CV#1 Introduction to CV

Today's menu:

- Computer Vision Basics

- Loading an Image

- Checking the type

- Showing the image

- Colors

- What is the shape of the image?

- Grayscaling

- What is the shape now?

- How does it look like?

- Colormap

Today's menu:

- Cropping an image

- Saving the image

- Lets see the pixel values

- Lets create an RGB version of it

- Cloning images

- Drawing (lines, shapes and text)

- Histograms

- Color Spaces

- BGR, RGB, HSV and HSL
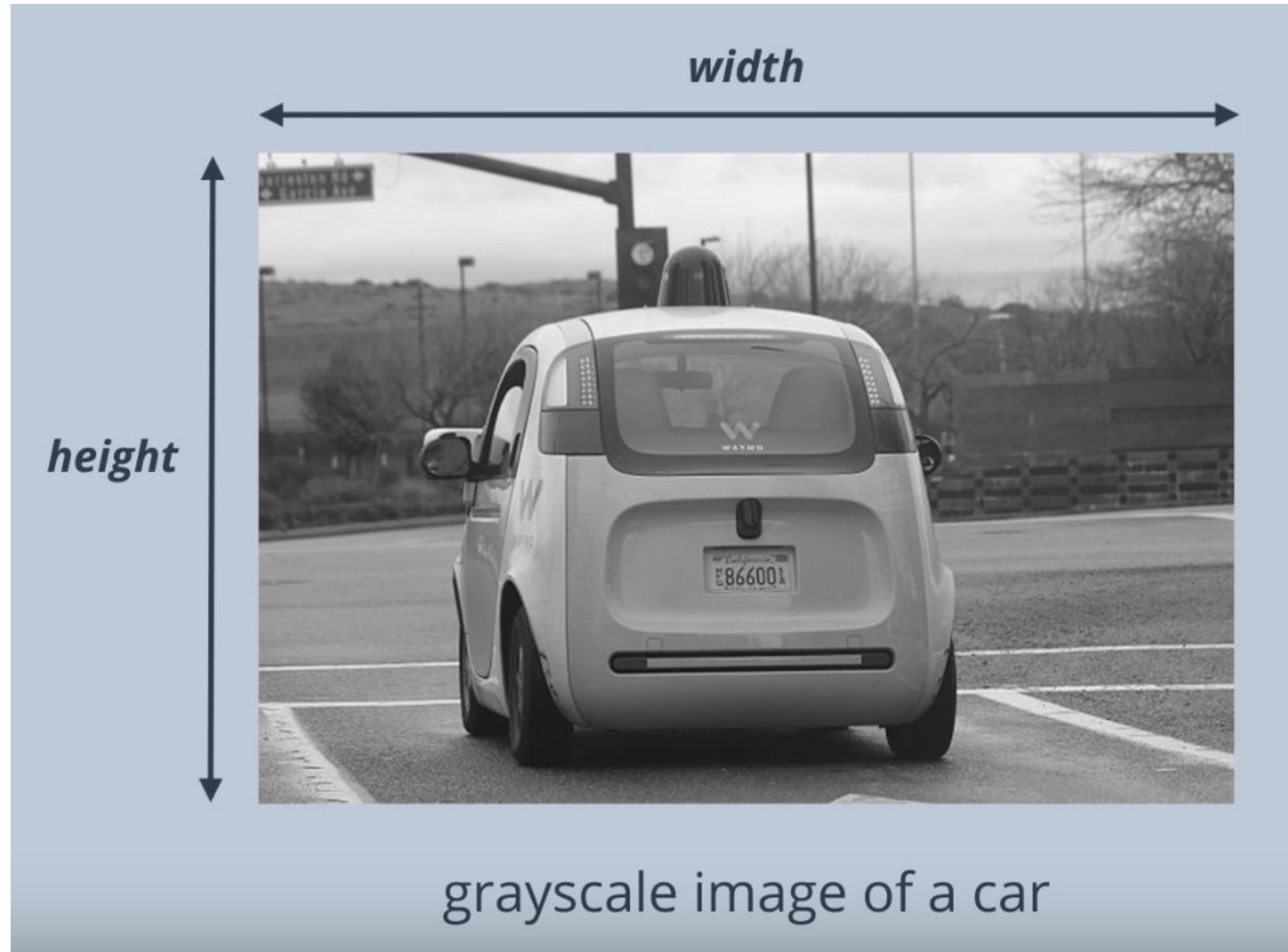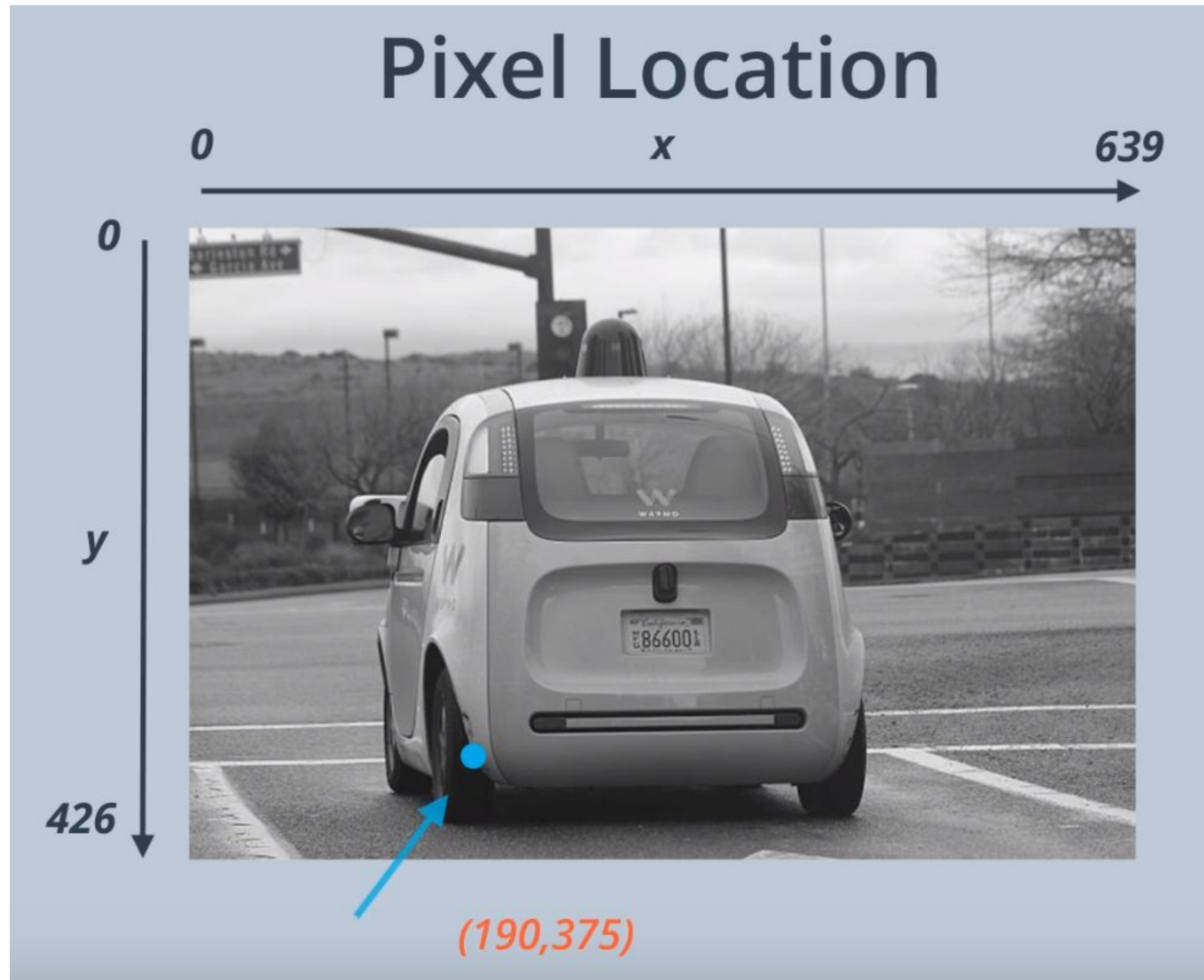
- Mini projects!
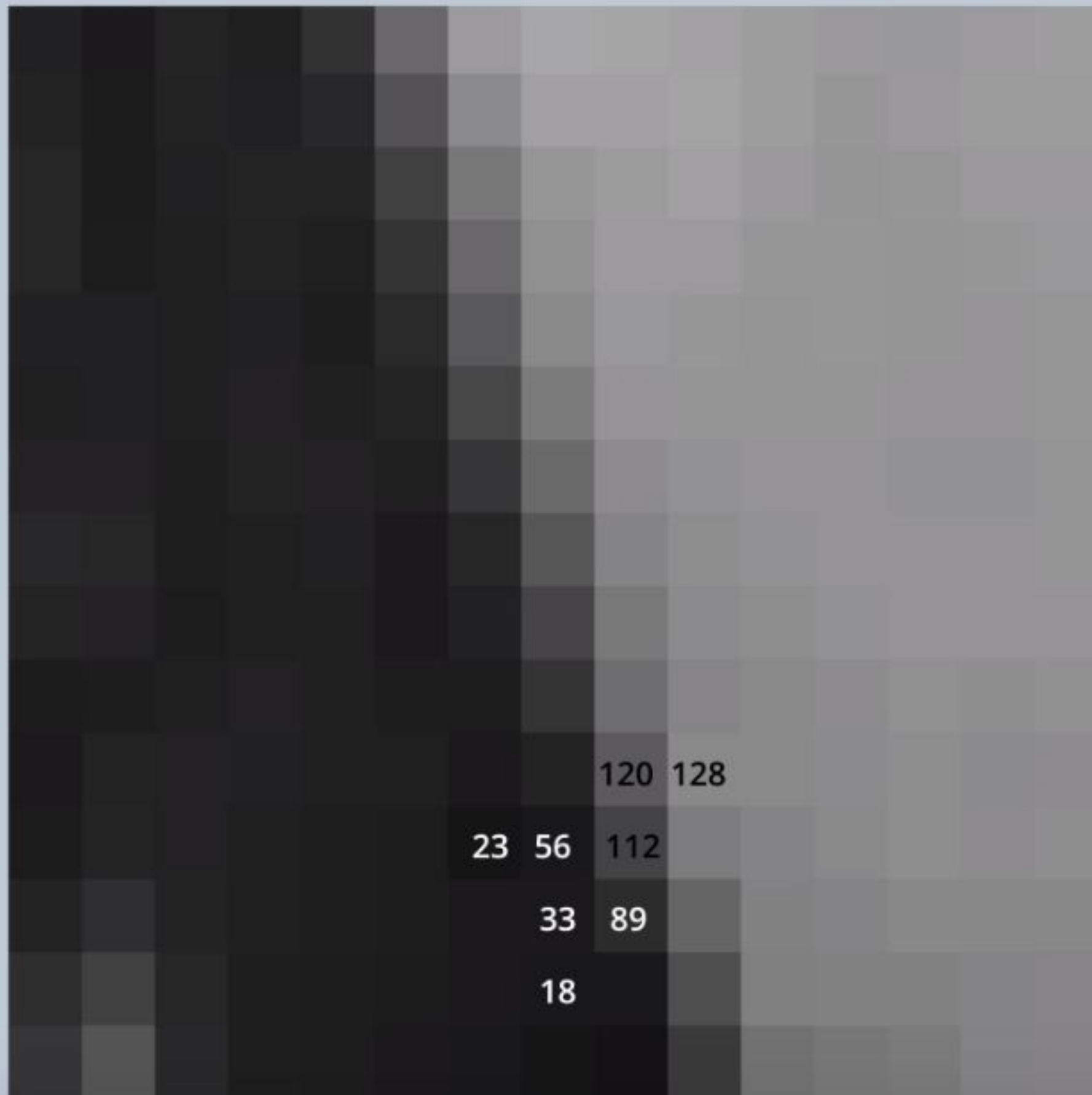
Image represented by a grid

