



How To Create Camera Filters

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Who AM I

Present

Research Engineer - Bobble Keyboard, Delhi

Past

Verification Architect - Sony Mobile Corporation & SRM Technologies, Tokyo

Technical Consultant - NEC & SRM Technologies, Tokyo

Software Engineer - SRM University, NEC Labs, Chennai



Agenda

- Basics of Image Data
- Basics of Real Time Image Processing
- The OpenGL & GPU
- Image Processing with OpenGL
- Real Time Camera Filters Architecture
- Demo and Code Explanation



Basics of Image Data



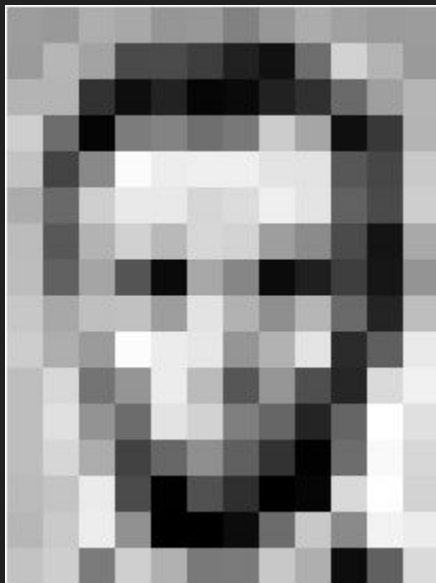
Basics of Image Data

2D Matrix of image data, whose size is width x height of the image

Each element in matrix is a vector of 4 values [Red, Green, Blue, Alpha]

Each color component is 8 bit wide, [0 - 255]

Basics of Image Data



157	153	174	168	150	152	129	151	172	161	155	156
155	182	163	74	75	62	33	17	110	210	180	154
180	180	50	14	34	6	10	33	48	106	159	181
206	109	5	124	131	111	120	204	166	15	56	180
194	68	137	251	237	239	239	228	227	87	71	201
172	105	207	233	233	214	220	239	228	98	74	206
188	88	179	209	185	215	211	158	139	75	20	169
189	97	165	84	10	168	134	11	31	62	22	148
199	168	191	193	158	227	178	143	182	106	36	190
205	174	155	252	236	231	149	178	228	43	95	234
190	216	116	149	236	187	85	150	79	38	218	241
190	224	147	108	227	210	127	102	36	101	255	224
190	214	173	66	103	143	95	90	2	109	249	215
187	196	235	75	1	81	47	0	6	217	255	211
183	202	237	145	0	0	12	108	200	138	243	236
195	206	123	207	177	121	123	200	175	13	96	218

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180	180	50	14	34	6	10	33	48	106	159	181
206	109	5	124	131	111	120	204	166	15	56	180
194	68	137	251	237	239	239	228	227	87	71	201
172	105	207	233	233	214	220	239	228	98	74	206
188	88	179	209	185	215	211	158	139	75	20	169
189	97	165	84	10	168	134	11	31	62	22	148
199	168	191	193	158	227	178	143	182	106	36	190
205	174	155	252	236	231	149	178	228	43	95	234
190	216	116	149	236	187	85	150	79	38	218	241
190	224	147	108	227	210	127	102	36	101	255	224
190	214	173	66	103	143	95	90	2	109	249	215
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Basics of Image Data

