

Tratamiento de Señales

Version 2022-2

Pixels

Capítulo 1]

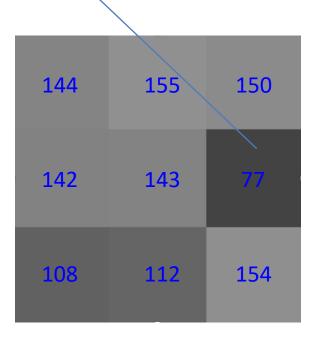
Dr. José Ramón Iglesias

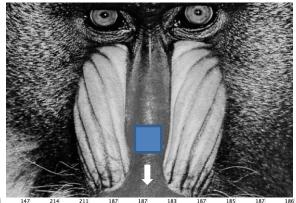
DSP-ASIC BUILDER GROUP Director Semillero TRIAC Ingenieria Electronica Universidad Popular del Cesar

pixel

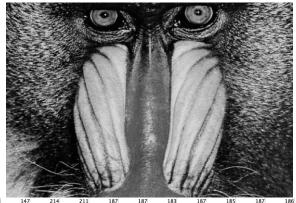
pixel

Picture Element

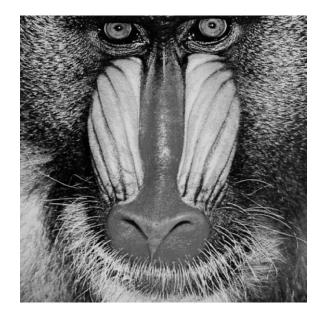


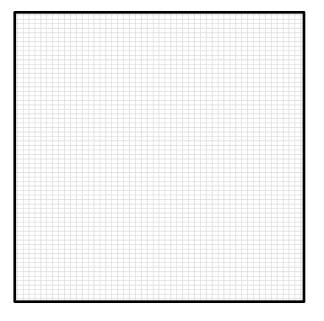


| | 11/11/11/11 | Sec. 1 (200) | | | | | | | | | | |
|-----|--|---|---|--|-----|-----|-----|-----|-----|-----|-----|-----|
| 178 | 147 | 214 | 211 | 187 | 187 | 183 | 187 | 185 | 187 | 186 | 184 | 185 |
| 183 | 141 | 155 | 214 | 184 | 197 | 210 | 210 | 210 | 187 | 188 | 187 | 188 |
| 151 | 142 | 142 | 215 | 201 | 187 | 222 | 213 | 221 | 187 | 149 | 160 | 160 |
| 113 | 142 | 177 | 214 | 214 | 210 | 174 | 223 | 193 | 209 | 173 | 179 | 158 |
| 135 | 186 | 210 | 218 | 194 | 178 | 146 | 164 | 206 | 196 | 212 | 192 | 180 |
| 144 | 194 | 196 | 166 | 184 | 146 | 145 | 150 | 181 | 186 | 201 | 170 | 182 |
| 185 | 200 | 183 | 174 | 185 | 142 | 124 | 150 | 144 | 166 | 184 | 173 | 183 |
| 183 | 218 | 183 | 175 | 185 | 146 | 105 | 149 | 162 | 184 | 188 | 189 | 192 |
| 155 | 187 | 198 | 162 | 187 | 127 | 114 | 157 | 178 | 197 | 175 | 177 | 157 |
| 196 | 151 | 196 | 214 | 170 | 121 | 138 | 157 | 152 | 152 | 116 | 147 | 115 |
| 195 | 189 | 140 | 197 | 144 | 163 | 162 | 152 | 146 | 145 | 88 | 143 | 146 |
| 154 | 188 | 142 | 140 | 158 | 155 | 158 | 127 | 156 | 143 | 153 | 180 | 163 |
| 205 | 137 | 139 | 140 | 143 | 139 | 156 | 147 | 133 | 135 | 128 | 145 | 150 |
| 139 | 141 | 106 | 116 | 144 | 155 | 150 | 157 | 111 | 114 | 152 | 182 | 160 |
| 113 | 143 | 116 | 187 | 142 | 143 | 77 | 107 | 155 | 160 | 155 | 149 | 93 |
| 149 | 200 | 183 | 142 | 108 | 112 | 154 | 184 | 205 | 186 | 156 | 178 | 139 |
| 144 | 147 | 113 | 108 | 106 | 105 | 112 | 147 | 121 | 156 | 140 | 140 | 109 |
| 142 | 107 | 74 | 155 | 137 | 180 | 141 | 110 | 87 | 106 | 138 | 93 | 107 |
| 85 | 107 | 132 | 146 | 193 | 149 | 115 | 136 | 143 | 138 | 141 | 147 | 138 |
| 100 | 137 | 146 | 179 | 157 | 167 | 137 | 157 | 163 | 119 | 100 | 104 | 139 |
| 94 | 143 | 155 | 158 | 146 | 158 | 125 | 117 | 106 | 89 | 96 | 83 | 95 |
| 134 | 151 | 124 | 115 | 93 | 107 | 107 | 141 | 123 | 122 | 128 | 128 | 129 |
| 155 | 132 | 134 | 106 | 112 | 95 | 101 | 110 | 128 | 147 | 127 | 117 | 136 |
| 126 | 111 | 158 | 112 | 163 | 126 | 149 | 127 | 122 | 147 | 84 | 95 | 90 |
| 109 | 95 | 115 | 113 | 157 | 152 | 164 | 164 | 144 | 132 | 78 | 112 | 90 |
| 98 | 85 | 84 | 96 | 118 | 138 | 97 | 115 | 140 | 99 | 101 | 113 | 109 |
| 84 | 113 | 104 | 95 | 100 | 113 | 101 | 145 | 122 | 91 | 92 | 109 | 89 |
| 105 | 104 | 81 | 149 | 186 | 157 | 141 | 132 | 103 | 109 | 116 | 102 | 93 |
| | 183 151 1133 135 144 143 183 155 196 195 1205 139 144 144 144 144 155 100 94 134 155 166 176 176 176 176 176 176 176 176 176 | 1178 147, 183 141, 151 142, 113 142, 114, 185 200, 183 218, 155 187, 196 151, 197, 197, 197, 197, 197, 197, 197, 19 | 183 141 155 151 142 142 113 142 147 1135 186 210 144 194 196 185 200 183 183 218 183 155 187 198 196 151 196 195 189 140 154 188 142 205 137 139 139 141 106 149 200 183 144 147 113 142 107 74 85 107 132 100 137 146 94 143 155 134 151 124 155 132 134 156 111 158 169 95 115 198 85 84 84 113 104 | 178 147 214 211 183 141 155 214 181 142 142 215 113 142 177 214 135 186 210 218 144 194 196 166 185 200 183 174 183 218 183 175 155 187 198 162 196 151 196 214 199 140 197 154 188 142 140 205 137 139 140 205 137 139 140 113 141 166 187 144 147 113 108 144 147 113 108 144 147 113 108 144 107 74 155 85 107 132 146 100 137 146 179 94 143 155 158 134 151 152 155 153 134 106 126 111 158 112 109 95 115 113 98 85 84 96 88 113 104 217 | 178 | 178 | 178 | 178 | 178 | 178 | 178 | 178 |