grayscale image of a car

Image represented by a grid
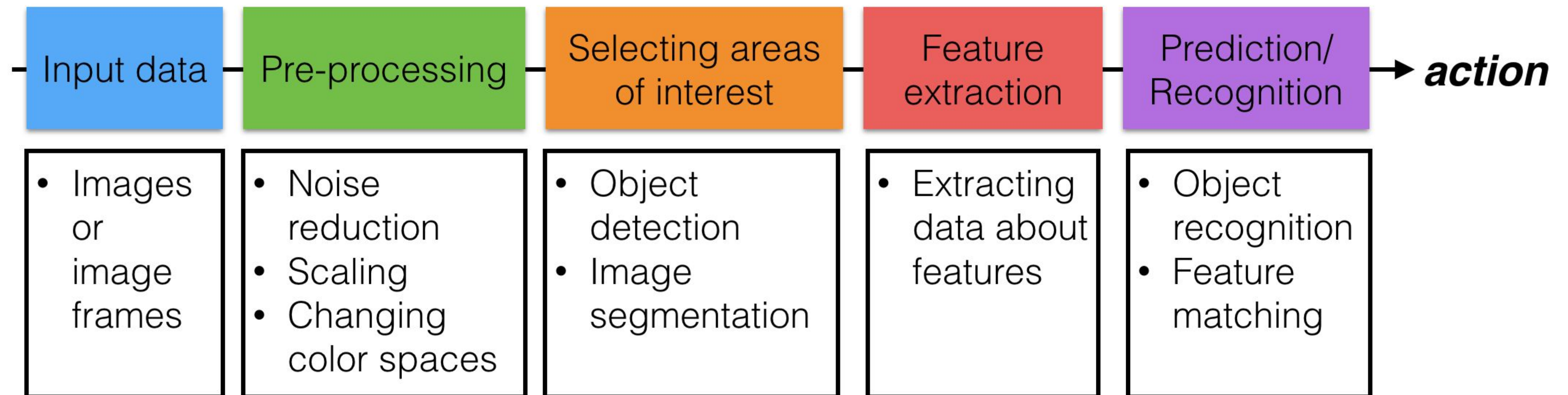
Pixel Values

Pixel Value

Grayscale range

0 - 255

0 = black
255 = white

120 128

23 56 112

33 89

18

Color Images
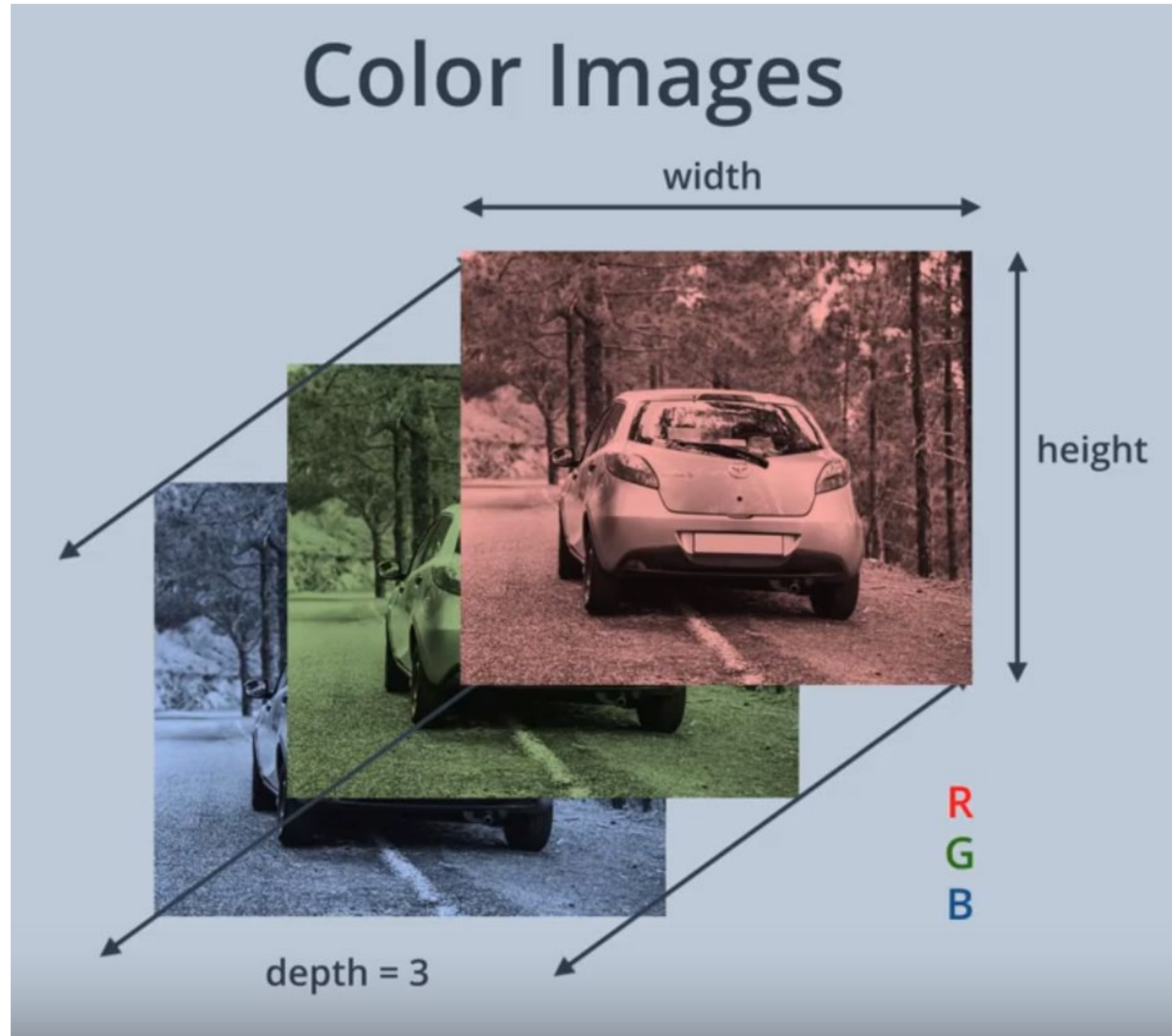
Computer Vision Pipeline

Input data	Pre-processing	Selecting areas of interest	Feature extraction	Prediction/ Recognition
• Images or image frames	• Noise reduction • Scaling • Changing color spaces	• Object detection • Image segmentation	• Extracting data about features	• Object recognition • Feature matching

→ *action*

OpenCV

Open Source Computer Vision Library is an **open source computer vision and machine learning software library**.