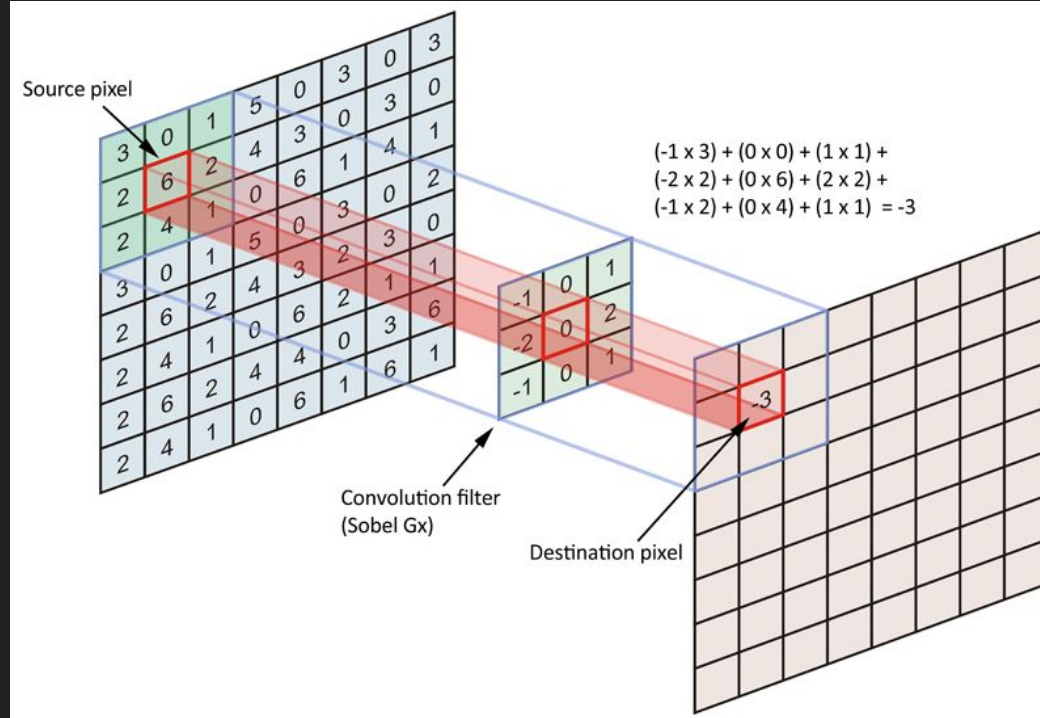


R: 255 G: 0 B: 0 A: 165	R: 255 G: 0 B: 0 A: 255	R: 255 G: 0 B: 0 A: 255	R: 255 G: 0 B: 0 A: 255	R: 222 G: 33 B: 0 A: 255
R: 0 G: 255 B: 0 A: 59	R: 126 G: 128 B: 0 A: 243	R: 253 G: 2 B: 0 A: 255	R: 255 G: 0 B: 0 A: 255	R: 255 G: 0 B: 0 A: 255
R: 0 G: 255 B: 0 A: 249	R: 0 G: 255 B: 0 A: 255	R: 77 G: 178 B: 0 A: 255	R: 242 G: 12 B: 0 A: 254	R: 255 G: 0 B: 0 A: 255
R: 0 G: 255 B: 0 A: 255	R: 0 G: 255 B: 0 A: 255	R: 0 G: 255 B: 0 A: 233	R: 119 G: 135 B: 0 A: 92	R: 255 G: 0 B: 0 A: 221
R: 0 G: 255 B: 0 A: 255	R: 0 G: 255 B: 0 A: 207	R: 0 G: 255 B: 0 A: 30	R: 0 G: 0 B: 0 A: 0	R: 255 G: 0 B: 0 A: 19

