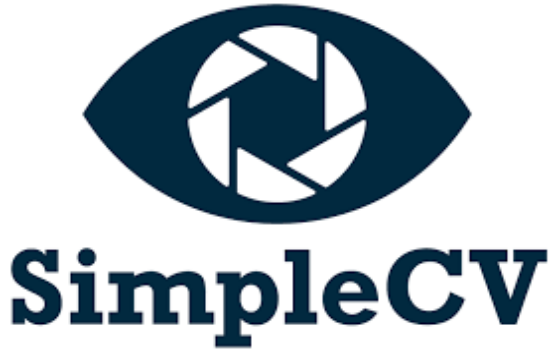
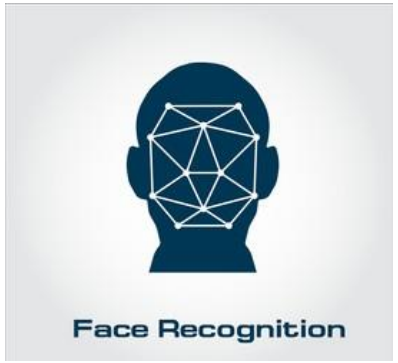
COMPUTER VISION

Gaining High-level understanding from digital images or videos

Microsoft SAP edunet foundation

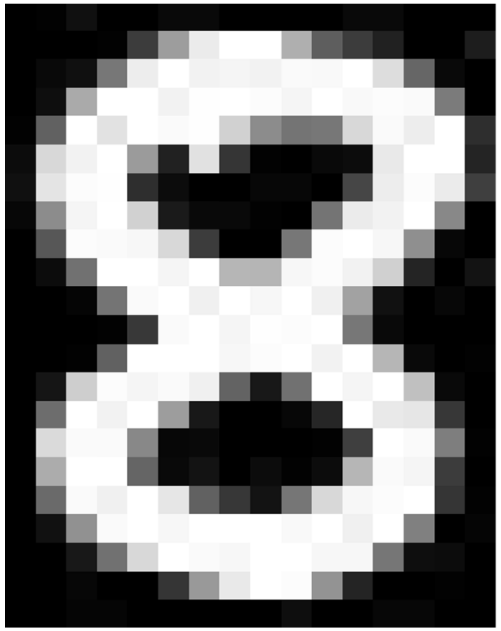
Popular Python Libraries





What is an Image?

Data in the form of matrix(Rows and Columns) consisting of Pixels



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0	14	170	255	255	244	254	255	253	245	255	249	253	251	124	1
2	98	255	228	255	251	254	211	141	116	122	215	251	238	255	49
13	217	243	255	155	33	226	52	2	0	10	13	232	255	255	36
16	229	252	254	49	12	0	0	7	7	0	70	237	252	235	62
6	141	245	255	212	25	11	9	3	0	115	236	243	255	137	0
0	87	252	250	248	215	60	0	1	121	252	255	248	144	6	0
0	13	113	255	255	245	255	182	181	248	252	242	208	36	0	19
1	0	5	117	251	255	241	255	247	255	241	162	17	0	7	0
0	0	0	4	58	251	255	246	254	253	255	120	11	0	1	0
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0	22	206	252	246	251	241	100	24	113	255	245	255	194	9	0
0	111	255	242	255	158	24	0	0	6	39	255	232	230	56	0
0	218	251	250	137	7	11	0	0	0	2	62	255	250	125	3
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0	107	251	241	255	230	98	55	19	118	217	248	253	255	52	4
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0	0	23	113	215	255	250	248	255	255	248	248	118	14	12	0
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0	0	5	5	0	0	0	0	0	14	1	0	6	6	0	0