The library **has more than 2500 optimized algorithms**, which includes a comprehensive set of both classic and state-of-the-art computer vision and machine learning algorithms.

These algorithms **can be used to** detect and recognize faces, identify objects, classify human actions in videos, track camera movements, track moving objects, extract 3D models of objects, produce 3D point clouds from stereo cameras, stitch images together to produce a high resolution image of an entire scene, find similar images from an image database, remove red eyes from images taken using flash, follow eye movements, recognize scenery and establish markers to overlay it with augmented reality, etc.

OpenCV

Open Source

OpenCV is open source and released under the BSD 3-Clause License. It is free for commercial use.
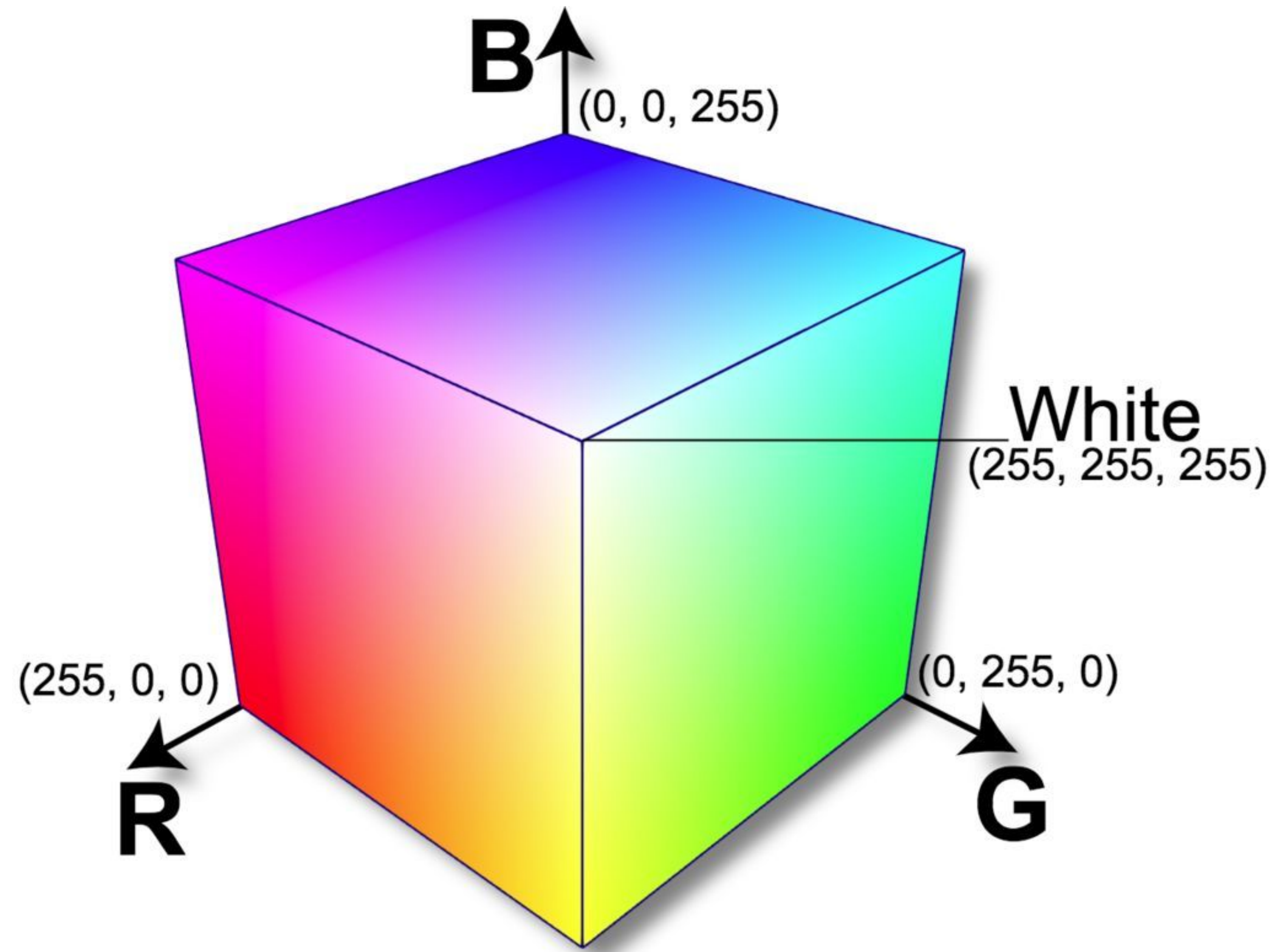
Optimized

