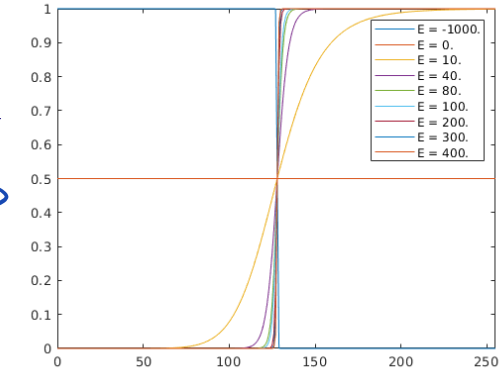
1. 探索对比度展宽函数

① 取尽大范围观察展宽效果

可见 E=-1000 总对1个 pixel 作用

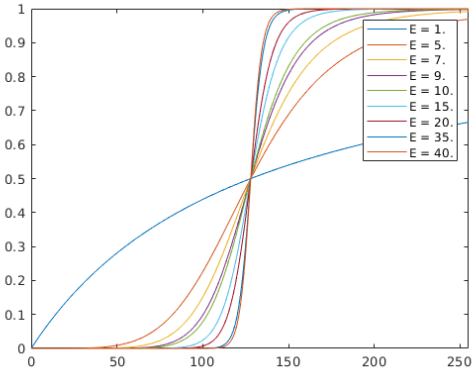
所以 E不可取过大

E取40会在窗口间把握图像

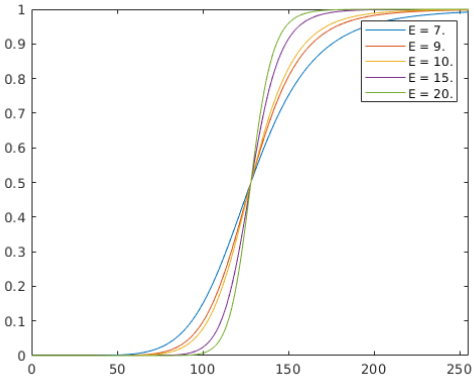


② 取 1-40 间一些点

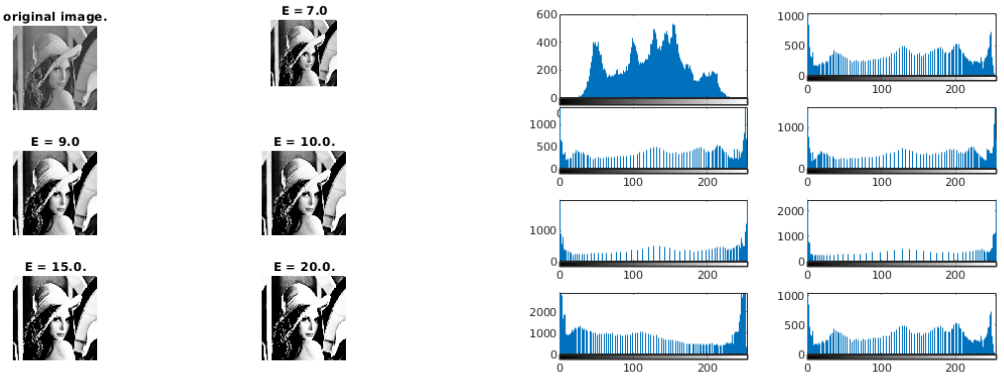
观察效果



③ 经观察E在右图取值范围效果较好.



实图效果及对应的直方图.