0	2	15	0	0	11	10	0	0	0	0	9	9	0	0	0
0	0	0	4	60	157	236	255	255	177	95	61	32	0	0	29
0	10	16	119	238	255	244	245	243	250	249	255	222	103	10	0
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2	98	255	228	255	251	254	211	141	116	122	215	251	238	255	49
13	217	243	255	155	33	226	52	2	0	10	13	232	255	255	36
16	229	252	254	49	12	0	0	7	7	0	70	237	252	235	62
6	141	245	255	212	25	11	9	3	0	115	236	243	255	137	0
0	87	252	250	248	215	60	0	1	121	252	255	248	144	6	0
0	13	113	255	255	245	255	182	181	248	252	242	208	36	0	19
1	0	5	117	251	255	241	255	247	255	241	162	17	0	7	0
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0	173	255	255	101	9	20	0	13	3	13	182	251	245	61	0
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0	18	146	250	255	247	255	255	255	249	255	240	255	129	0	5
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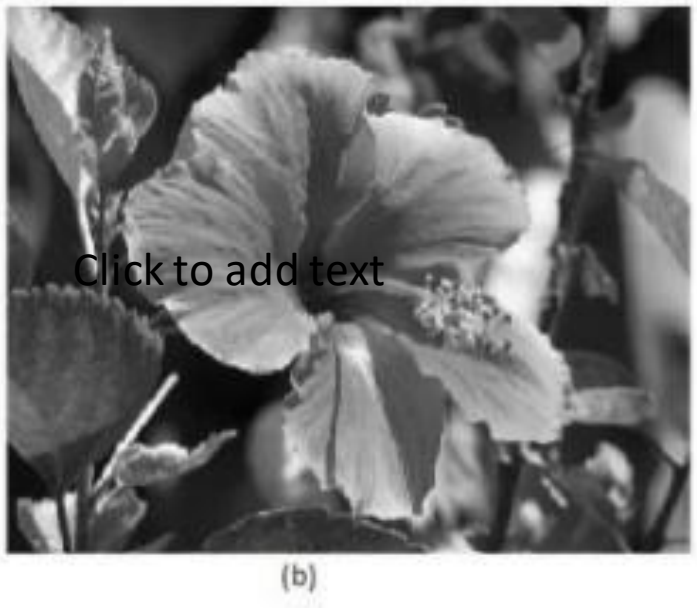
0	0	6	1	0	52	153	233	255	252	147	37	0	0	4	1
0	0	5	5	0	0	0	0	0	14	1	0	6	6	0	0