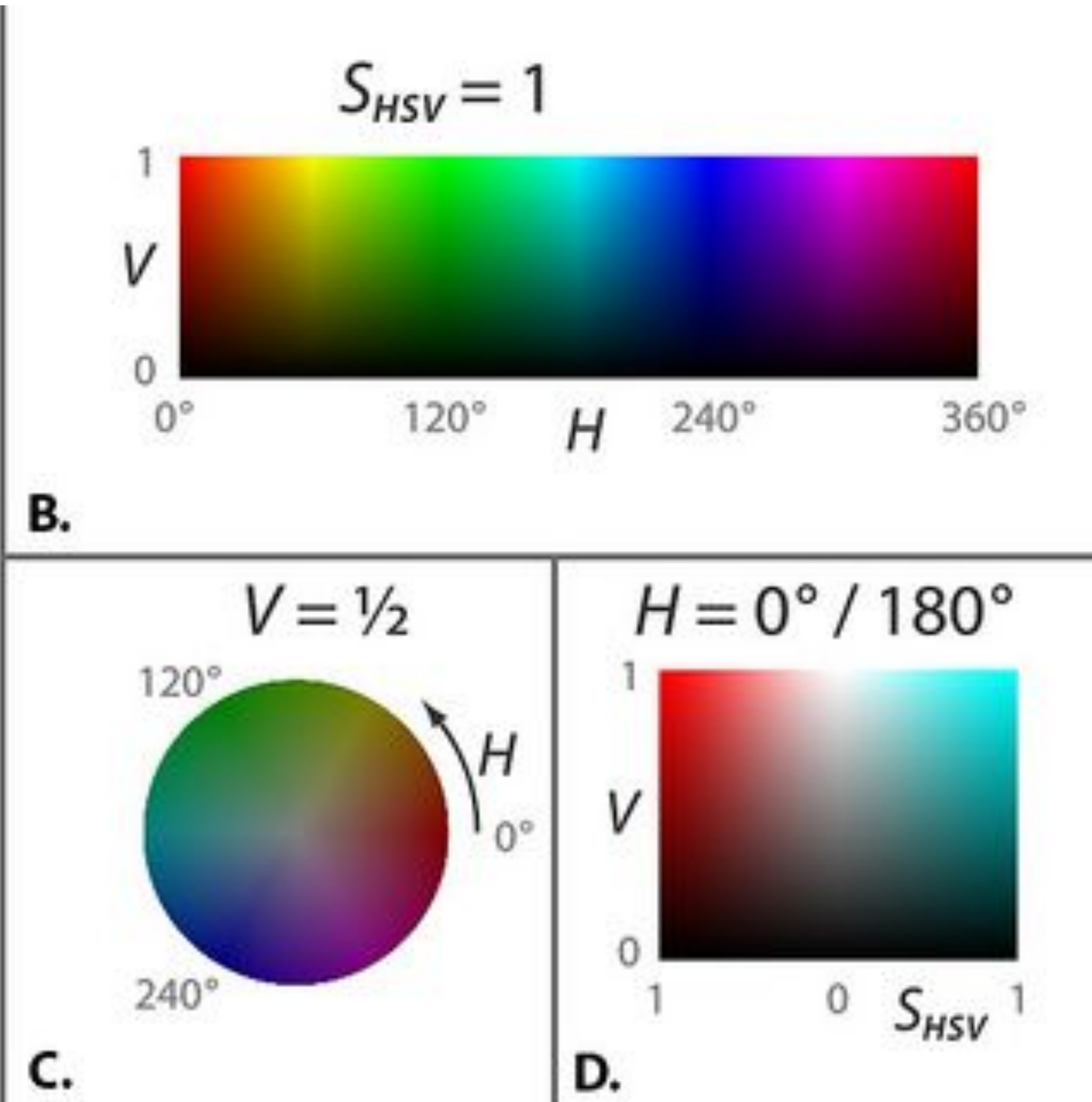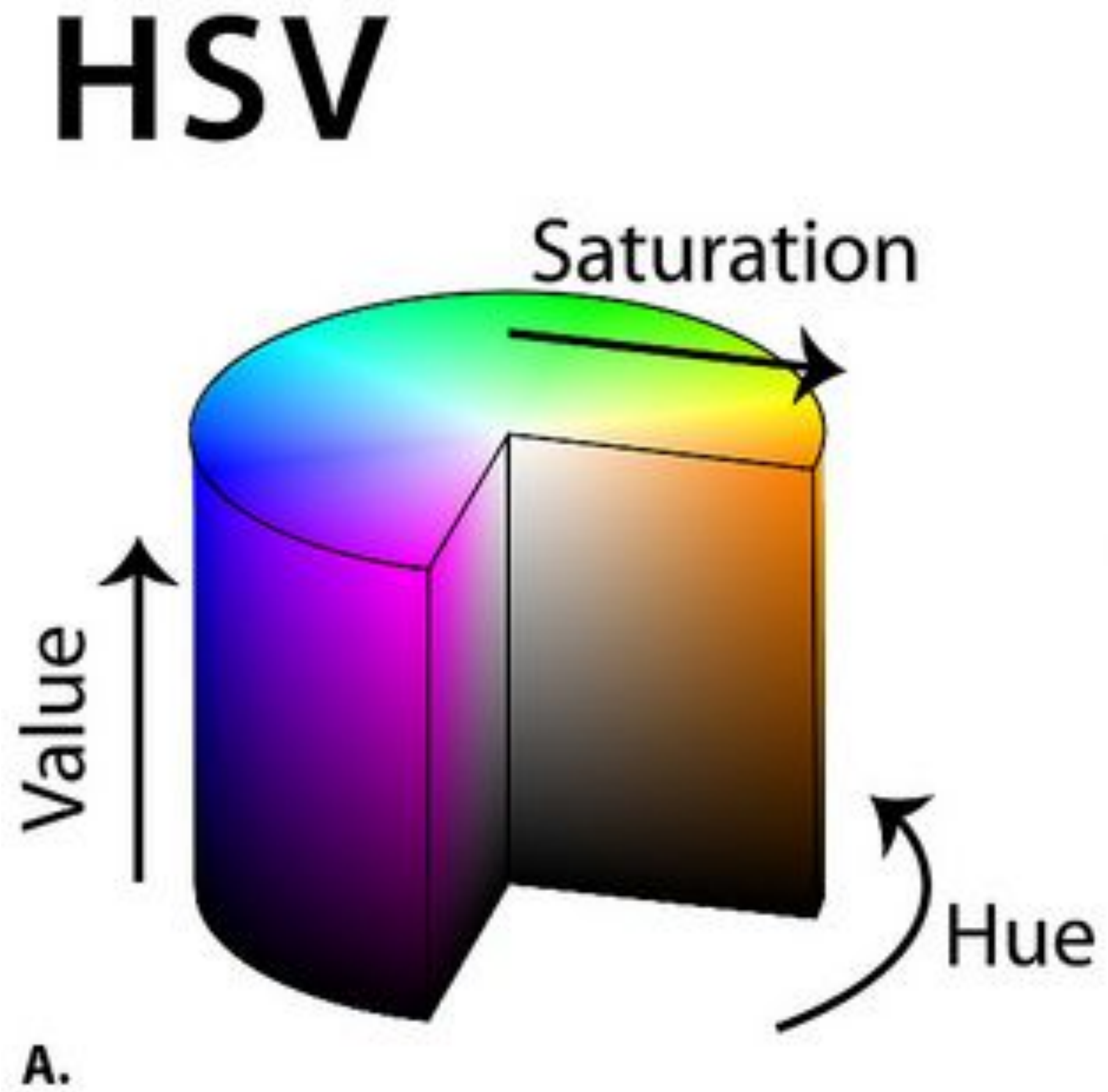OpenCV is a highly optimized library with focus on real-time applications.

