



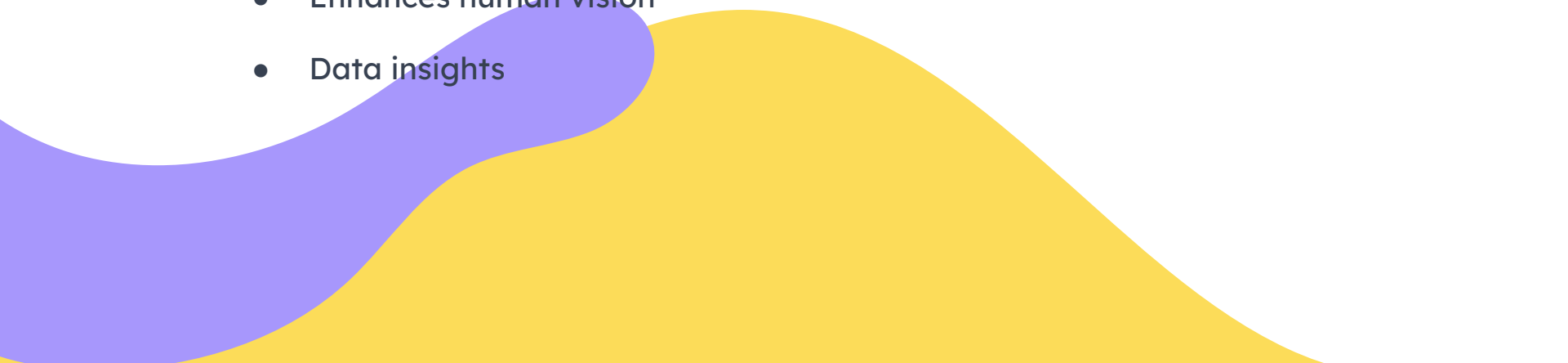
Computer Vision and its Applications

Presenters: Swapnil, Tejal and Vardhan

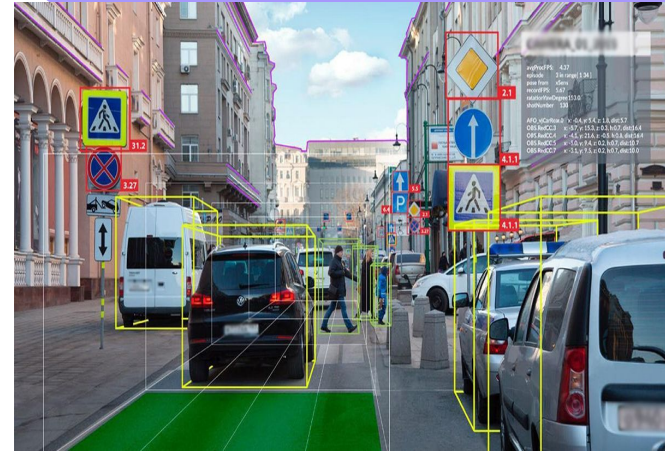
What is Computer Vision?

Computer vision is a field of artificial intelligence that enables machines to interpret and understand visual information from the world.

Importance:

- Automation
 - Enhances human vision
 - Data insights
- 

Applications



Applications



Tasks involved:

Classification



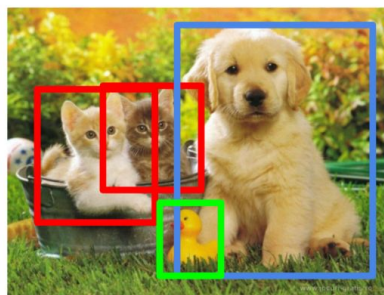
CAT

**Classification
+ Localization**



CAT

Object Detection



CAT, DOG, DUCK

**Instance
Segmentation**

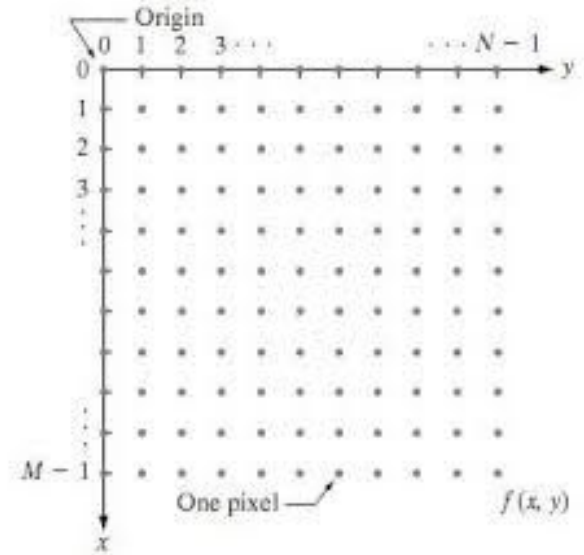
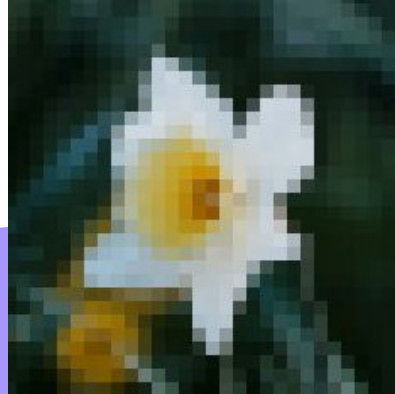


