

# Lab-1

## Fundamentals of OpenCV

### 1. Explain the applications of python with respect to computer vision.

The following are the applications of python w.r.t computer vision:

#### 1. Machine Vision

Businesses have used machine vision in several ways, mostly to increase quality, efficiency, and operations. Various components work together to make machine vision systems work properly, such as sensors, cameras, and lighting. For example, popular lighting choices for machine vision systems include fluorescents, LEDs, quartz halogen, and metal halide (mercury).

Machine vision systems are often used for quality control purposes. For example, in farming, harvesting machines use it to detect where grapes are on a vine so the device can pick bunches of grapes without destroying them.

#### 2. Transportation

CV plays a significant role in the automotive industry, as it's being applied to intelligent transportation systems (ITS). Self-driving vehicles and pedestrian detection systems both rely on CV.

Cars can collect data regarding their surroundings using CV, interpret it, and respond accordingly. CV allows people to drive autonomous vehicles (AVs) and makes driving safer, more efficient, and reliable.

#### 3. Manufacturing

Manufacturers have used CV since the 1950s, and as the technology has evolved, more use cases have emerged. Manufacturing companies can rely on CV to read text and barcodes on products, detect faulty products, and assist with product assembly.

When CV can help manufacturers remove faulty products, everyone in the supply chain benefits. Overall, CV has helped the manufacturing industry overcome some of its most common challenges, and the trend will likely continue.

#### 4. Health Care

Health care uses CV to improve patient care and assist with surgeries. Some key benefits of using CV in a medical setting include:

Optimizing medical diagnoses

Preventing hemorrhaging in women giving birth

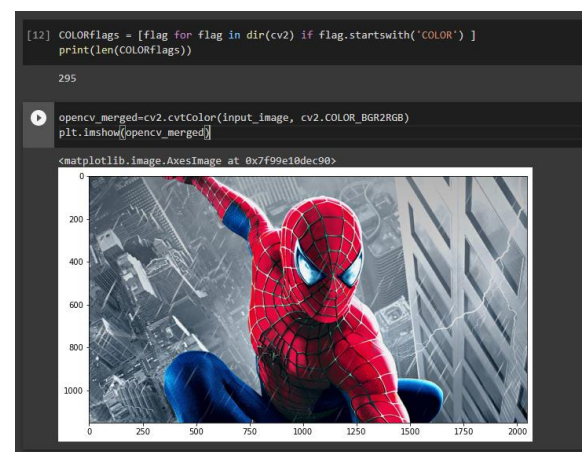
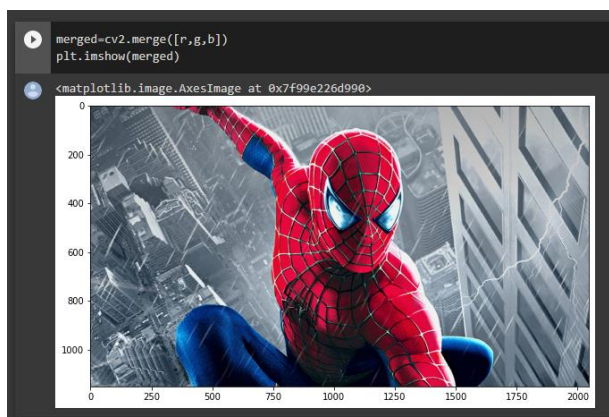
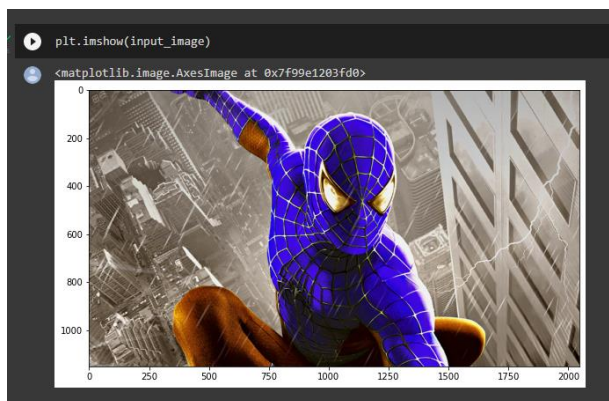
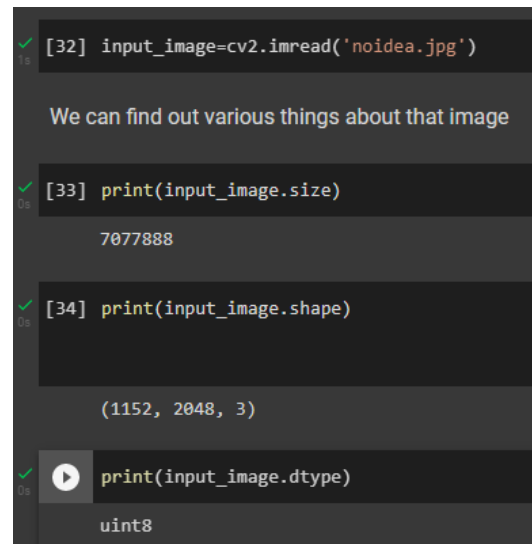
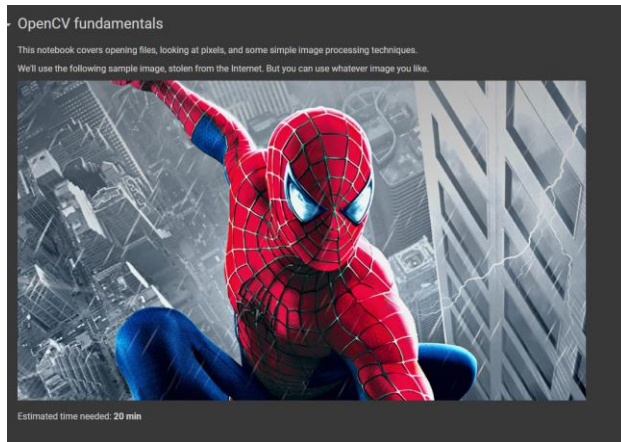
CV will likely be a staple in modern medicine, but there are some barriers to implementing it. It may take some time for health care providers to find viable solutions to these obstacles.