Cross-Platform

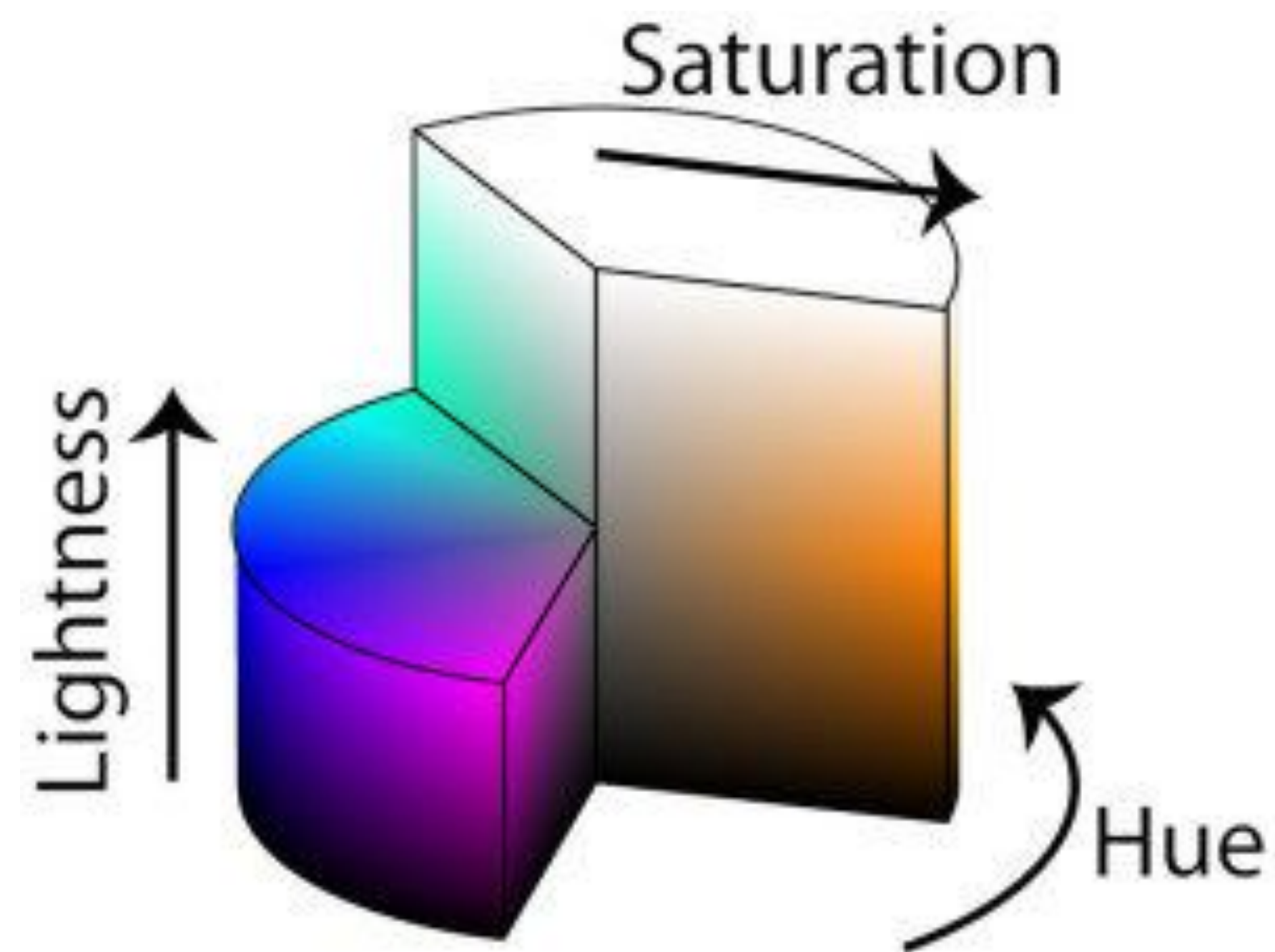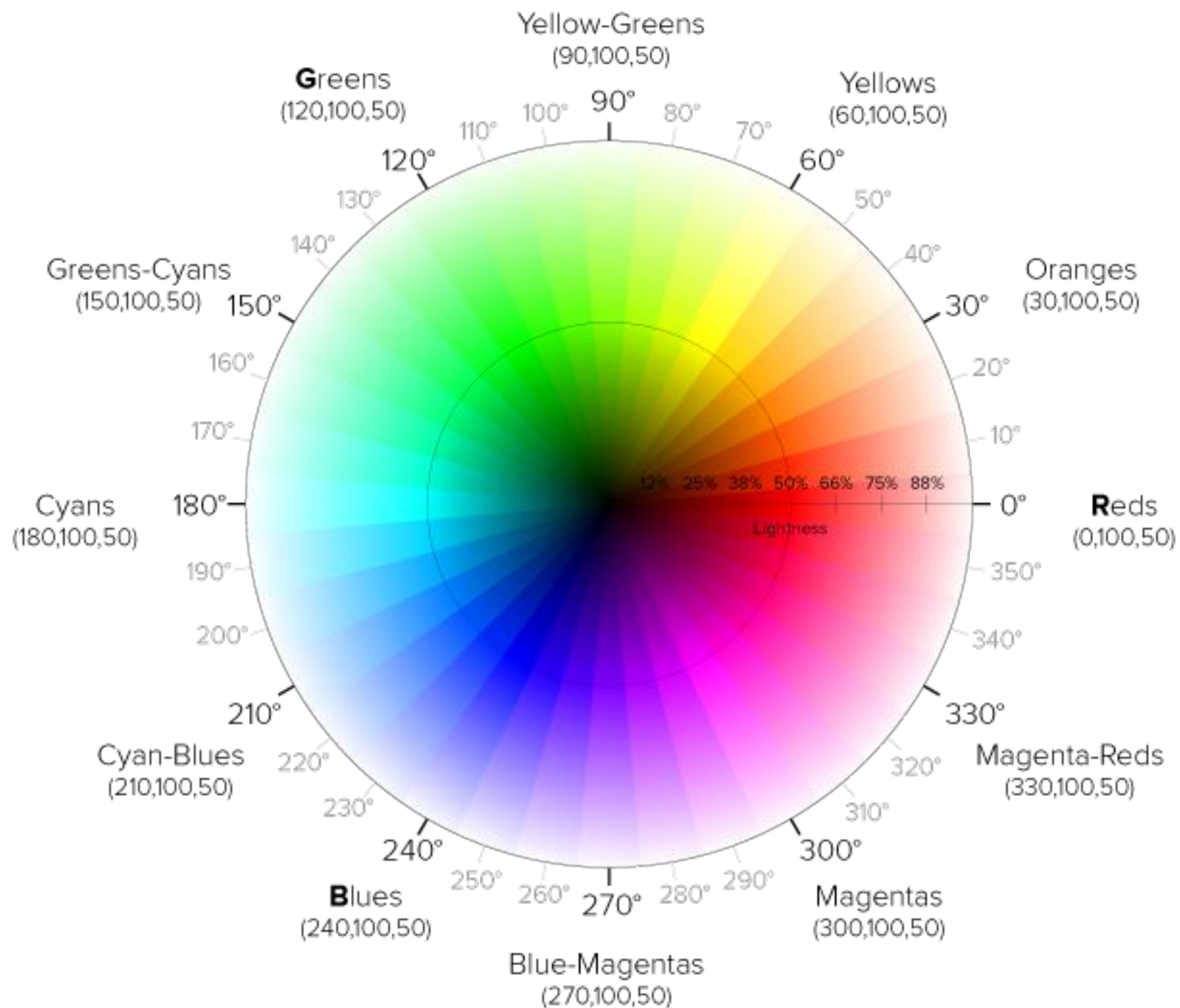C++, Python and Java