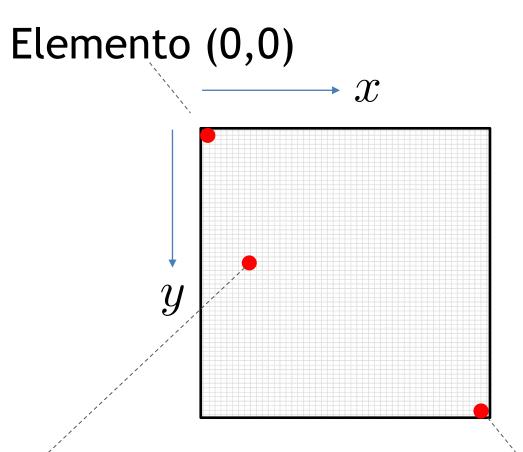
| 185 | 184 | 186 | 187 | 185 | 187 | 183 | 187 | 187 | 211 | 214 | 147 | 178 | 210 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 188 | 187 | 188 | 187 | 210 | 210 | 210 | 197 | 184 | 214 | 155 | 141 | 183 | 217 |
| 160 | 160 | 149 | 187 | 221 | 213 | 222 | 187 | 201 | 215 | 142 | 142 | 151 | 192 |
| 158 | 179 | 173 | 209 | 193 | 223 | 174 | 210 | 214 | 214 | 177 | 142 | 113 | 148 |
| 180 | 192 | 212 | 196 | 206 | 164 | 146 | 178 | 194 | 218 | 210 | 186 | 135 | 140 |
| 182 | 170 | 201 | 186 | 181 | 150 | 145 | 146 | 184 | 166 | 196 | 194 | 144 | 142 |
| 183 | 173 | 184 | 166 | 144 | 150 | 124 | 142 | 185 | 174 | 183 | 200 | 185 | 144 |
| 192 | 189 | 188 | 184 | 162 | 149 | 105 | 146 | 185 | 175 | 183 | 218 | 183 | 166 |
| 157 | 177 | 175 | 197 | 178 | 157 | 114 | 127 | 187 | 162 | 198 | 187 | 155 | 168 |
| 115 | 147 | 116 | 152 | 152 | 157 | 138 | 121 | 170 | 214 | 196 | 151 | 196 | 158 |
| 146 | 143 | 88 | 145 | 146 | 152 | 162 | 163 | 144 | 197 | 140 | 189 | 195 | 189 |
| 163 | 180 | 153 | 143 | 156 | 127 | 158 | 155 | 158 | 140 | 142 | 188 | 154 | 185 |
| 150 | 145 | 128 | 135 | 133 | 147 | 156 | 139 | 143 | 140 | 139 | 137 | 205 | 187 |
| 160 | 182 | 152 | 114 | 111 | 157 | 150 | 155 | 144 | 116 | 106 | 141 | 139 | 134 |
| 93 | 149 | 155 | 160 | 155 | 107 | 77 | 143 | 142 | 187 | 116 | 143 | 113 | 78 |
| 139 | 178 | 156 | 186 | 205 | 184 | 154 | 112 | 108 | 142 | 183 | 200 | 149 | 115 |
| 109 | 140 | 140 | 156 | 121 | 147 | 112 | 105 | 106 | 108 | 113 | 147 | 144 | 142 |
| 107 | 93 | 138 | 106 | 87 | 110 | 141 | 180 | 137 | 155 | 74 | 107 | 142 | 183 |
| 138 | 147 | 141 | 138 | 143 | 136 | 115 | 149 | 193 | 146 | 132 | 107 | 85 | 145 |
| 139 | 104 | 100 | 119 | 163 | 157 | 137 | 167 | 157 | 179 | 146 | 137 | 100 | 110 |
| 95 | 83 | 96 | 89 | 106 | 117 | 125 | 158 | 146 | 158 | 155 | 143 | 94 | 104 |
| 129 | 128 | 128 | 122 | 123 | 141 | 107 | 107 | 93 | 115 | 124 | 151 | 134 | 87 |
| 136 | 117 | 127 | 147 | 128 | 110 | 101 | 95 | 112 | 106 | 134 | 132 | 155 | 119 |
| 90 | 95 | 84 | 147 | 122 | 127 | 149 | 126 | 163 | 112 | 158 | 111 | 126 | 137 |
| 90 | 112 | 78 | 132 | 144 | 164 | 164 | 152 | 157 | 113 | 115 | 95 | 109 | 79 |
| 109 | 113 | 101 | 99 | 140 | 115 | 97 | 138 | 118 | 96 | 84 | 85 | 98 | 59 |
| 89 | 109 | 92 | 91 | 122 | 145 | 101 | 113 | 100 | 95 | 104 | 113 | 84 | 126 |
| 93 | 102 | 116 | 109 | 103 | 132 | 141 | 157 | 186 | 149 | 81 | 104 | 105 | 142 |