CAT, DOG, DUCK

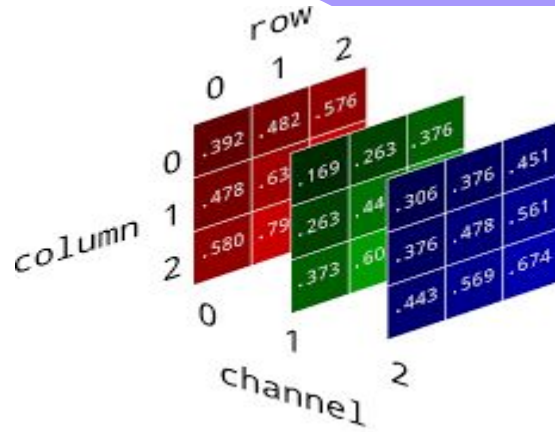
Single object

Multiple objects

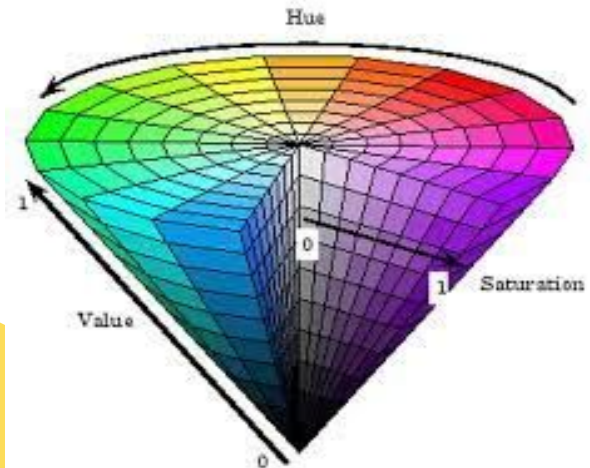
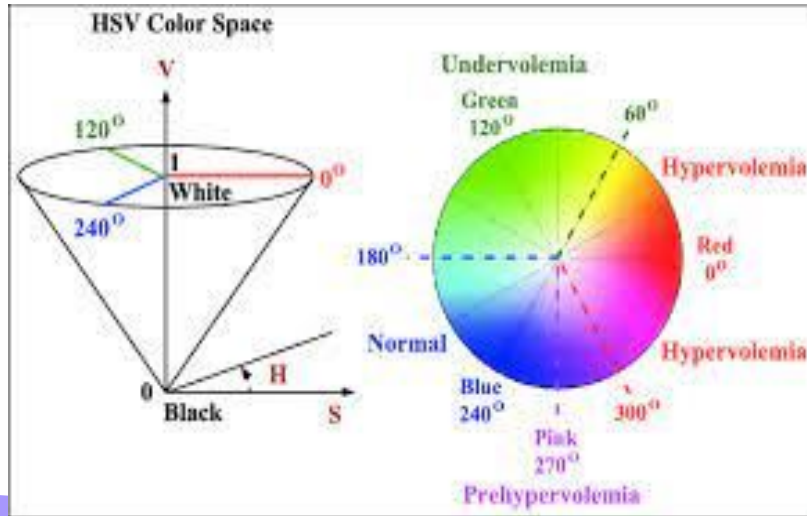
What is an image?