interfaces support Linux, MacOS, Windows, iOS, and Android.
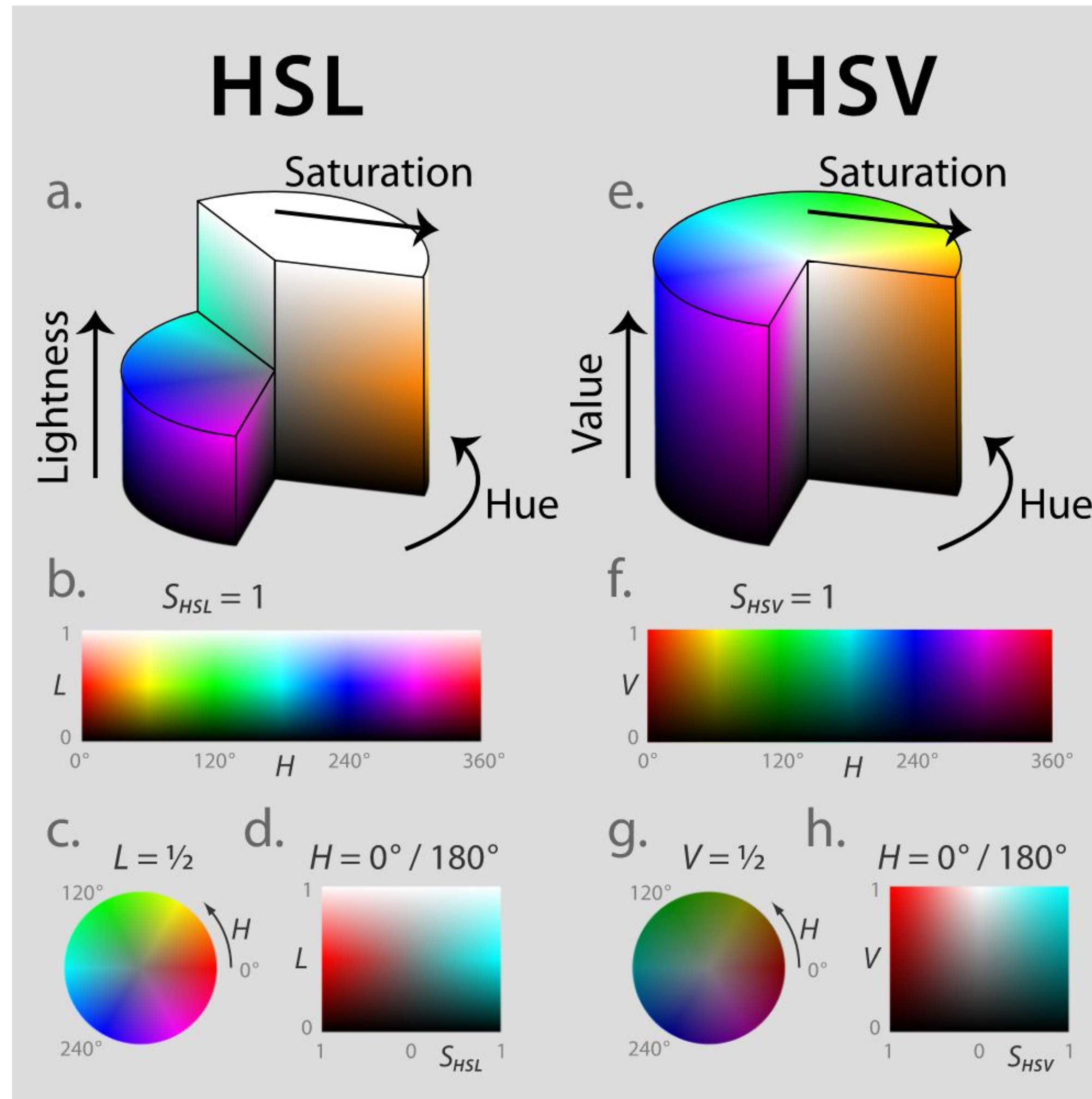
Color Spaces: RGB

