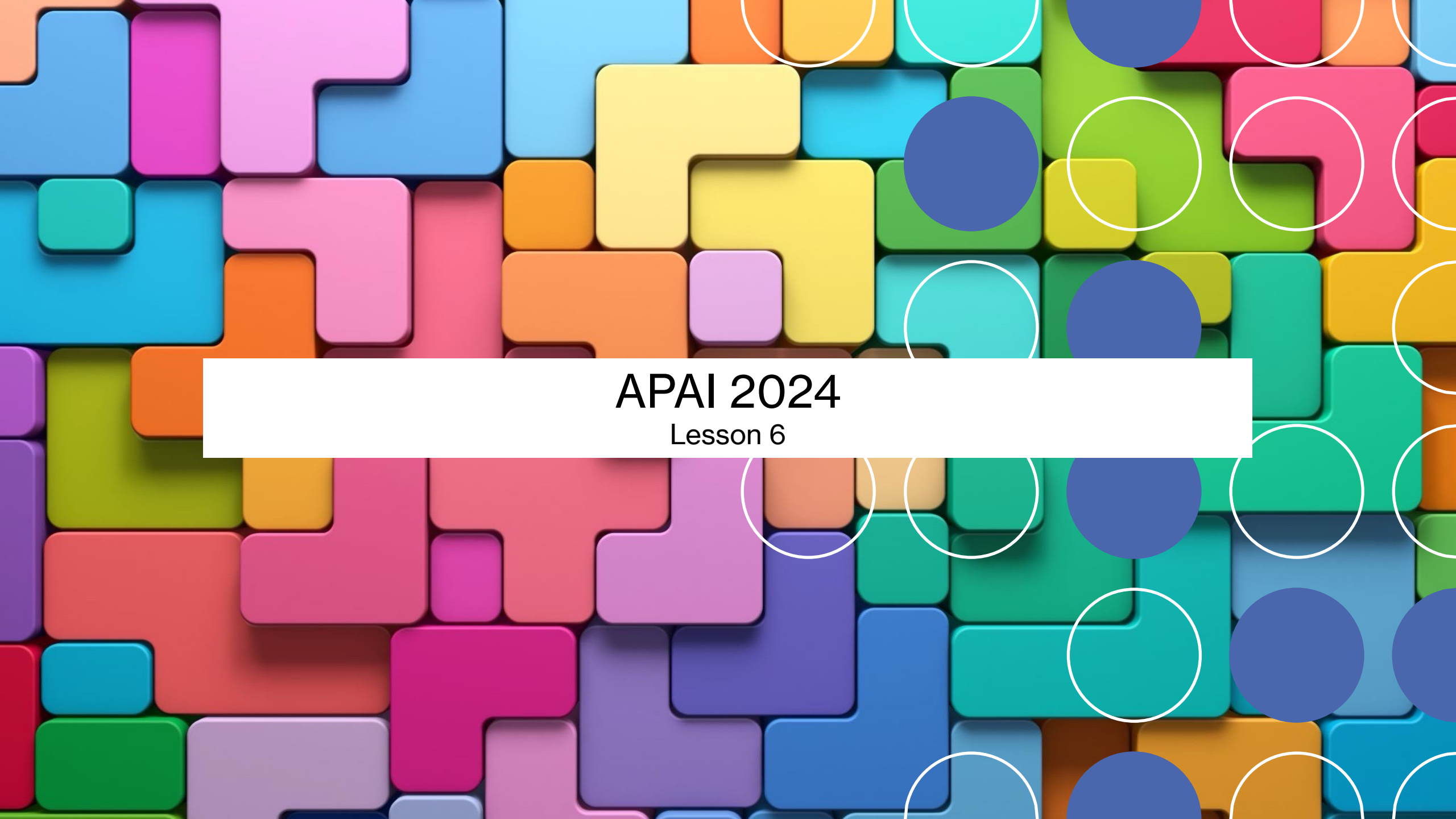

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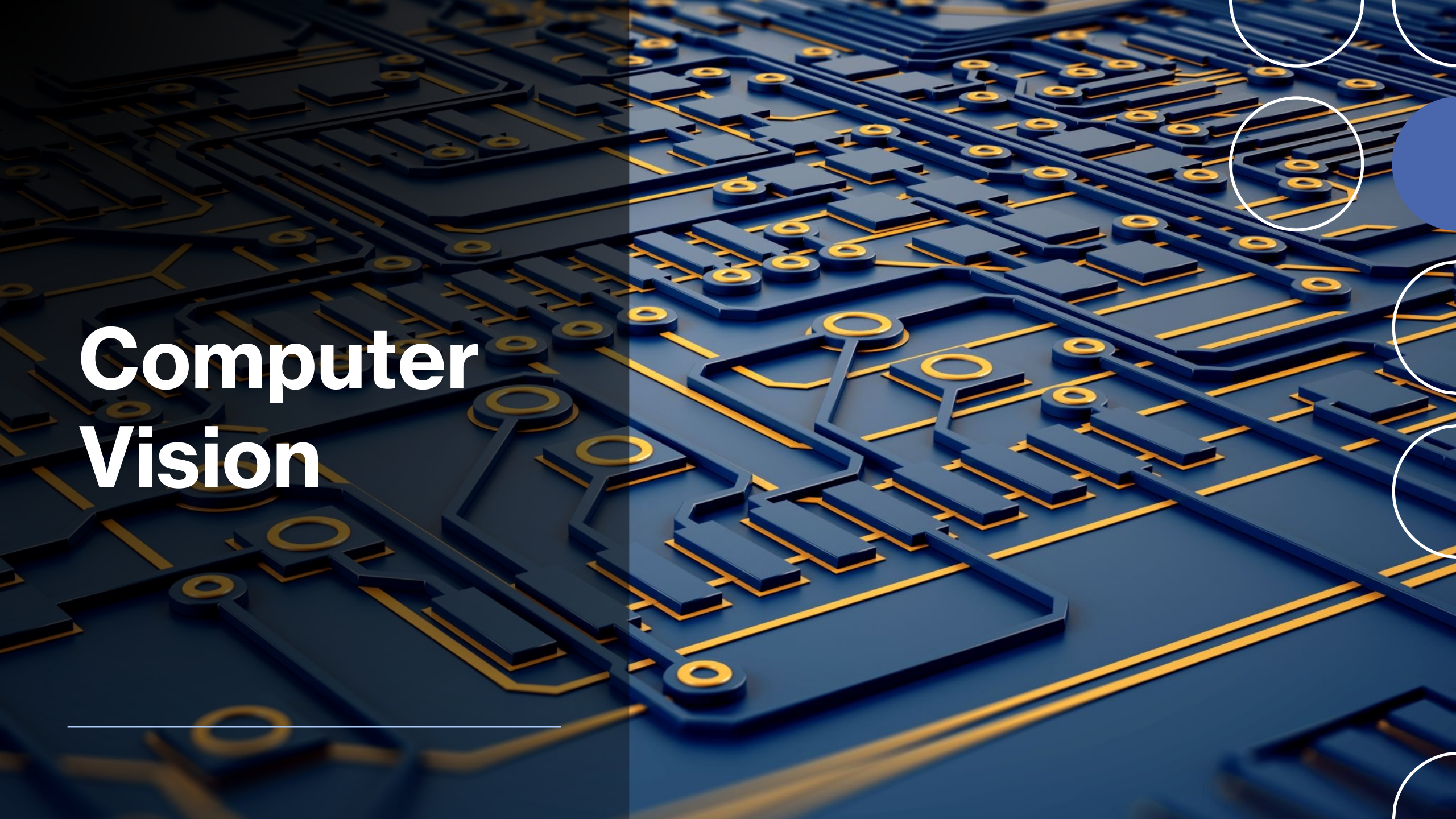
Lesson 6



Computer Vision

Color Spaces

RGB (Red, Green, Blue)

HSV (Hue, Saturation, Value)

LAB (Luminance, a, b)

