

# Project 1

Sung Soo Hwang

# Project 1

- Develop a program which edits the input video
  - Read 'video.mp4'. Depending on the input of a user, your program should do the following operations
    - Negative transformation on the user input 'n'
    - Gamma transformation with the value of gamma as 2.5 on the user input 'g'
    - Histogram equalization on the user input 'h'
    - Color slicing on the user input 's'
      - Hue value:  $9 < \text{hue} < 23$
    - Color conversion on the user input 'c'
      - Increase Hue value by 50
      - For hue values bigger than 129, subtract 129 instead
    - Average filtering on the user input 'a'
      - Use "blur" function with mask size as 9X9
    - Sharpening by unsharp masking on the user input 'u'
      - Use "blur" function with mask size as 9X9
    - White balancing by using gray world assumption on the user input 'w'
    - Reset the image on the user input 'r'

# Project 1

- Your program should display one window 'video'
  - Depending on the input of the user, contents in the window should be changed
  - For color conversion, use CV\_BGR2HSV and CV\_HSV2BGR
  - Use waitKey for user interaction
    - waitKey returns the code of the pressed key or -1 if no key was pressed before the specified time had elapsed.
    - ESC → 27

# Project 1

Dec	Hx	Oct	Char	Dec	Hx	Oct	Html	Chr	Dec	Hx	Oct	Html	Chr	Dec	Hx	Oct	Html	Chr
0	0	000	NUL (null)	32	20	040	&#32;	Space	64	40	100	&#64;	@	96	60	140	&#96;	`
1	1	001	SOH (start of heading)	33	21	041	&#33;	!	65	41	101	&#65;	A	97	61	141	&#97;	a
2	2	002	STX (start of text)	34	22	042	&#34;	"	66	42	102	&#66;	B	98	62	142	&#98;	b
3	3	003	ETX (end of text)	35	23	043	&#35;	#	67	43	103	&#67;	C	99	63	143	&#99;	c
4	4	004	EOT (end of transmission)	36	24	044	&#36;	\$	68	44	104	&#68;	D	100	64	144	&#100;	d
5	5	005	ENQ (enquiry)	37	25	045	&#37;	%	69	45	105	&#69;	E	101	65	145	&#101;	e
6	6	006	ACK (acknowledge)	38	26	046	&#38;	&	70	46	106	&#70;	F	102	66	146	&#102;	f
7	7	007	BEL (bell)	39	27	047	&#39;	'	71	47	107	&#71;	G	103	67	147	&#103;	g
8	8	010	BS (backspace)	40	28	050	&#40;	(	72	48	110	&#72;	H	104	68	150	&#104;	h
9	9	011	TAB (horizontal tab)	41	29	051	&#41;	)	73	49	111	&#73;	I	105	69	151	&#105;	i
10	A	012	LF (NL line feed, new line)	42	2A	052	&#42;	*	74	4A	112	&#74;	J	106	6A	152	&#106;	j
11	B	013	VT (vertical tab)	43	2B	053	&#43;	+	75	4B	113	&#75;	K	107	6B	153	&#107;	k
12	C	014	FF (NP form feed, new page)	44	2C	054	&#44;	,	76	4C	114	&#76;	L	108	6C	154	&#108;	l
13	D	015	CR (carriage return)	45	2D	055	&#45;	-	77	4D	115	&#77;	M	109	6D	155	&#109;	m
14	E	016	SO (shift out)	46	2E	056	&#46;	.	78	4E	116	&#78;	N	110	6E	156	&#110;	n
15	F	017	SI (shift in)	47	2F	057	&#47;	/	79	4F	117	&#79;	O	111	6F	157	&#111;	o
16	10	020	DLE (data link escape)	48	30	060	&#48;	0	80	50	120	&#80;	P	112	70	160	&#112;	p
17	11	021	DC1 (device control 1)	49	31	061	&#49;	1	81	51	121	&#81;	Q	113	71	161	&#113;	q
18	12	022	DC2 (device control 2)	50	32	062	&#50;	2	82	52	122	&#82;	R	114	72	162	&#114;	r
19	13	023	DC3 (device control 3)	51	33	063	&#51;	3	83	53	123	&#83;	S	115	73	163	&#115;	s
20	14	024	DC4 (device control 4)	52	34	064	&#52;	4	84	54	124	&#84;	T	116	74	164	&#116;	t
21	15	025	NAK (negative acknowledge)	53	35	065	&#53;	5	85	55	125	&#85;	U	117	75	165	&#117;	u
22	16	026	SYN (synchronous idle)	54	36	066	&#54;	6	86	56	126	&#86;	V	118	76	166	&#118;	v
23	17	027	ETB (end of trans. block)	55	37	067	&#55;	7	87	57	127	&#87;	W	119	77	167	&#119;	w
24	18	030	CAN (cancel)	56	38	070	&#56;	8	88	58	130	&#88;	X	120	78	170	&#120;	x
25	19	031	EM (end of medium)	57	39	071	&#57;	9	89	59	131	&#89;	Y	121	79	171	&#121;	y
26	1A	032	SUB (substitute)	58	3A	072	&#58;	:	90	5A	132	&#90;	Z	122	7A	172	&#122;	z
27	1B	033	ESC (escape)	59	3B	073	&#59;	;	91	5B	133	&#91;	[	123	7B	173	&#123;	{
28	1C	034	FS (file separator)	60	3C	074	&#60;	<	92	5C	134	&#92;	\	124	7C	174	&#124;	
29	1D	035	GS (group separator)	61	3D	075	&#61;	=	93	5D	135	&#93;	]	125	7D	175	&#125;	}
30	1E	036	RS (record separator)	62	3E	076	&#62;	>	94	5E	136	&#94;	^	126	7E	176	&#126;	~
31	1F	037	US (unit separator)	63	3F	077	&#63;	?	95	5F	137	&#95;	_	127	7F	177	&#127;	DEL