Color Spaces: HSV

Color Spaces: HSL

# Color Spaces: HSV and HSL

Histograms

You can consider histogram as a graph or plot, which gives you an overall idea about the intensity distribution of an image. It is a plot with pixel values (ranging from 0 to 255) in X-axis and corresponding number of pixels in the image on Y-axis.

It is just another way of understanding the image. By looking at the histogram of an image, you get intuition about contrast, brightness, intensity distribution etc of that image. Almost all image processing tools today, provides features on histogram.

In this example the histogram was drawn

from a grayscale image:
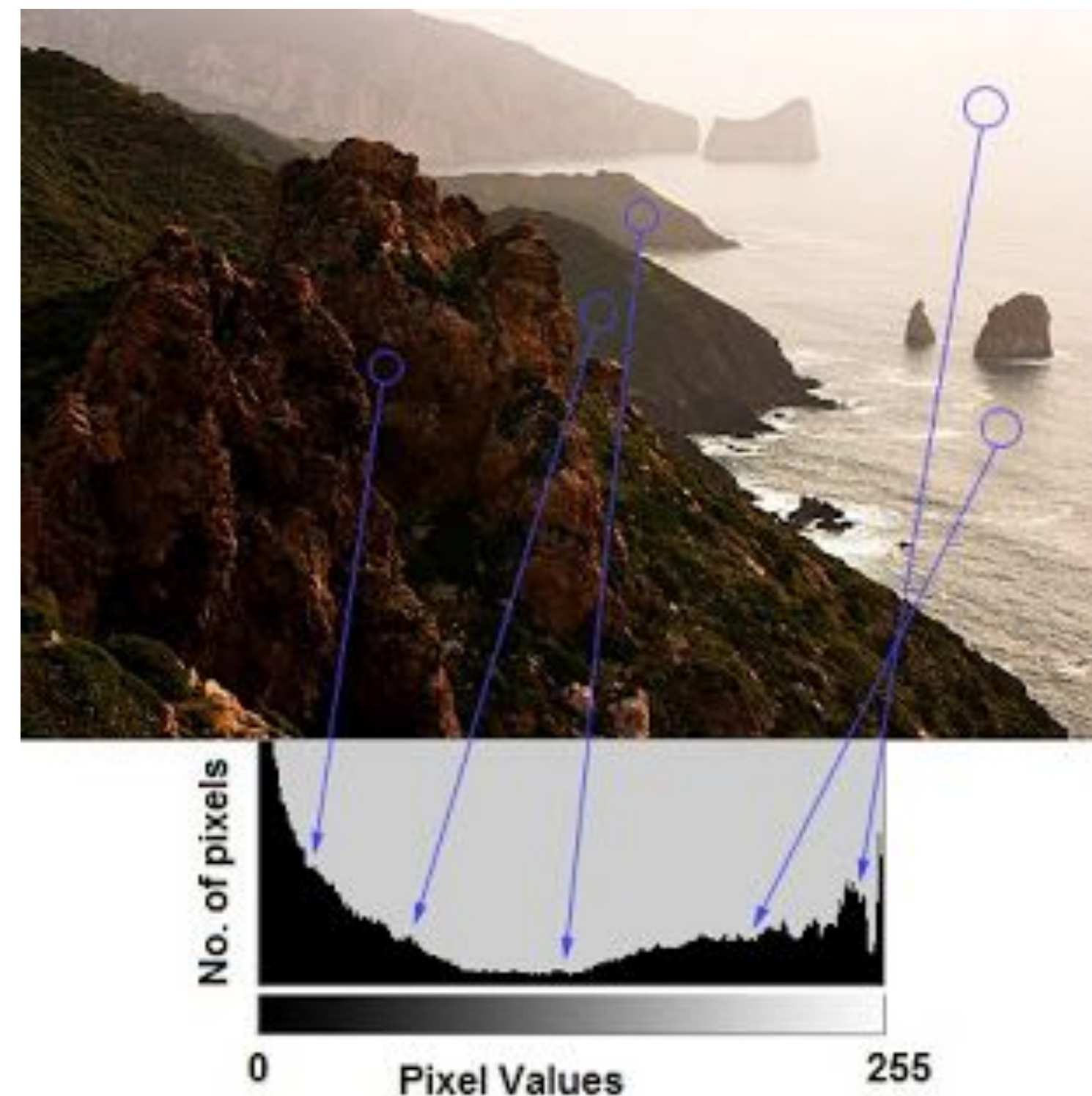
Yeah yeah, but I want to see the code...

About me...

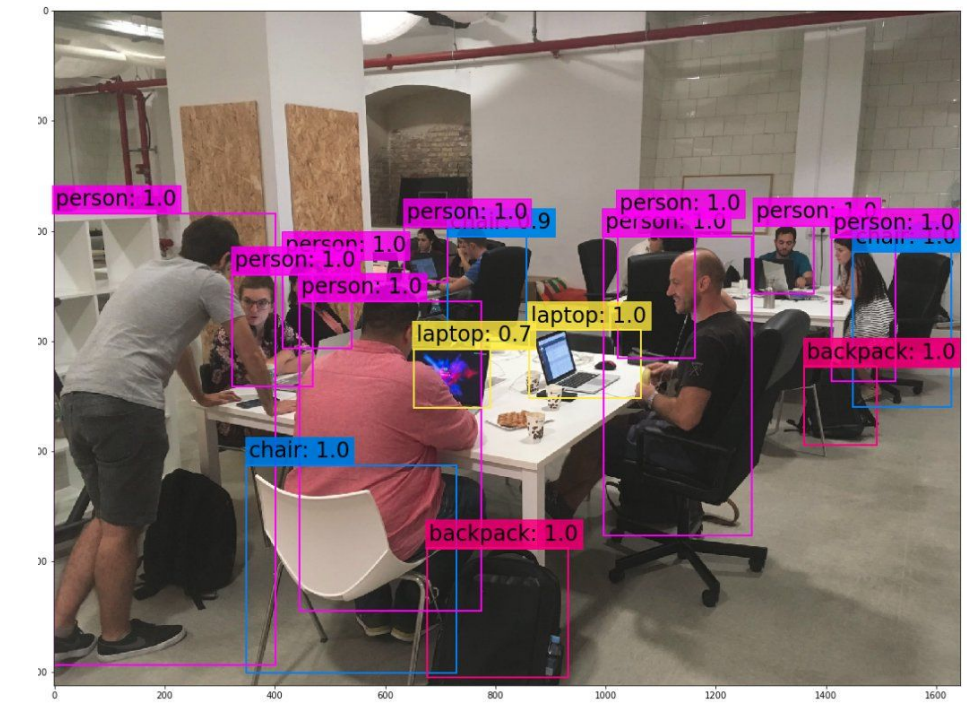## George Studenko
Software Engineer and AI Enthusiast