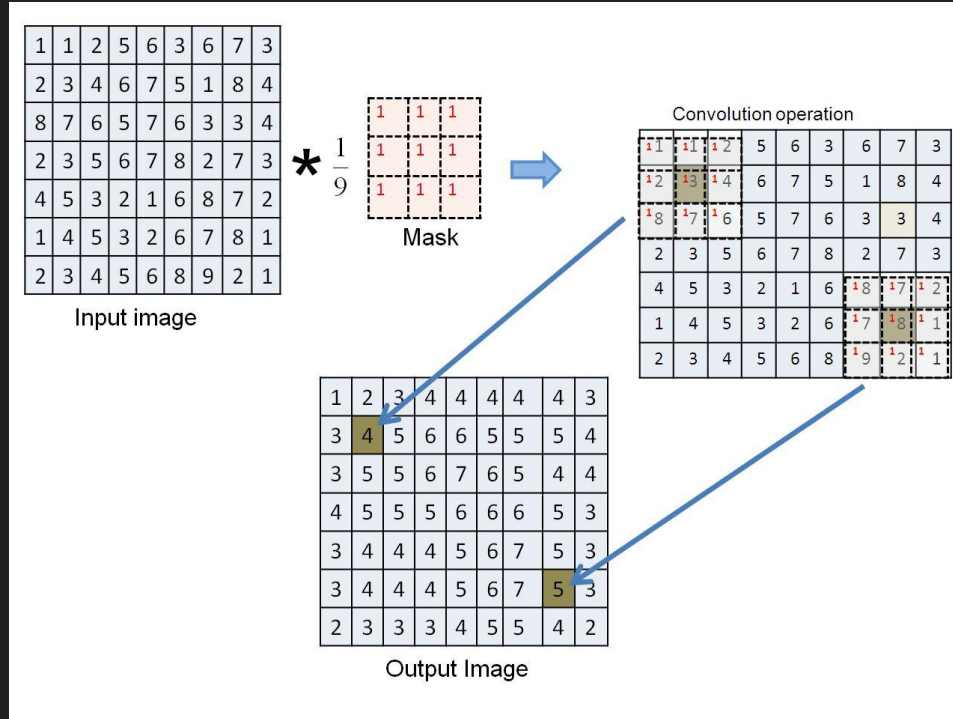


Basics of Real Time Image Processing

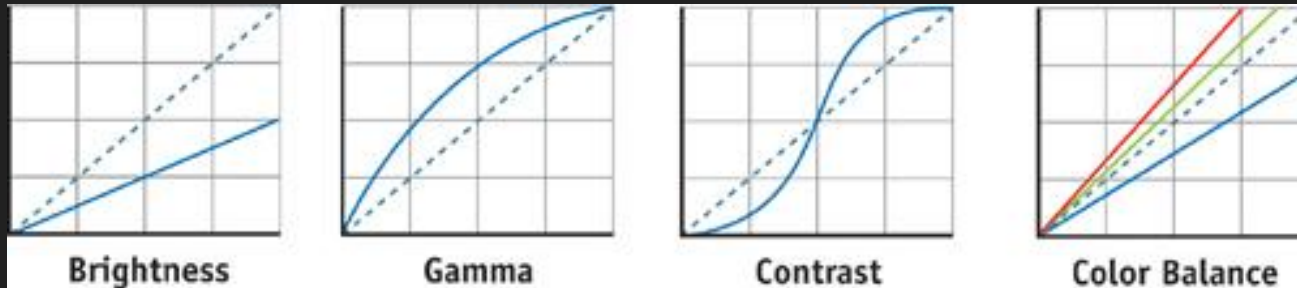
Basics of Real Time Image Processing



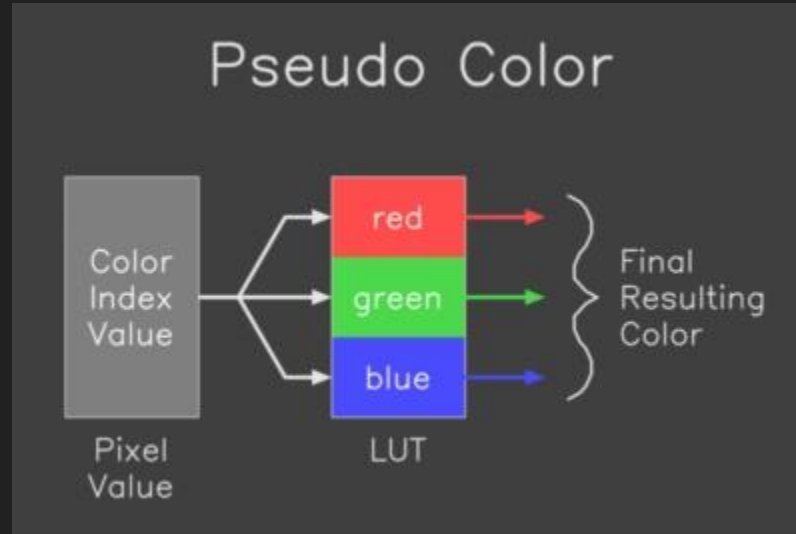
Basics of Real Time Image Processing



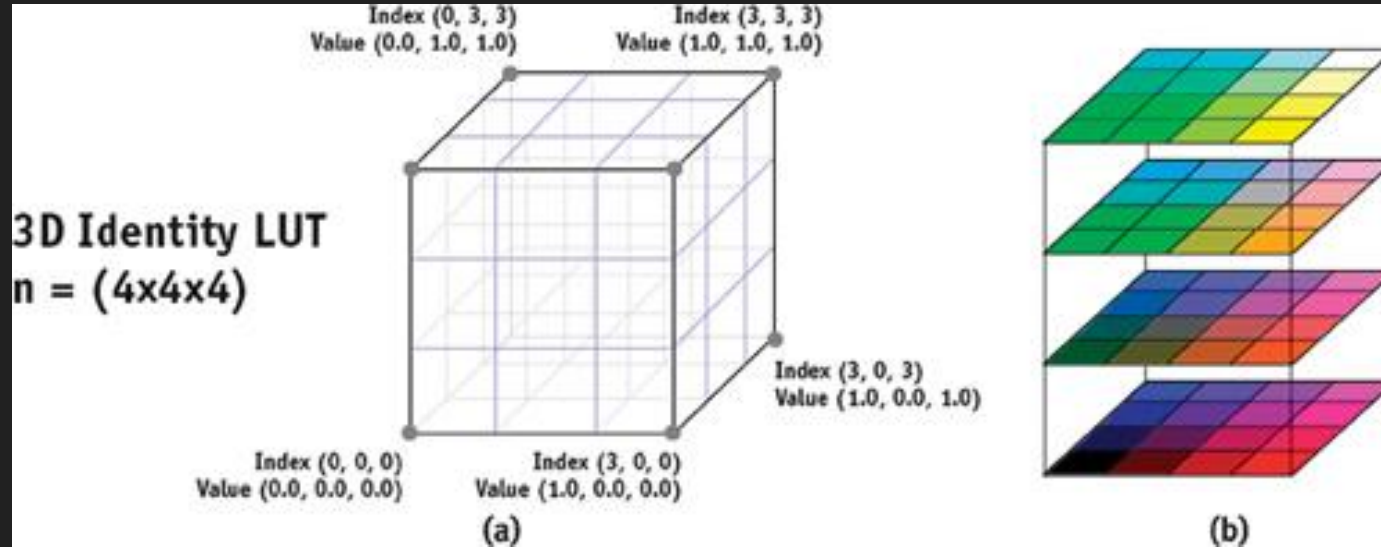
Basics of Real Time Image Processing



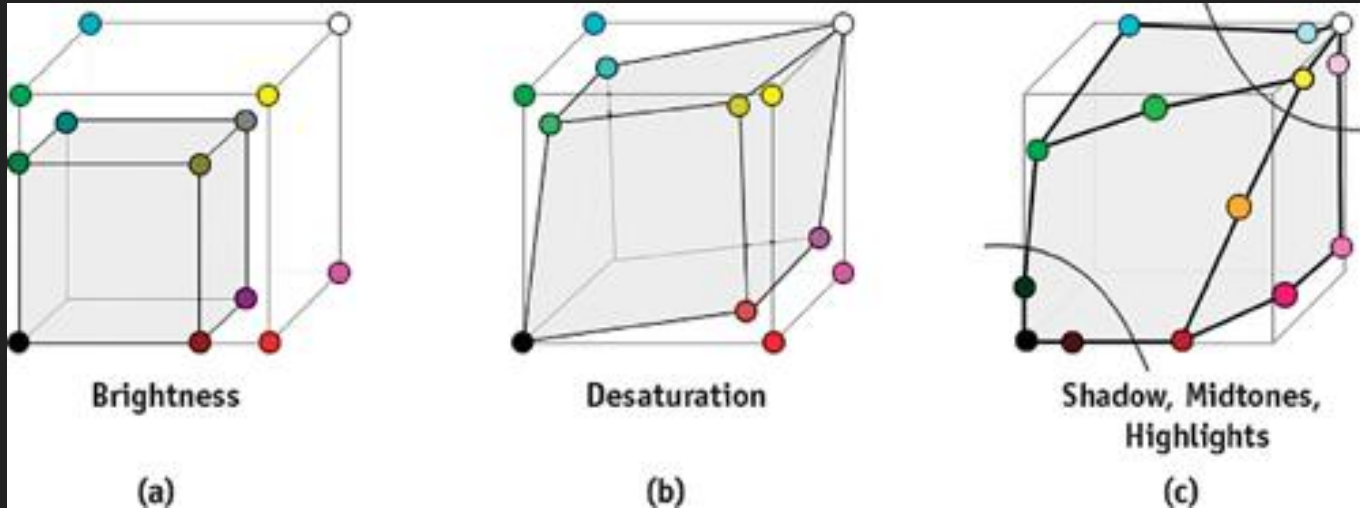
Basics of Real Time Image Processing



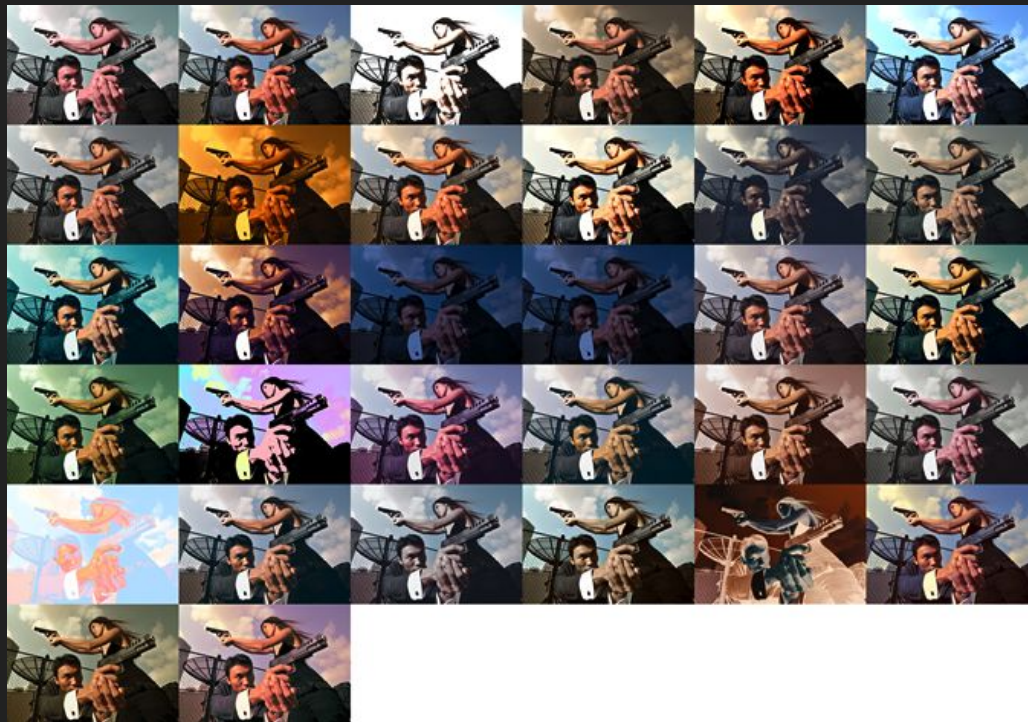
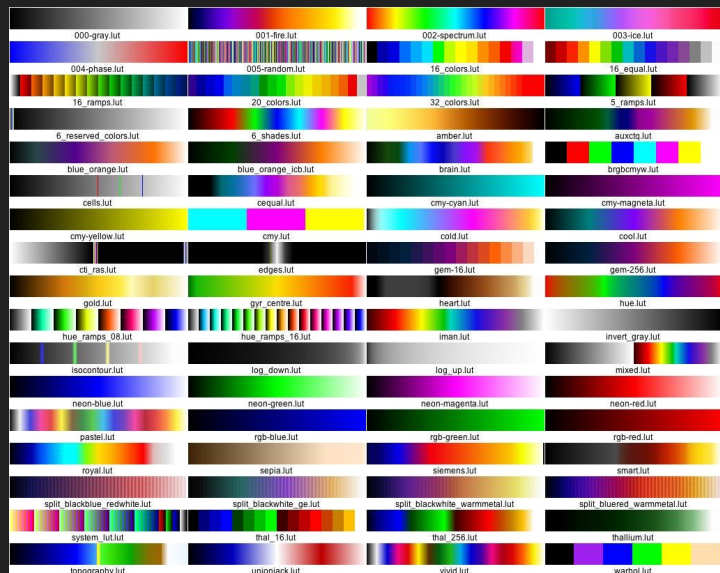
Basics of Real Time Image Processing



Basics of Real Time Image Processing



Basics of Real Time Image Processing





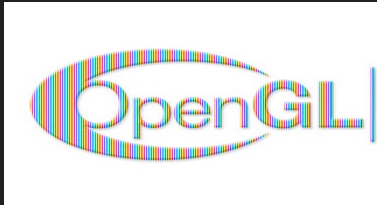
The OpenGL and GPU



The OpenGL and GPU

Low Level API to work with GPU and Graphics

Hardware accelerated parallel image processing and rendering



The OpenGL and GPU

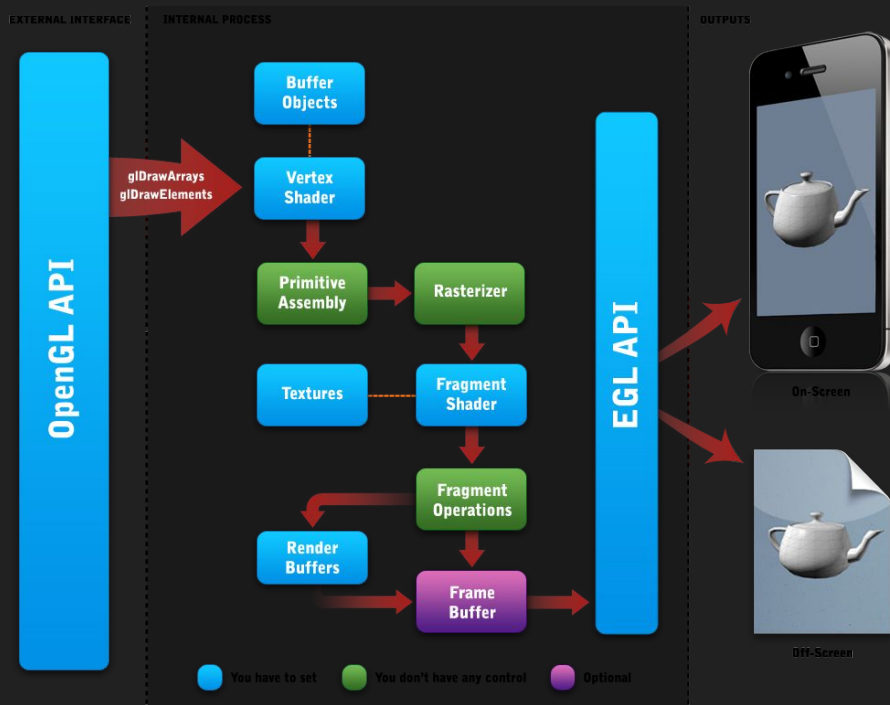




Image processing with OpenGL

Image processing with OpenGL



ES2.0 Programmable Pipeline

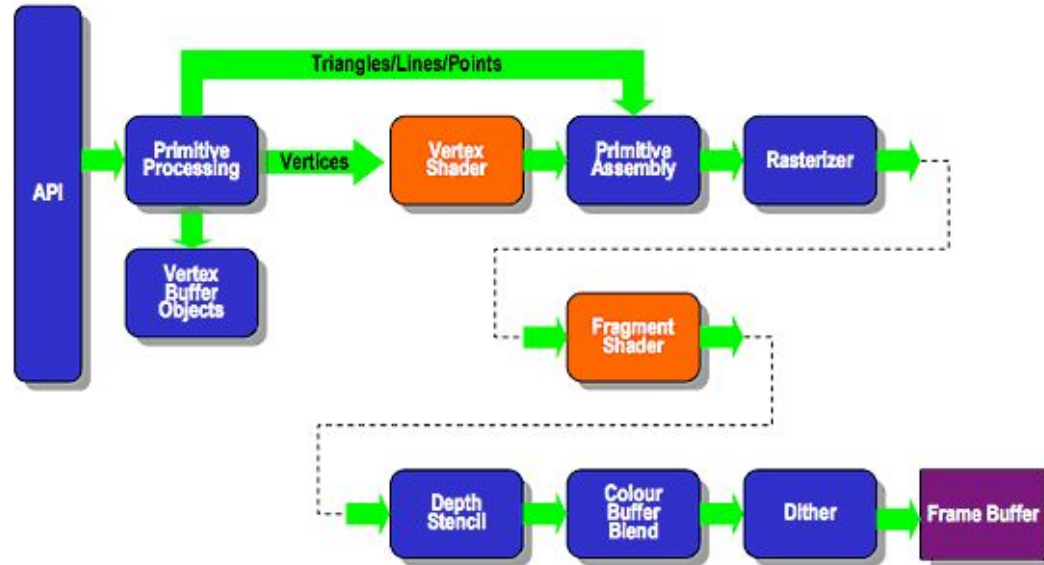


Image processing with OpenGL

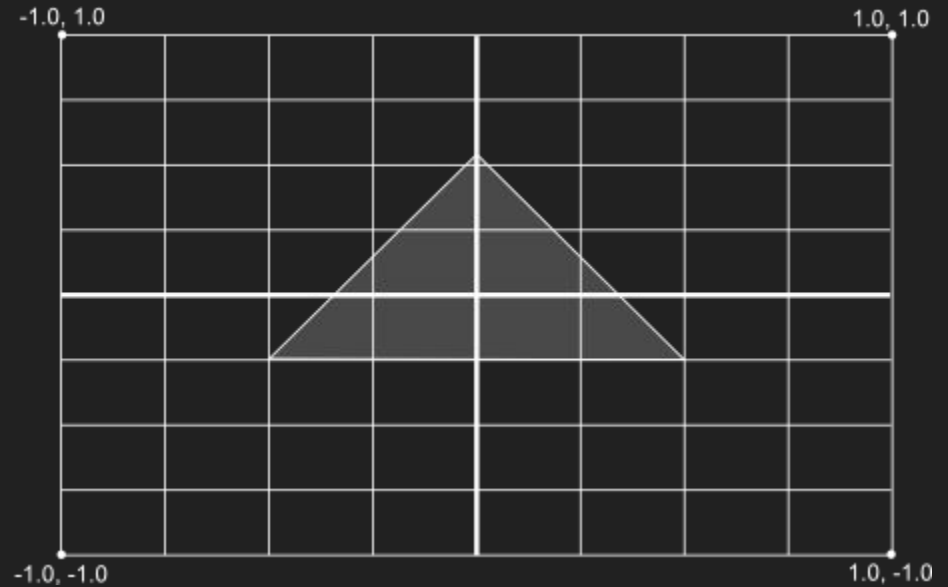
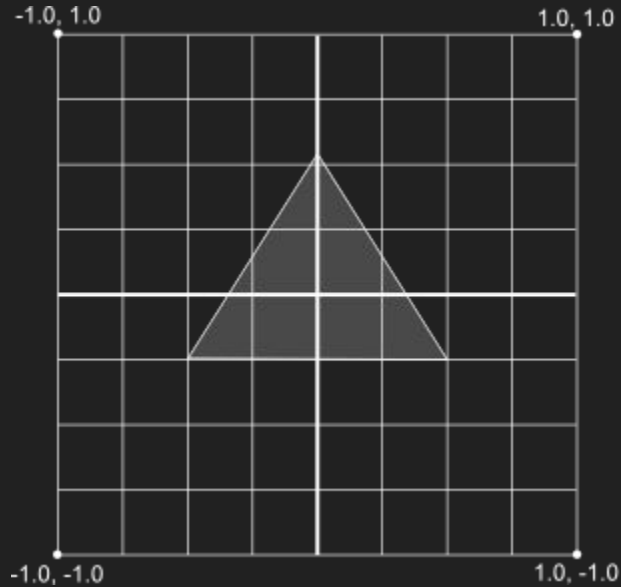




Image processing with OpenGL

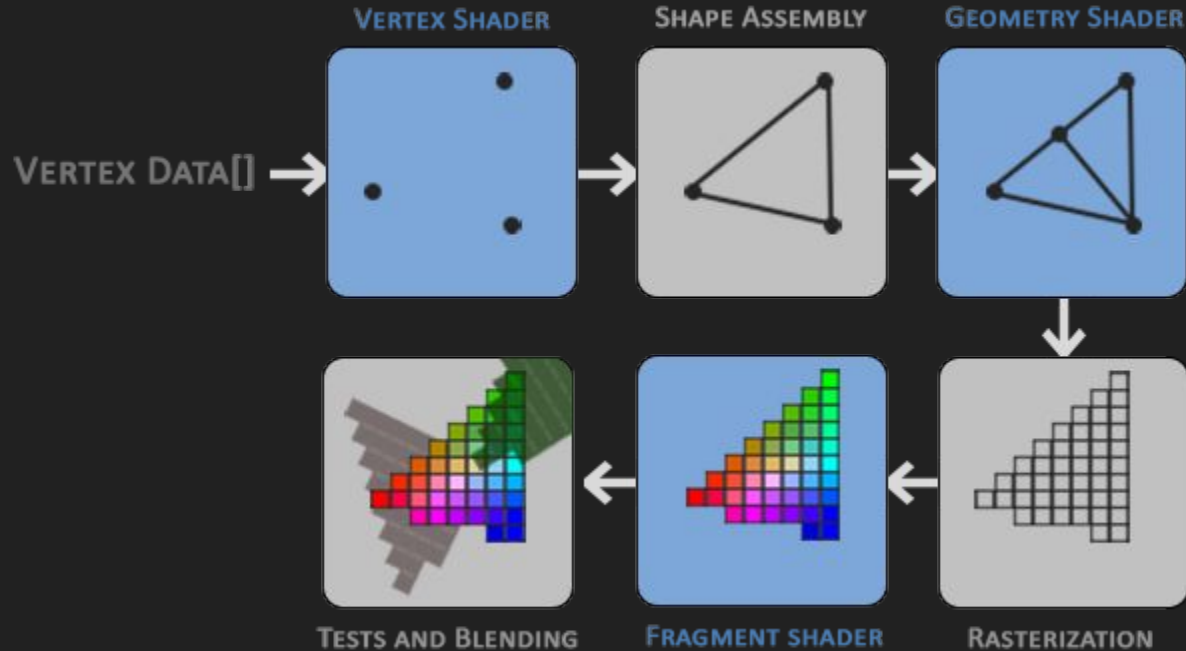
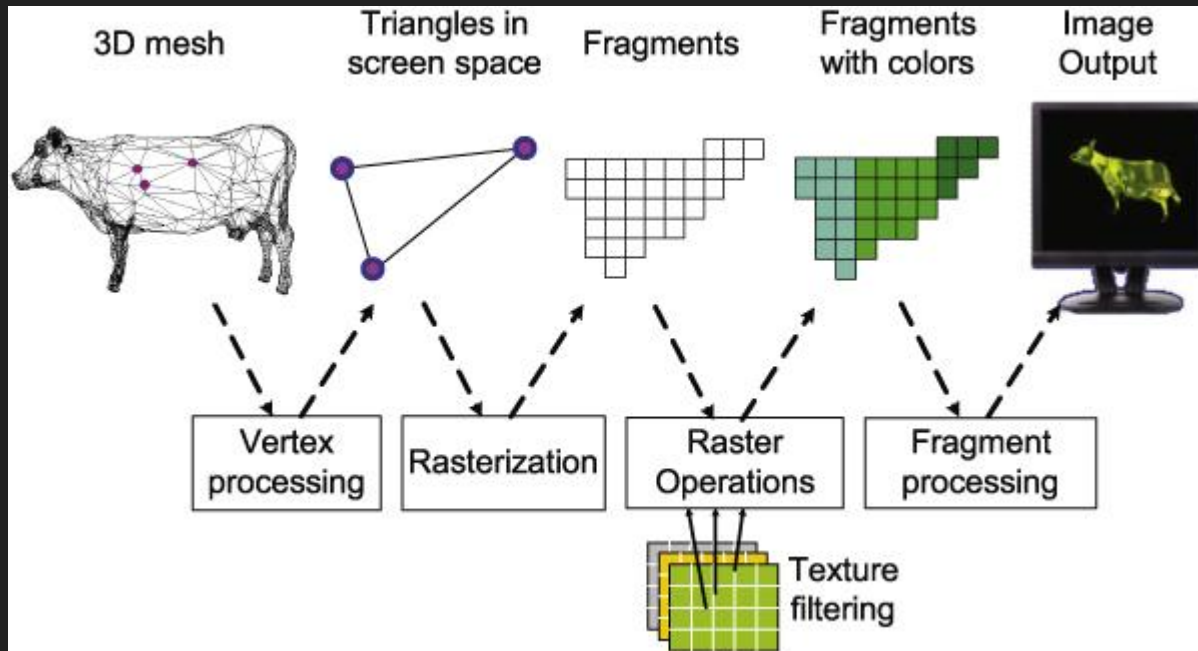


Image processing with OpenGL

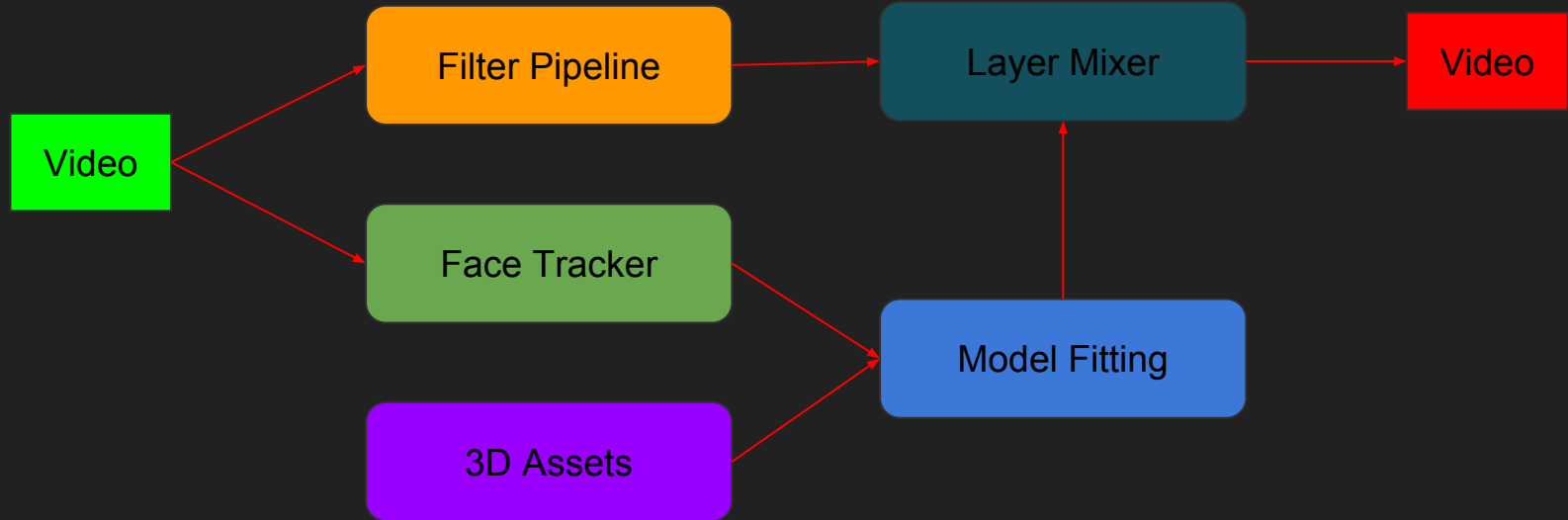




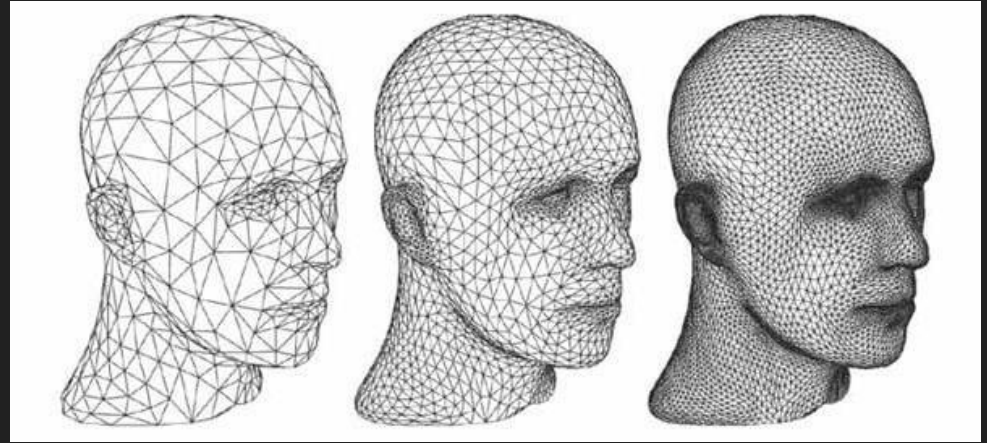
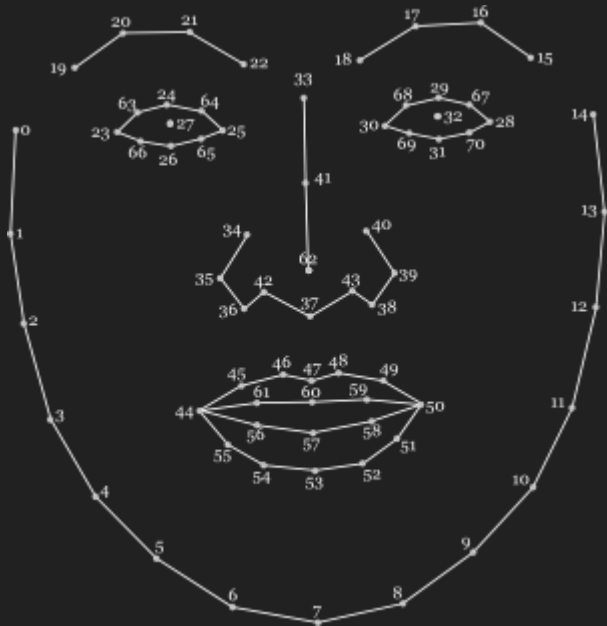
Real Time Camera Filters Architecture



Real Time Camera Filters Architecture



Camera Filters Architecture





Demo & Code Explanation

Source : <https://github.com/touchtalent/alchemy>



Questions ?



Thank You