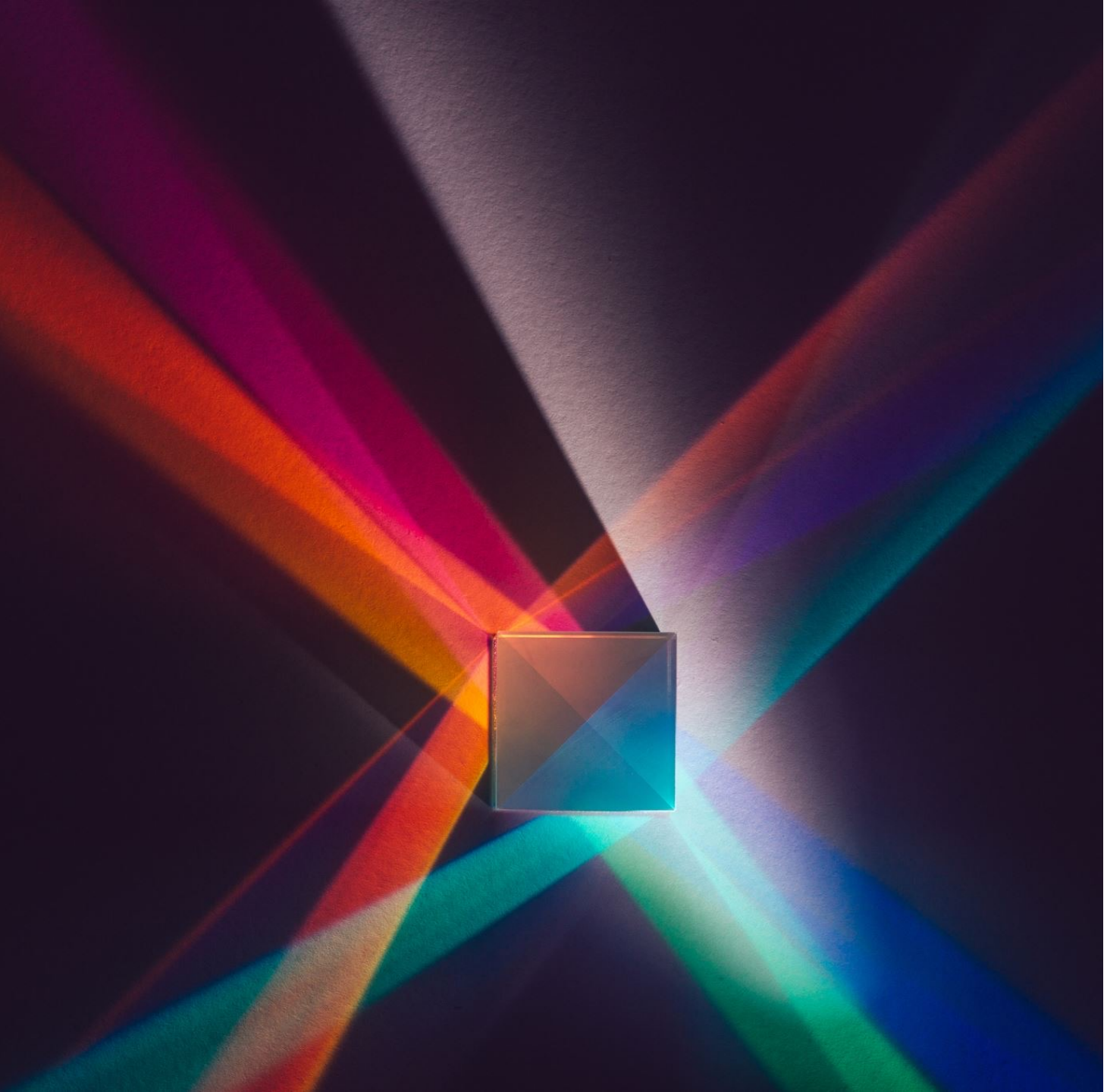
YCrCb (Luminance, Chroma Red, Chroma Blue)

Color Spaces

- **RGB (Red, Green, Blue)**
  - Description: Color space based on the three primary colors, red, green, and blue.
  - Usage: Commonly used for representing and manipulating digital images.
  - Characteristics: Each pixel is represented by a combination of values for red, green, and blue.