RGB and Grayscale images



HSV Colour scheme



Convolution Operation

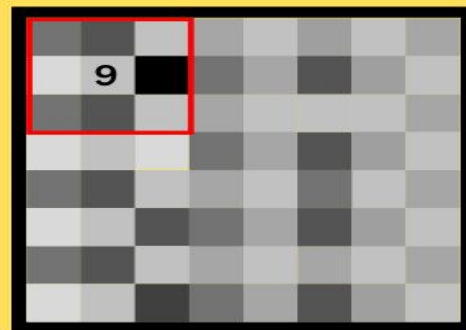


Image

1	1	1
1	-4	1
1	1	1

Kernel

$4*1$	$4*1$	$2*1$
$2*1$	$5*-4$	$3*1$
$4*1$	$8*1$	$2*1$



Image

$$\begin{aligned} [2,2] &= (4*1) + (4*1) + (2*1) + (2*1) + (5*-4) + (3*1) \\ &+ (4*1) + (8*1) + (2*1) == 9 \end{aligned}$$

The weighted values are convolved to form the center pixel's value

Modules



matplotlib

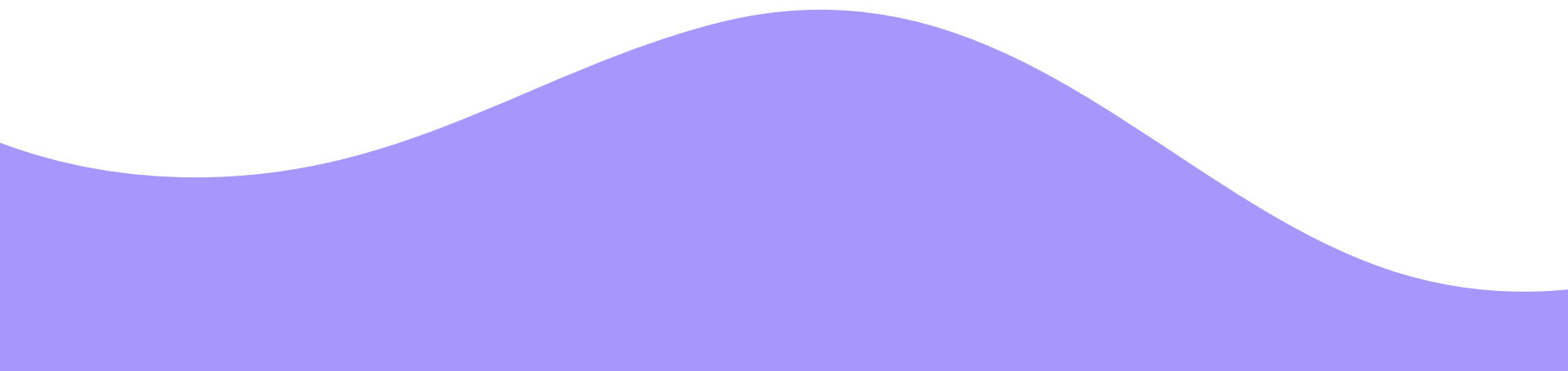


References and Learning Material

1.) Session Github Repo Link: <https://github.com/tejalkul/TL-CV-Workshop.git>

2.) OpenCV tutorial: <https://www.youtube.com/watch?v=oXlwWbU8l2o&pp=ygUPb3BlbmN2IHR1dG9yaWFs>

3.) Advanced Learning:

- <https://www.youtube.com/watch?v=vT1JzLTH4G4&list=PL3FW7Lu3i5JvHM8ljYj-zLfQRF3EO8sYv> (**Deep Learning Course by Stanford**)
 - <https://github.com/priyammaz/HAL-DL-From-Scratch/tree/main> (**Pytorch For Deep Learning**)
- 

Project Ideas

1. Gesture Recognition:

- a. Build a gesture recognition system to interpret hand gestures captured by the webcam.
- b. Recognise and perform actions based on gestures.
- c. Reference:
https://www.youtube.com/watch?v=a99p_fAr6e4&pp=ygUhZ2VzdHVyZSByZWVvZ25pdGlvbiBvcGVuY3YgcHl0aG9u

2. Motion Detection:

- a. Implement a background subtraction algorithm to detect moving objects in a video stream.
- b. Could be extended to make security system.
- c. References:
<https://www.youtube.com/watch?v=zKfYOriFMM&pp=ygUkbW90aW9uIGRldGVjdGlvbiB1c2luZyBvcGVuY3YgcHl0aG9u>

Project Ideas

1. Object Recognition:

- a. Build a gesture recognition system to interpret hand gestures captured by the webcam.
- b. Recognise and perform actions based on gestures.
- c. References:
<https://www.youtube.com/watch?v=V62M9d8QkYM&pp=ygUmb2lqZWNOIHJlY29nbml0aW9uIHVzaW5nIG9wZW5jdiBweXRob24%3D>

2. Image Segmentation

- a. Implement a background subtraction algorithm to detect moving objects in a video stream.
- b. Could be extended to make security system.
- c. References:
<https://www.youtube.com/watch?v=UlgALDgb2fY&pp=ygUmaW1hZ2Ugc2VnbWVudGF0aW9uIHVzaW5nIG9wZW5jdiBweXRob24%3D>

Follow us