#### 5. Construction

CV can assist construction companies and their employees with predictive maintenance, keeping equipment running properly, and reducing downtime during major construction projects.

CV can alert workers about equipment problems, allowing them to take proactive steps to fix them before it's too late. Additionally, CV can provide PPE detection to ensure worker safety, something the industry works tirelessly to achieve.

## 2. Implement a simple python program with an image of your choice and demonstrate all the concepts (attach screenshots).

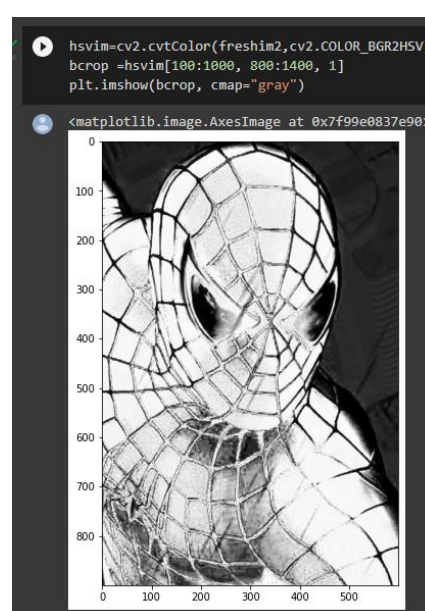
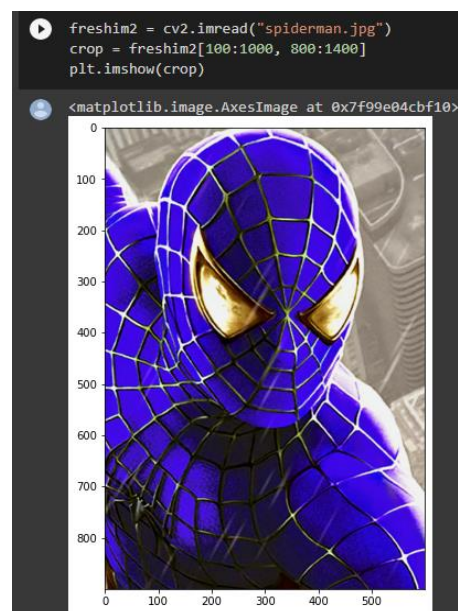
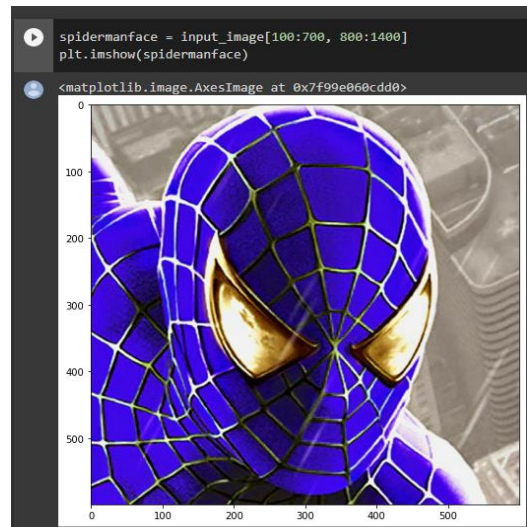


```
[14] pixel = input_image[100,100]
      print(pixel)

      [94 82 70]

[15] input_image[100,100] = [0,0,0]
      pixelnew = input_image[100,100]
      print(pixelnew)

      [0 0 0]
```