Image : Image with Pixels

https://mozanunal.com/images/pixel.png

Types of Images

Color Image



Grayscale Image

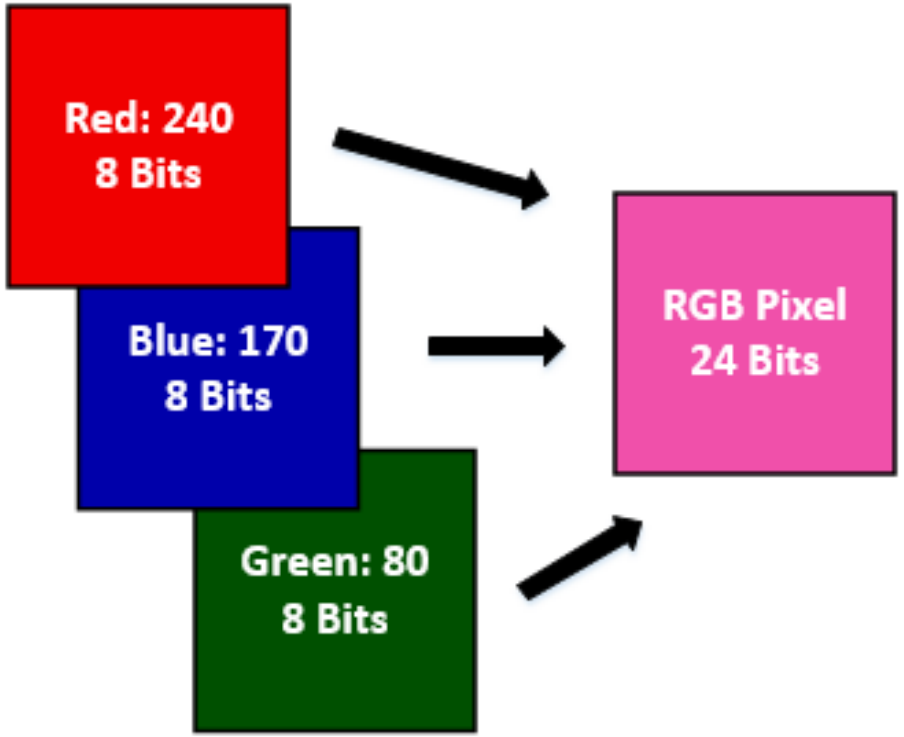
Binary Image

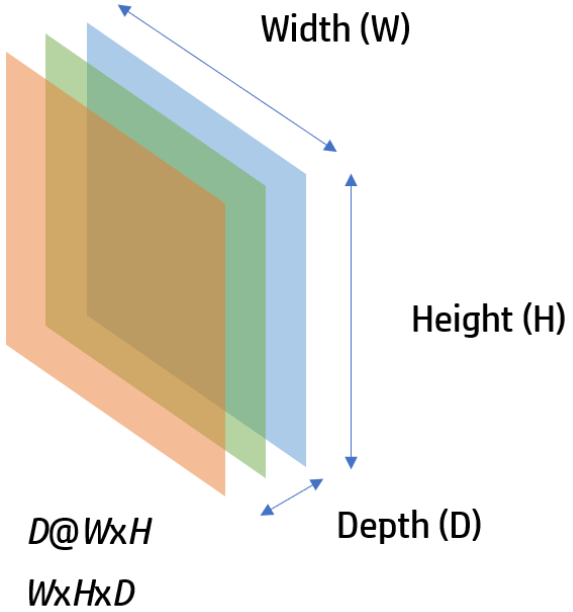
https://www.researchgate.net/profile/Sanskruti-Patel-2/publication/344249310/figure/fig2/AS:935972338425861@1600164603821/Figure2-a-RGB-image-b-Gray-Scale-image-c-Binary-image.jpg

Color Image

Width * Height * Depth

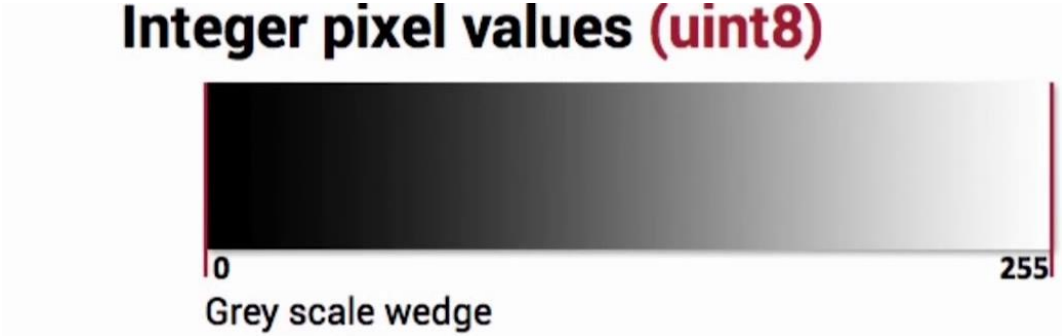
Depth : [Red, Green, Blue]





https://www.codeproject.com/KB/tips/1112774/rgbPixelEx.PNG

How to get Binary Image in Opencv?



https://i.ytimg.com/vi/tSBuwNpIUdI/maxresdefault.jpg

Main methods of OpenCV

1. cv2.imread() - method loads an image from the specified file
2. cv2.resize() – Resizing the pixels value of an image
3. cv2.cvtColor()- convert an image from one color space to another.
4. cv2.threshold() – Changing the pixels value with respect to a threshold
5. cv2.filter2D() – For convolve a kernel with an Image
6. cv2.Canny() – Applying Canny Edge Detection on Image
7. cv2.rectangle() – To get rectangle on an image
8. cv2.CascadeClassifier() – Applying Pre-trained models for certain ML task

