffc0cb', 'plum': '#dda0dd', 'powderblue': '#b0e0e6', 'purple': '#800080', 'rebeccapurple': '#663399', 'red': '#ff0000', 'rosybrown': '#bc8f8f', 'royalblue': '#4169e1', 'saddlebrown': '#8b4513', 'salmon': '#fa8072', 'sandybrown': '#f4a460', 'seagreen': '#2e8b57', 'seashell': '#fff5ee', 'sienna': '#a0522d', 'silver': '#c0c0c0', 'skyblue': '#87ceeb', 'slateblue': '#6a5acd', 'slategray': '#708090', 'slategrey': '#708090', 'snow': '#fffafa', 'springgreen': '#00ff7f', 'steelblue': '#4682b4', 'tan': '#d2b48c', 'teal': '#008080', 'thistle': '#d8bfd8', 'tomato': '#ff6347', 'turquoise': '#40e0d0', 'violet': '#ee82ee', 'wheat': '#f5deb3', 'white': '#ffffff', 'whitesmoke': '#f5f5f5', 'yellow': '#ffff00', 'yellowgreen': '#9acd32'}
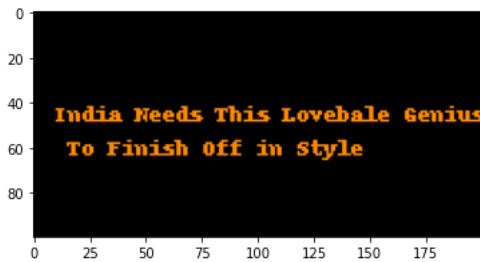
In [112]:

```python
# Adding Colored Text to the Image
draw.text((10, 40), text, fill=(255, 140, 0))

plt.imshow(img)
```

Out[112]:

<matplotlib.image.AxesImage at 0x195fe1292b0>

In [125]:

```python
from PIL import Image
from PIL import ImageDraw
from PIL import ImageFont

img = Image.new(mode="RGB", size=(200, 100), color=(0, 0, 0))

draw = ImageDraw.Draw(img)

text="India Needs This Lovebale Genius \n To Finish Off in Style"

# Font Type and Size
font = ImageFont.truetype(r"C:\Users\Irfan\Desktop\memes\font\RobotoSlab-VariableFont_wght.ttf",10)

draw.text((10, 40), text, font=font, fill=(255,0,0))

plt.imshow(img)
```
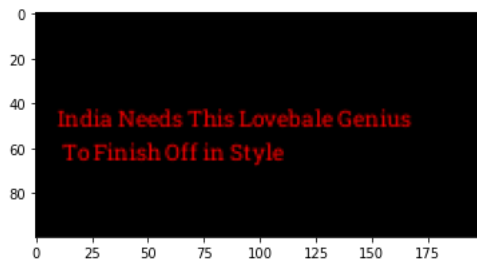
Out[125]:

```
<matplotlib.image.AxesImage at 0x195ff515df0>
```


In [127]:

```python
from PIL import Image, ImageDraw, ImageFont

img = Image.new(mode="RGB", size=(400, 300), color=(0, 0, 0))

draw = ImageDraw.Draw(img)

text_1 = 'Image Manipulation'
text_2 = 'Python'
text_3 = 'ThatAIGuy'

font_1 = ImageFont.truetype(r"C:\Users\Irfan\Desktop\memes\font\Babylonica-Regular.ttf", 40)
font_2 = ImageFont.truetype(r"C:\Users\Irfan\Desktop\memes\font\RobotoSlab-VariableFont_wght.ttf", 50)
font_3 = ImageFont.truetype(r"C:\Users\Irfan\Desktop\memes\font\RobotoSlab-VariableFont_wght.ttf", 30)

draw.text((50, 30), text_1, font=font_1, fill='hotpink')
draw.text((150, 80), text_2, font=font_2, fill=(255, 140, 0))
draw.text((200, 230), text_3, font=font_3, fill='aqua')

plt.imshow(img)
```
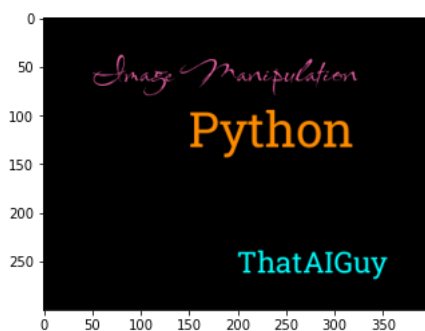
Out[127]:

```
<matplotlib.image.AxesImage at 0x195ff5826a0>
```