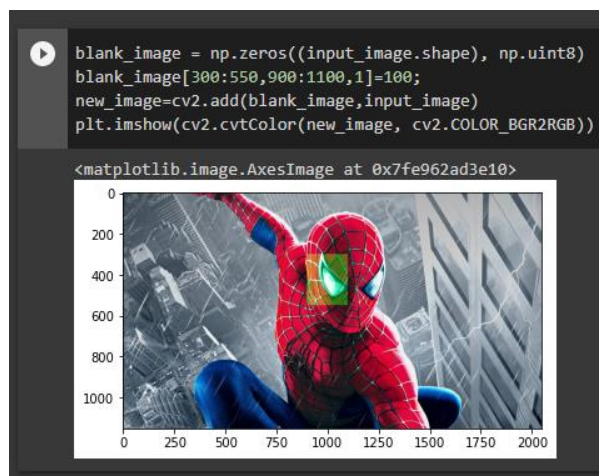
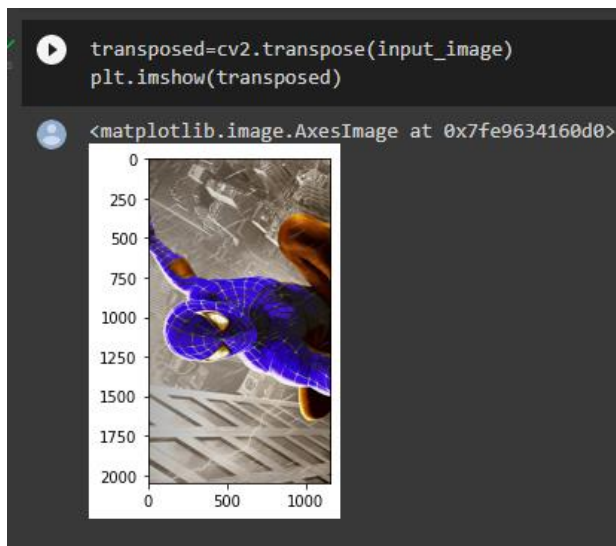
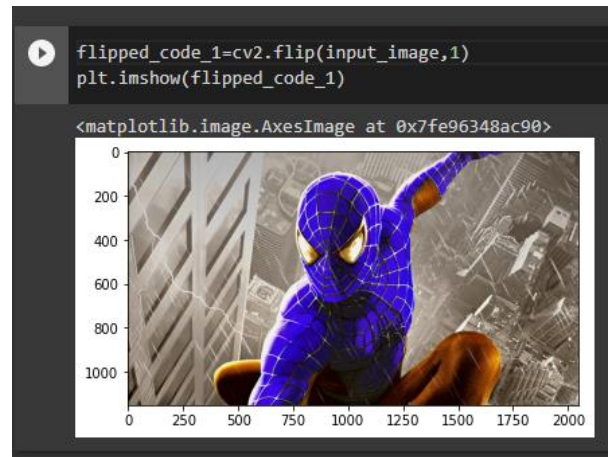
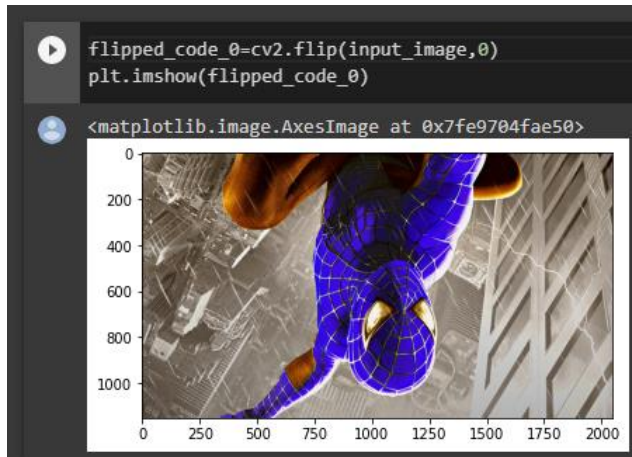