Source: [www.LookupTables.com](http://www.LookupTables.com)

# Exercise 4

Sung Soo Hwang

# Exercise 4

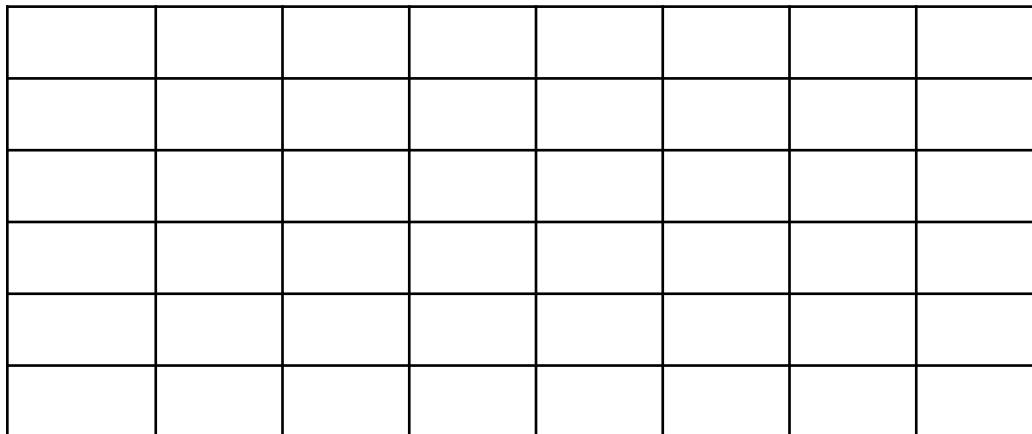
- Compute a normalized histogram for the input image. Assume dynamic range of the input is from 0~31, and the number of bins is 8.

0	1	2	3	4	5	6	7
8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23
24	25	26	27	28	29	30	31
24	25	26	27	28	29	30	31
24	25	26	27	28	29	30	31

# Exercise 4

- Mark a pixel in red when the pixel is the part of the line defined as below.

Point  $p1(0, 0)$ ,  $p2(4,4)$ ;  
`line(image, p1, p2, Scalar(0, 0, 255), 1, 8, 0);`



# Exercise 4

- Mark a pixel in red when the pixel is the part of the line defined as below.