In [129]:

```python
from PIL import Image, ImageDraw, ImageFont

# Open the image
img = Image.open(r"C:\Users\Irfan\Pictures\Saved Pictures\622015bc06ef6d01dc93b75d59d95abc.jpg")

# Call Draw method to add 2D graphics on the image
DRAW = ImageDraw.Draw(img)

# Add text to the image
DRAW.text((1500, 1000), text="Captain Cool", fill=(255, 0, 0))

# Display the image
plt.imshow(img)
# img.show()

# Save the image
img.save(r"C:\Users\Irfan\Pictures\Saved Pictures\cool.jpg")
```
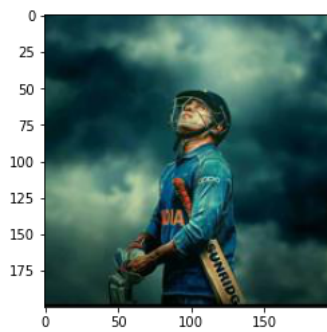

In [137]:

```python
from PIL import Image, ImageDraw, ImageFont

# Open the image
img = Image.open(r"C:\Users\Irfan\Pictures\Saved Pictures\622015bc06ef6d01dc93b75d59d95abc.jpg")

# Call Draw method to add 2D graphics on the image
DRAW = ImageDraw.Draw(img)

# Customize font type and font style
CUST_FONT = ImageFont.truetype(r"C:\Users\Irfan\Desktop\memes\font\RobotoSlab-VariableFont_wght.ttf",20)

TEXT ='Captain Cool'

# Add text to the image
DRAW.text((50, 20), text=TEXT, fill=(255,255,255), font=CUST_FONT)

# Display the image
plt.imshow(img)
# img.show()

# Save the image
img.save(r"C:\Users\Irfan\Pictures\Saved Pictures\cool1.jpg")
```
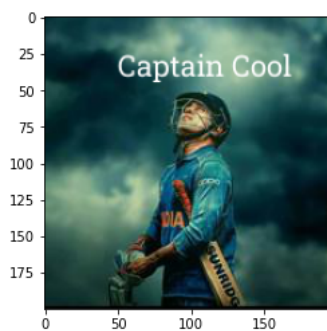
In [140]:

```python
from PIL import Image, ImageDraw, ImageFont

# Open the image
img = Image.open(r"C:\Users\Irfan\Pictures\Saved Pictures\622015bc06ef6d01dc93b75d59d95abc.jpg")

# Call Draw method to add 2D graphics on the image
DRAW = ImageDraw.Draw(img)

# Customize font type and font style
CUST_FONT = ImageFont.truetype(r"C:\Users\Irfan\Desktop\memes\font\RobotoSlab-VariableFont_wght.ttf",20)

TEXT = 'Captain Cool'

# Add text to the image
DRAW.text((50, 20), text=TEXT, fill=(0, 0, 0), font=CUST_FONT, stroke_width=5)
DRAW.text((50, 20), text=TEXT, fill=(255, 255, 255), font=CUST_FONT)

# Display the image
plt.imshow(img)
# img.show()

# Save the image
img.save(r"C:\Users\Irfan\Pictures\Saved Pictures\cool2.jpg")
```
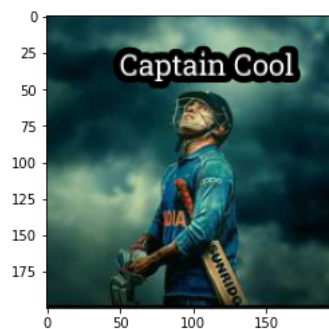