Matriz de 512 x 512 pixels (con valores de 0 a 255)

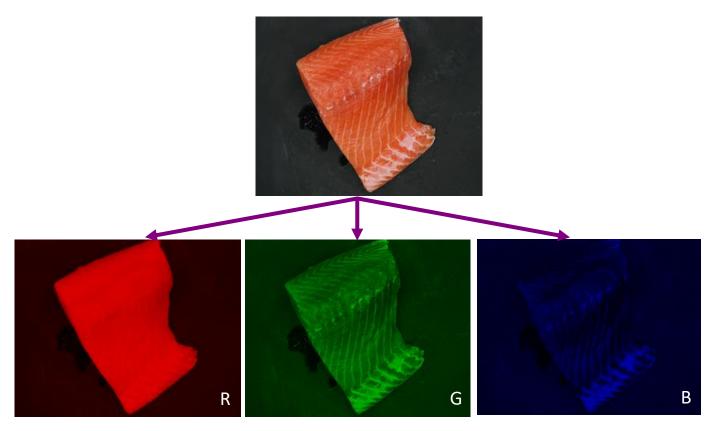




Elemento (256,75)

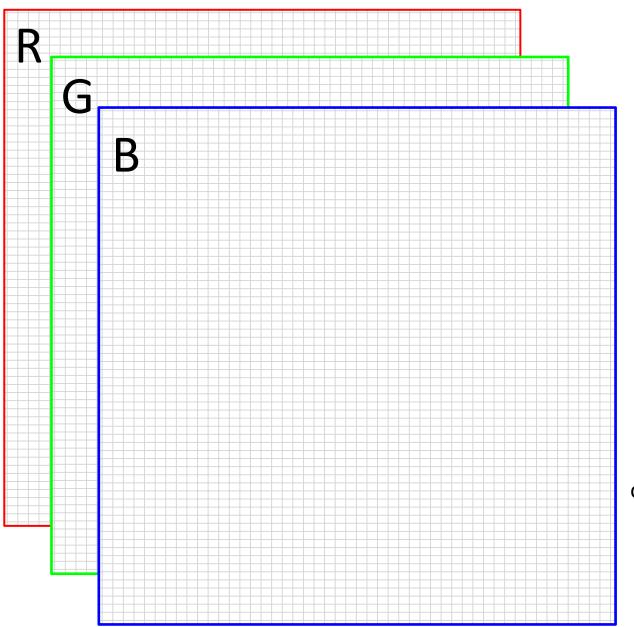
Elemento (511,511)

Imágenes a Color



Descomposición RGB

Imágenes a Color



Una imagen a color de 512x512 pixels se almacena como tres matrices de 512x512

o una sola de 512x512x3