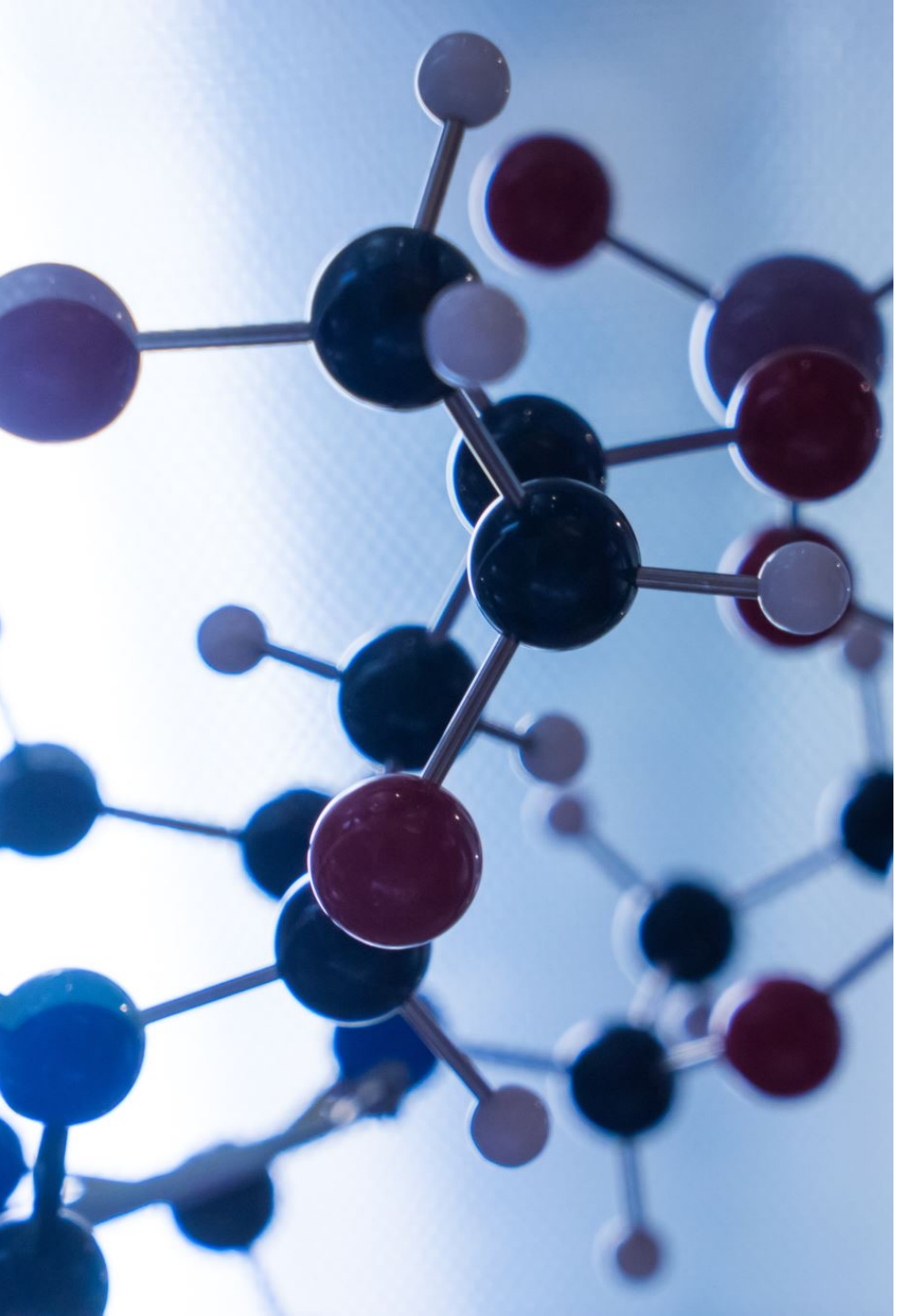
Color Spaces

- **HSV (Hue, Saturation, Value)**
  - Description: Color space that separates brightness (Value) from color (Hue) and saturation (Saturation)
  - Usage: Useful for identifying and manipulating color tones and intensities in images
  - Characteristics: Color is represented by hue (Hue), saturation indicates color purity, and value (Value) represents brightness



Color Spaces

- **LAB (Luminance, a, b)**
  - Description: Color space that separates luminance (Luminance) from the two color channels a and b
  - Usage: Very useful for representing colors more uniformly compared to RGB space
  - Characteristics: Luminance represents brightness, while channels a and b indicate color variation from green to red (a) and from blue to yellow (b)



Color Spaces

- **YCrCb (Luminance, Chroma Red, Chroma Blue)**
  - Description: Color space that separates luminance (Y) from the chrominance components red (Cr) and blue (Cb)
  - Usage: Commonly used in image processing, especially in compression and transmission
  - Characteristics: Y represents luminance, Cr indicates the difference between red and the luminance channel, while Cb indicates the difference between blue and the luminance channel

Development

Task 0

Assignment: Image Color Space Conversion and Visualization

Create a Python function that processes an image by converting it to different color spaces and displays the results as a mosaic.

Function Requirements:

1. Read an image file from the provided path.
2. Convert the image from BGR color space to RGB, HSV, LAB, and YCrCb color spaces using OpenCV.
3. Resize the images in each color space for visualization purposes.
4. Create a mosaic by concatenating the resized images horizontally.
5. Display the mosaic image to show the original image in different color spaces.

Development

Task 1

Assignment: Image Processing Function

Create a Python function that processes an image to highlight green areas and display the results in a mosaic format.

Function Requirements:

1. Read an image file from the provided path.
2. Convert the image from BGR color space to HSV color space.
3. Identify green areas in the image based on predefined color thresholds.
4. Highlight the green areas by creating a mask and applying it to the image.
5. Draw rectangles around significant green areas to emphasize them.
6. Resize the original image, mask, and processed images for visualization.
7. Create a mosaic by arranging the resized images horizontally.
8. Display the mosaic image to show the original image, mask, green areas, and processed image.

Development

Task 2

Image Enhancement in LAB Color Space

Create a Python function that enhances an image in LAB color space and displays the results in a mosaic format.

Function Requirements:

1. Read an image file from the provided path.
2. Convert the image from BGR color space to LAB color space using OpenCV.
3. Split the LAB image into its L, a, and b channels.
4. Apply histogram equalization to each channel (L, a, and b) separately using OpenCV's `cv2.equalizeHist`.
5. Merge the enhanced channels back into an LAB image and convert it to BGR color space.
6. Resize the original image and the enhanced LAB images for visualization purposes.
7. Create a mosaic by concatenating the resized images horizontally.
8. Display the mosaic image to show the original image and the enhanced LAB channels (L, a, and b).

Thanks