2. 直方图均衡化

由图可知 $P_r(0)=0.17$ $r_k=0$

$P_r(1)=0.25$ $r_k=1$

$P_r(2)=0.21$ $r_k=2$

$P_r(3)=0.16$ $r_k=3$

$P_r(4)=0.07$ $r_k=4$

$P_r(5)=0.08$ $r_k=5$

$P_r(6)=0.04$ $r_k=6$

$P_r(7)=0.02$ $r_k=7$

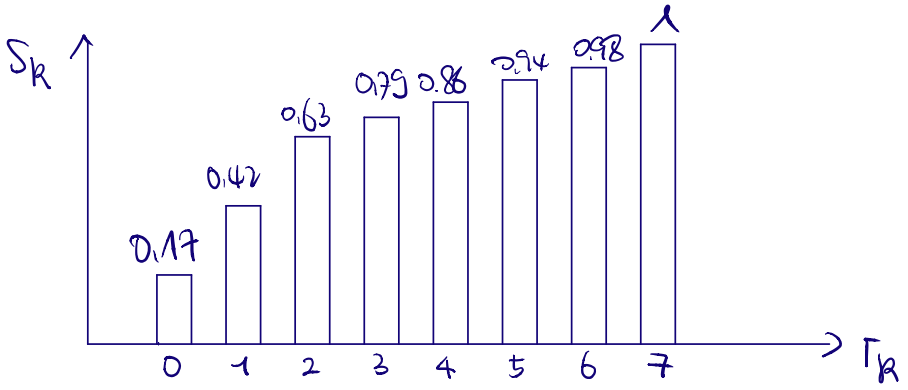
$$S_0=T(r_0)=P_r(r_0)=0.17$$

$$S_1=T(r_1)=\sum_{j=0}^{1}P_r(r_j)=0.17+0.25=0.42$$

$S_2 = 0.63$ $\quad S_5 = 0.94$

$S_3 = 0.79$ $\quad S_6 = 0.98$

$S_4 = 0.86$ $\quad S_7 = 1$



$m_0 = \lfloor 7 \times 0.17 \rfloor = \lfloor 1.19 \rfloor = 1 \rightarrow 0.17$

$m_1 = \lfloor 7 \times 0.42 \rfloor = \lfloor 2.94 \rfloor = 3 \rightarrow 0.25$

$m_2 = \lfloor 7 \times 0.63 \rfloor = \lfloor 4.41 \rfloor = 4 \rightarrow 0.21$

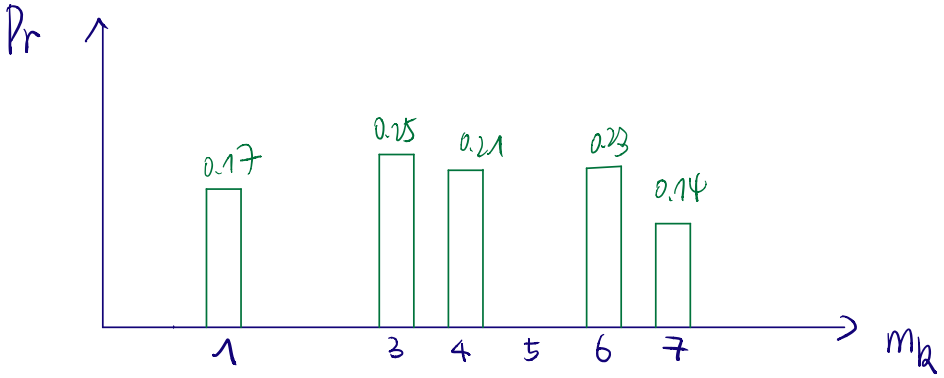
$m_3 = \lfloor 7 \times 0.79 \rfloor = \lfloor 5.53 \rfloor = 6$

$m_4 = \lfloor 7 \times 0.86 \rfloor = \lfloor 6.02 \rfloor = 6$ $\} \rightarrow 0.23$

$m_5 = \lfloor 7 \times 0.94 \rfloor = \lfloor 6.58 \rfloor = 7$

$m_6 = \lfloor 7 \times 0.98 \rfloor = \lfloor 6.86 \rfloor = 7$

$m_7 = \lfloor 7 \times 1 \rfloor = \lfloor 7 \rfloor = 7$ $\} 0.14$



3. 由于累积分布函数是不减的所以灰度函数，映射后的图像无法取到所有灰度级，由图可知，第一次均衡化的图像已经均匀分布了，所以第二次均衡化与第一次并无差异。