# Lab-2

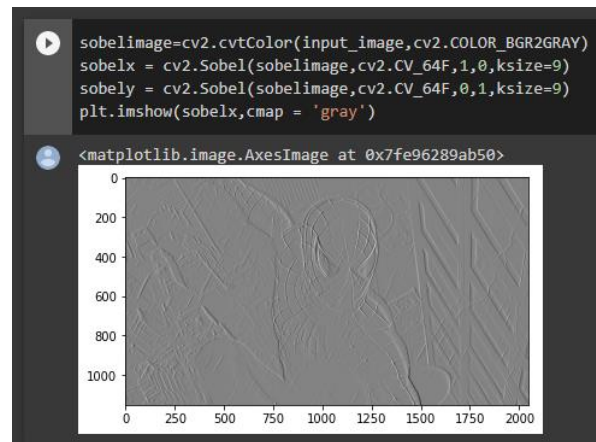
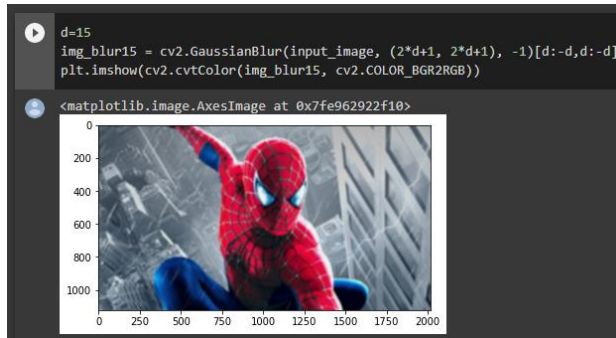
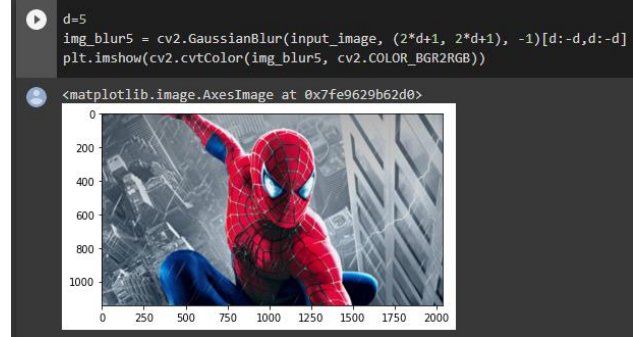
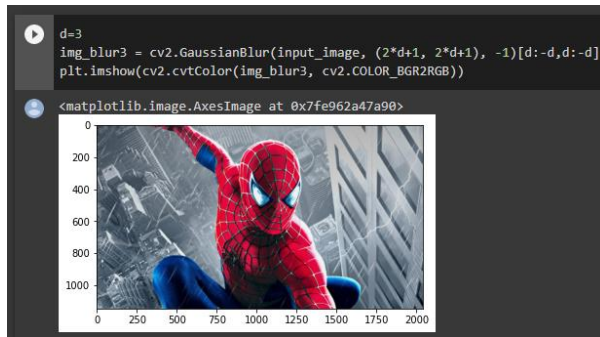
## Image stats and image processing

1. Implement a simple python program with an image of your choice and demonstrate all the concepts (attach screenshots).



```
[5] for i in range(0,3):
    min_value, max_value, min_location, max_location=cv2.minMaxLoc(input_image[:, :, i])
    print("min {} is at {}, and max {} is at {}".format(min_value, min_location, max_value, max_location))
```