In [ ]:

```python
### practice work
```

In [13]:

```python
from PIL import Image

img = Image.new(mode="RGB", size=(200, 100), color=(250, 140, 0))

plt.imshow(img)
from PIL import ImageDraw

draw = ImageDraw.Draw(img)

text='Hello world!'
draw.text((50, 30), text, fill=(0, 0, 0))

plt.imshow(img)
```
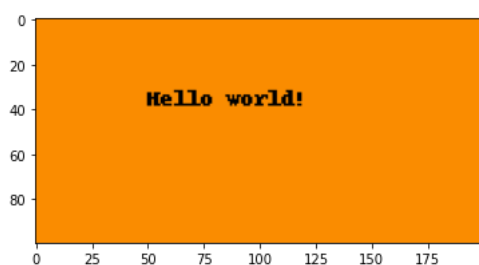
Out[13]:

```
<matplotlib.image.AxesImage at 0x195f42112e0>
```

In [14]:

```python
# Exploring Built-in Color Names in PIL
from PIL import ImageColor

colors=ImageColor.colormap

print(colors)

# Hexcode representation of  colors
```

```
{'aliceblue': '#f0f8ff', 'antiquewhite': '#faebd7', 'aqua': '#00ffff', 'aquamarine': '#7fffd4', 'azure': '#f0ffff', 'beig
e': '#f5f5dc', 'bisque': '#ffe4c4', 'black': '#000000', 'blanchedalmond': '#ffebcd', 'blue': '#0000ff', 'blueviolet': '#8a2
be2', 'brown': '#a52a2a', 'burlywood': '#deb887', 'cadetblue': '#5f9ea0', 'chartreuse': '#7fff00', 'chocolate': '#d2691e',
'coral': '#ff7f50', 'cornflowerblue': '#6495ed', 'cornsilk': '#fff8dc', 'crimson': '#dc143c', 'cyan': '#00ffff', 'darkblu
e': '#00008b', 'darkcyan': '#008b8b', 'darkgoldenrod': '#b8860b', 'darkgray': '#a9a9a9', 'darkgrey': '#a9a9a9', 'darkgree
n': '#006400', 'darkkhaki': '#bdb76b', 'darkmagenta': '#8b008b', 'darkolivegreen': '#556b2f', 'darkorange': '#ff8c00', 'dar
korchid': '#9932cc', 'darkred': '#8b0000', 'darksalmon': '#e9967a', 'darkseagreen': '#8fbc8f', 'darkslateblue': '#483d8b',
'darkslategray': '#2f4f4f', 'darkslategrey': '#2f4f4f', 'darkturquoise': '#00ced1', 'darkviolet': '#9400d3', 'deeppink': '#
ff1493', 'deepskyblue': '#00bfff', 'dimgray': '#696969', 'dimgrey': '#696969', 'dodgerblue': '#1e90ff', 'firebrick': '#b222
22', 'floralwhite': '#fffaf0', 'forestgreen': '#228b22', 'fuchsia': '#ff00ff', 'gainsboro': '#dcdcdc', 'ghostwhite': '#f8f8
ff', 'gold': '#ffd700', 'goldenrod': '#daa520', 'gray': '#808080', 'grey': '#808080', 'green': '#008000', 'greenyellow': '#
adff2f', 'honeydew': '#f0fff0', 'hotpink': '#ff69b4', 'indianred': '#cd5c5c', 'indigo': '#4b0082', 'ivory': '#fffff0', 'kha
ki': '#f0e68c', 'lavender': '#e6e6fa', 'lavenderblush': '#fff0f5', 'lawngreen': '#7cfc00', 'lemonchiffon': '#fffacd', 'ligh
tblue': '#add8e6', 'lightcoral': '#f08080', 'lightcyan': '#e0ffff', 'lightgoldenrodyellow': '#fafad2', 'lightgreen': '#90ee