Threshold Function

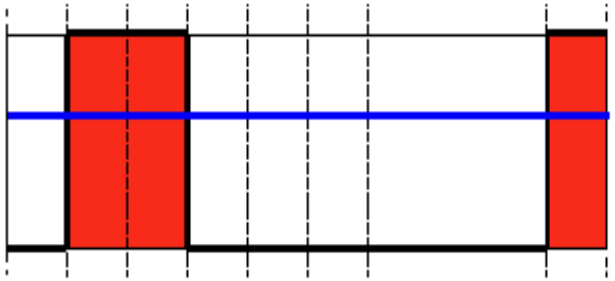
ret,binary = cv2.threshold(img,127,255,cv2.THRESH_BINARY)

Threshold Binary

- This thresholding operation can be expressed as:

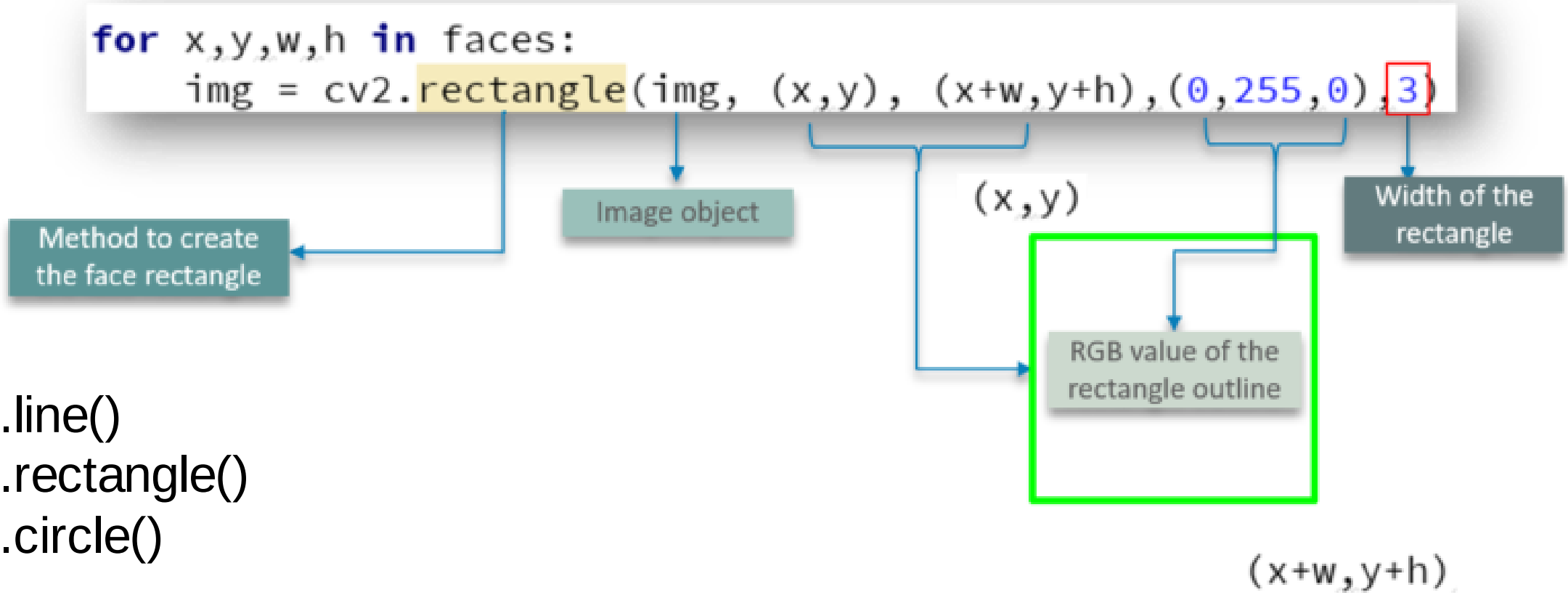
$$\texttt{dst}(x,y) = \begin{cases} \texttt{maxVal} & \text{if } \texttt{src}(x,y) > \texttt{thresh} \\ 0 & \text{otherwise} \end{cases}$$

- So, if the intensity of the pixel $\texttt{src}(x,y)$ is higher than $\texttt{thresh}$, then the new pixel intensity is set to a $\texttt{MaxVal}$. Otherwise, the pixels are set to 0.



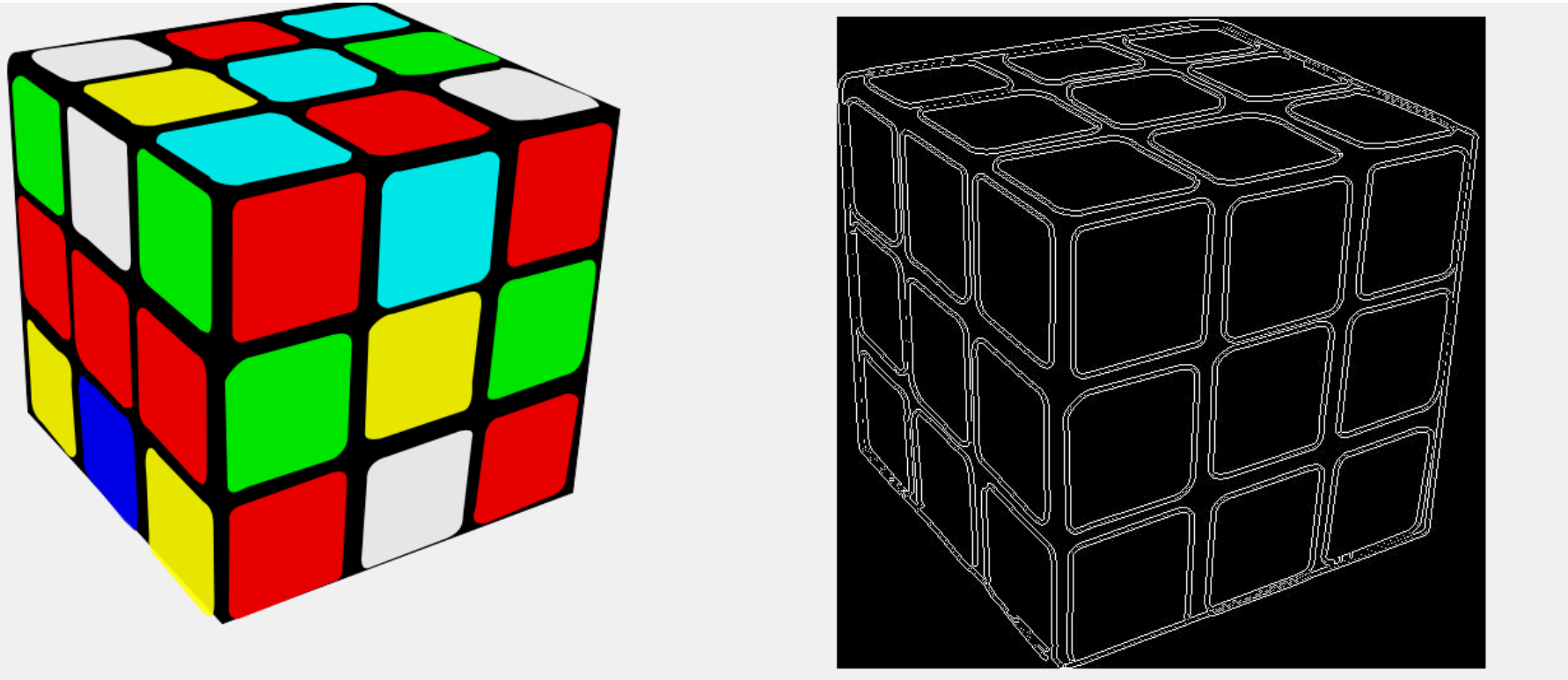
https://docs.opencv.org/2.4.13.7/doc/tutorials/imgproc/threshold/threshold.html#threshold-binary

Shapes in Opencv



- cv2.line()
- cv2.rectangle()
- cv2.circle()

Edge Detection



http://4.bp.blogspot.com/-W5XdeoIeSss/UY9PpuykF4I/AAAAAAAAAkE/pNR275VKfrg/s1600/q1jjy.png

REFERENCES

1. https://docs.opencv.org/master/d6/d00/tutorial_py_root.html
2. https://machinelearningmastery.com/what-is-computer-vision/
3. https://en.wikipedia.org/wiki/Pixel

THANK YOU