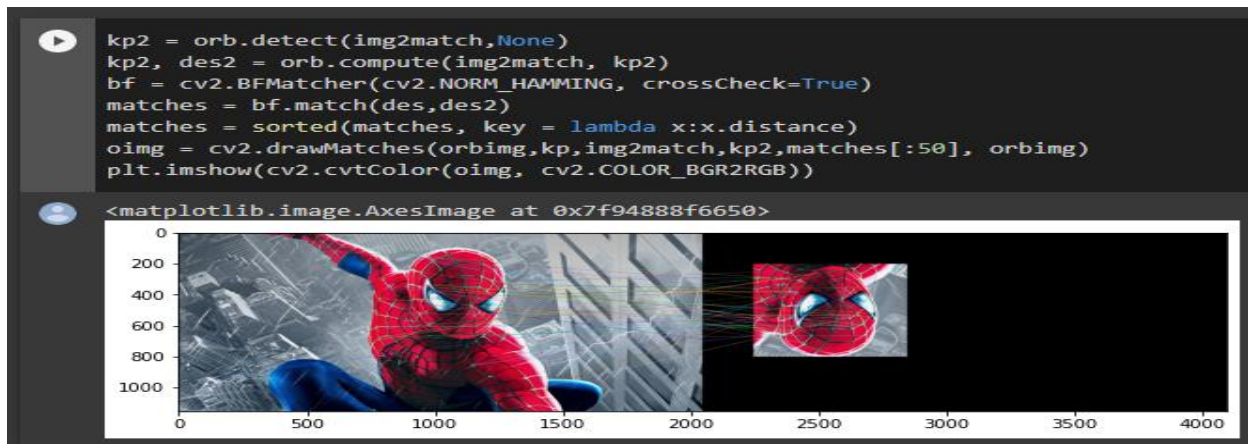
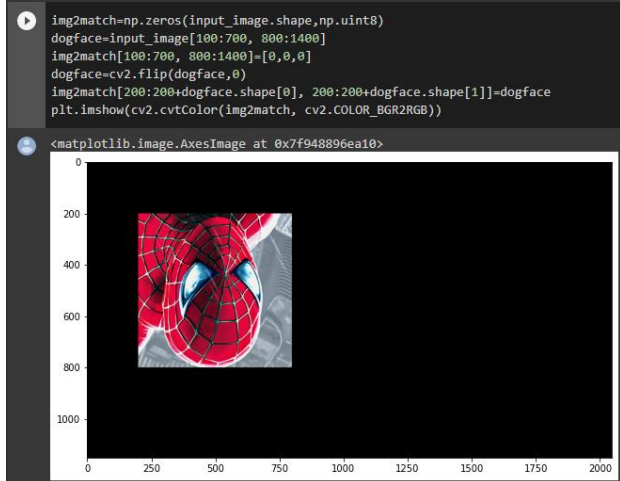
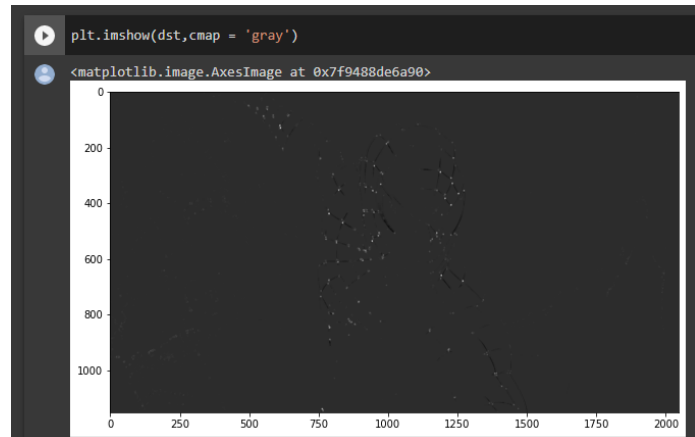
```
min 0.0 is at (404, 5), and max 255.0 is at (567, 0)
min 0.0 is at (340, 0), and max 255.0 is at (567, 0)
min 0.0 is at (490, 0), and max 255.0 is at (559, 0)
```



# Lab-3

## Features in computer vision

1. Implement a simple python program with an image of your choice and demonstrate all the concepts (attach screenshots).





# Lab-4

## Cascade Classification

1. Implement a simple python program with an image of your choice and demonstrate all the concepts (attach screenshots).