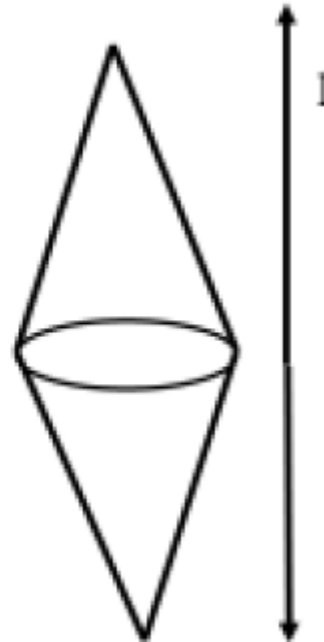
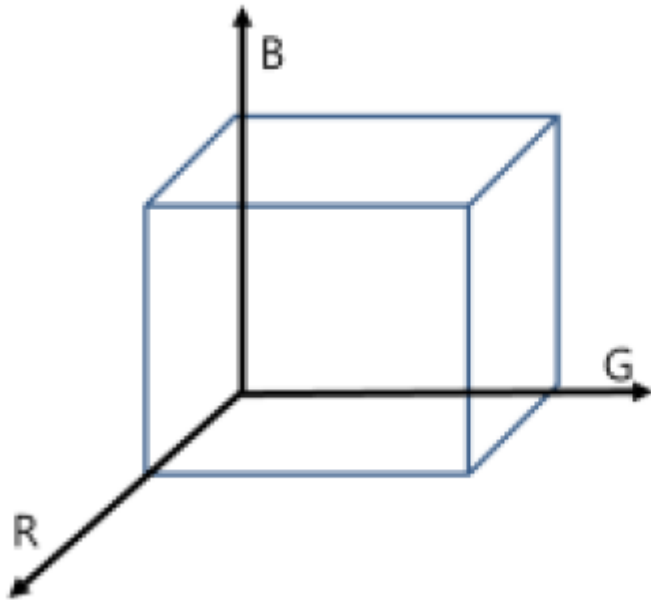
```
Point p1(0, 0), p2(4,4);  
line(image, p1, p2, Scalar(0, 0, 255), 1, 4, 0);
```

[illegible]



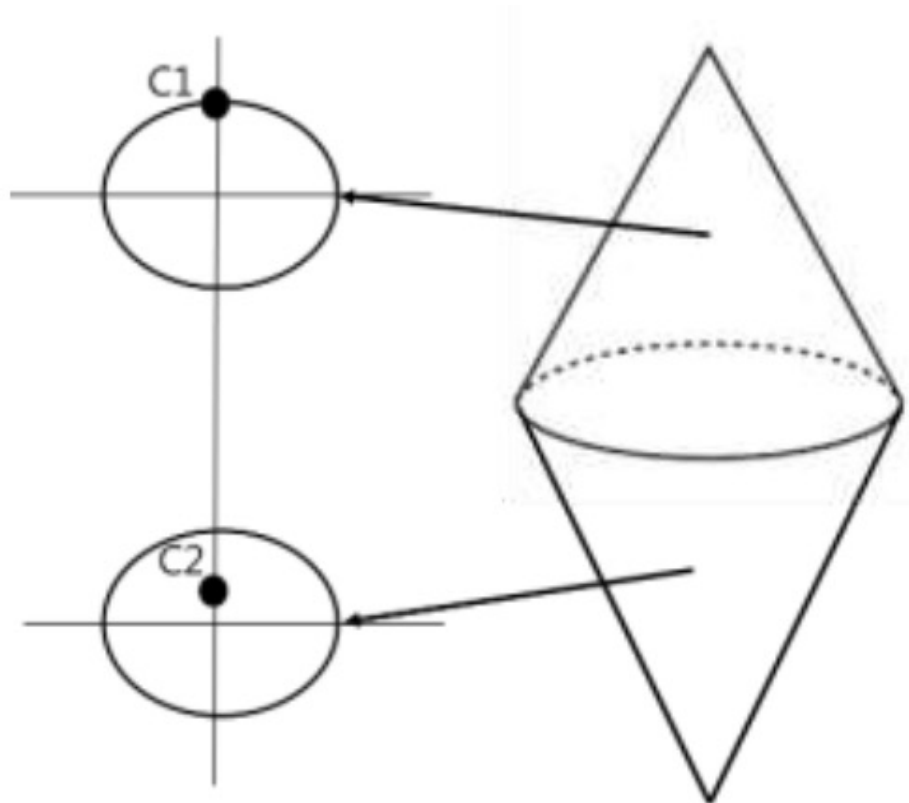
# Exercise 4

- Mark the location of achromatic color in the following RGB space and HSI space



# Exercise 4

- Compare Hue, Saturation, and Intensity value of C1 and C2.



# Exercise 4

- Perform white balancing of the image below using gray-world assumption. Assume dynamic range of the input is from 0~31

0	1	2	3
8	9	10	11
16	17	18	19
24	25	26	27
24	25	26	27