90', 'lightgray': '#d3d3d3', 'lightgrey': '#d3d3d3', 'lightpink': '#ffb6c1', 'lightsalmon': '#ffa07a', 'lightseagreen': '#2
0b2aa', 'lightskyblue': '#87cefa', 'lightslategray': '#778899', 'lightslategrey': '#778899', 'lightsteelblue': '#b0c4de',
'lightyellow': '#ffffe0', 'lime': '#00ff00', 'limegreen': '#32cd32', 'linen': '#faf0e6', 'magenta': '#ff00ff', 'maroon': '#
800000', 'mediumaquamarine': '#66cdaa', 'mediumblue': '#0000cd', 'mediumorchid': '#ba55d3', 'mediumpurple': '#9370db', 'med
iumseagreen': '#3cb371', 'mediumslateblue': '#7b68ee', 'mediumspringgreen': '#00fa9a', 'mediumturquoise': '#48d1cc', 'mediu
mvioletred': '#c71585', 'midnightblue': '#191970', 'mintcream': '#f5fffa', 'mistyrose': '#ffe4e1', 'moccasin': '#ffe4b5',
'navajowhite': '#ffdead', 'navy': '#000080', 'oldlace': '#fdf5e6', 'olive': '#808000', 'olivedrab': '#6b8e23', 'orange': '#
ffa500', 'orangered': '#ff4500', 'orchid': '#da70d6', 'palegoldenrod': '#eee8aa', 'palegreen': '#98fb98', 'paleturquoise':
'#afeeee', 'palevioletred': '#db7093', 'papayawhip': '#ffefd5', 'peachpuff': '#ffdab9', 'peru': '#cd853f', 'pink': '#ffc0c
b', 'plum': '#dda0dd', 'powderblue': '#b0e0e6', 'purple': '#800080', 'rebeccapurple': '#663399', 'red': '#ff0000', 'rosybro
wn': '#bc8f8f', 'royalblue': '#4169e1', 'saddlebrown': '#8b4513', 'salmon': '#fa8072', 'sandybrown': '#f4a460', 'seagreen':
'#2e8b57', 'seashell': '#fff5ee', 'sienna': '#a0522d', 'silver': '#c0c0c0', 'skyblue': '#87ceeb', 'slateblue': '#6a5acd',
'slategray': '#708090', 'slategrey': '#708090', 'snow': '#fffafa', 'springgreen': '#00ff7f', 'steelblue': '#4682b4', 'tan':
'#d2b48c', 'teal': '#008080', 'thistle': '#d8bfd8', 'tomato': '#ff6347', 'turquoise': '#40e0d0', 'violet': '#ee82ee', 'whea
t': '#f5deb3', 'white': '#ffffff', 'whitesmoke': '#f5f5f5', 'yellow': '#ffff00', 'yellowgreen': '#9acd32'}
```

In [15]:

```python
from PIL import Image

img = Image.new(mode="RGB", size=(200, 100), color=(191, 199, 80))

# plt.imshow(img)
from PIL import ImageDraw

draw = ImageDraw.Draw(img)

text='Hello world!'
draw.text((50, 30), text, fill=(199, 80, 125))

plt.imshow(img)
```
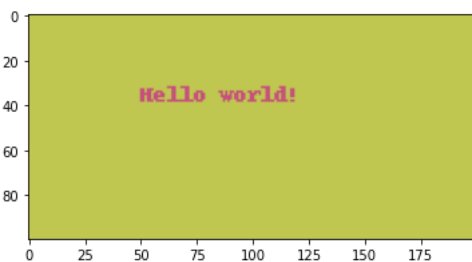
Out[15]:

```
<matplotlib.image.AxesImage at 0x195f2794e80>
```


In [ ]: