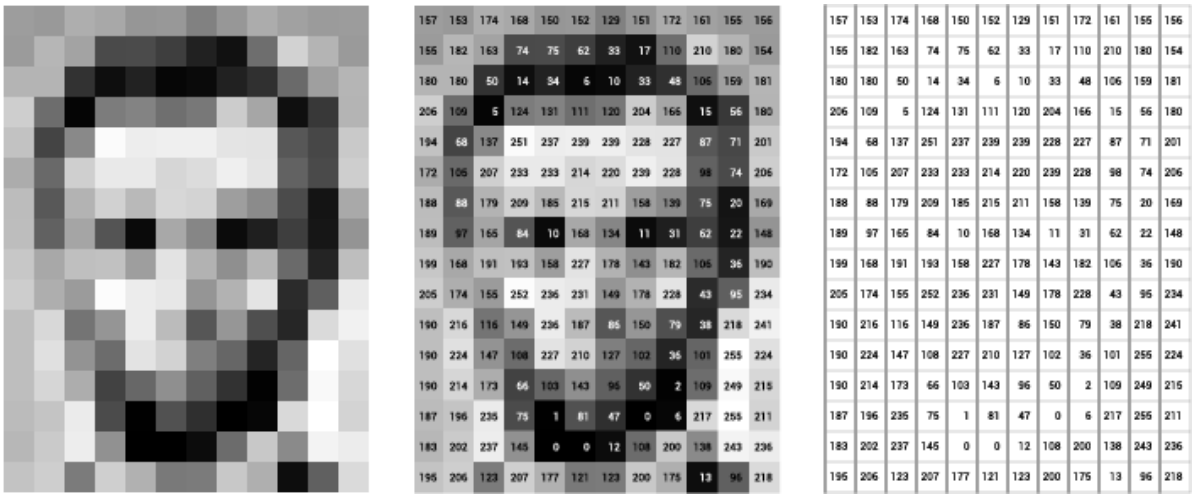
Images

Computers don't see images the way we see them, when an image is stored on your computer it needs to be stored in a way in which the computer can understand.

- They see images as a 2D matrix or 3D array where the third dimension represents the channels.
- Each unit in that grid is a **pixel**.
- Your resolution determines the size of this matrix. A resolution of 800 x 600 would be a grid of size 800 by 600 pixels.
- Each pixel has a number associated with it determining its colour.



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	86	150	79	38	218	241
190	224	147	108	227	210	127	102	36	101	255	224
190	214	173	66	103	143	96	50	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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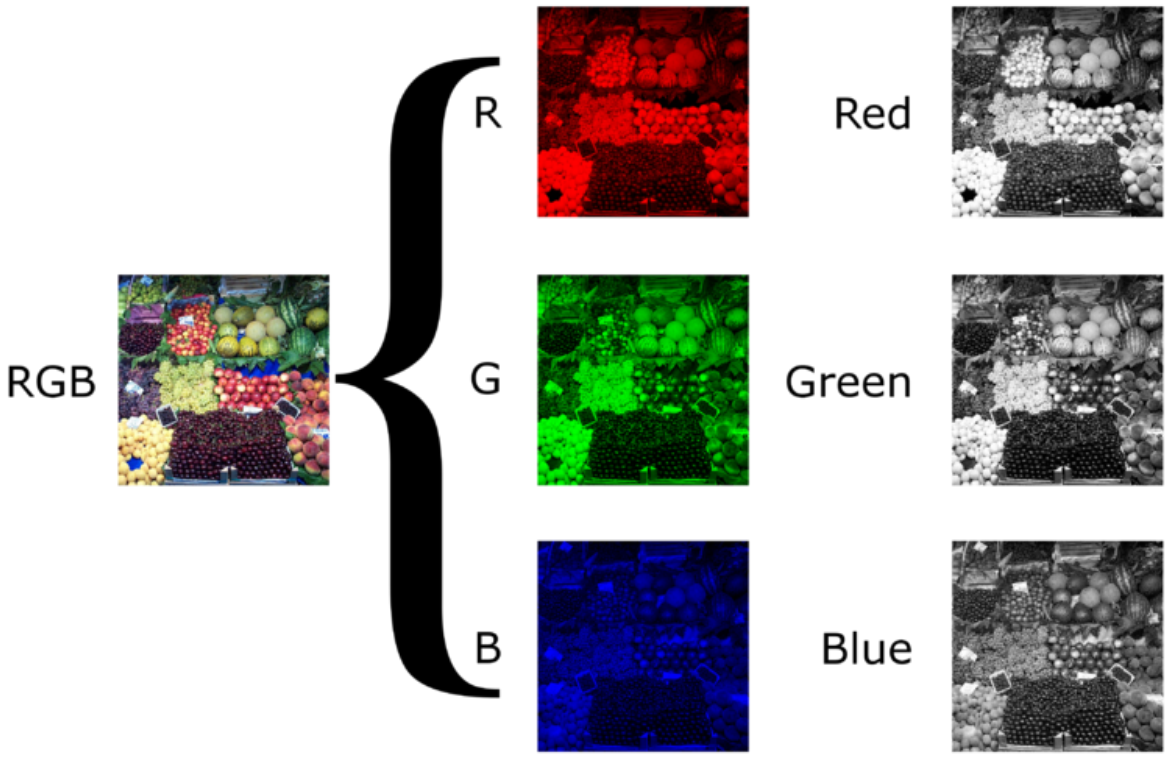
For example, this is how a computer would represent a grayscale image:

- **Grayscale** images have one channel to represent the image(gray).
- Colours on computers are usually represented using 8-bit numbers giving a set of 8 zeros and ones. This gives 2 or 256 possible representations of each pixel.
- Each representation describes the intensity or brightness of that particular colour. In this case, 0 is black and 255 would represent white.

With colour images they are normally represented by the RGB (Red, Green, Blue) model, for example:

- **RGB** is represented by three channels - **Red**, **Green** and **Blue**.
- The channels are combined together to create the image.
- All red would be expressed as (255, 0, 0), green by (0, 255, 0) and blue by (0, 0, 255).
- White can be by (255, 255, 255) and black by (0, 0, 0).
- Any other colour can be represented by a combination of all three. For instance (106, 13, 173) would represent the colour purple.
- This gives us a possible combination of 16,777,216 different colours.



There are other systems a computer can use to represent colours

- For printers, they use the CMYK system to represent colours:

    - **C** for Cyan
    - **M** for Mageneta
    - **Y** or Yellow
    - **K** for Black
- Another common one is Hexadecimal format.
    - Each colour is represented by # followed by six characters #RRGGBB.
    - Each RR (red), GG (green), and BB (blue) are hexadecimal integers between 00 and FF.
    - For example, #0000FF displays blue since FF is the highest representation and 00 is the lowest.
    - #CC5500 would represent a burnt orange colour can you see why?