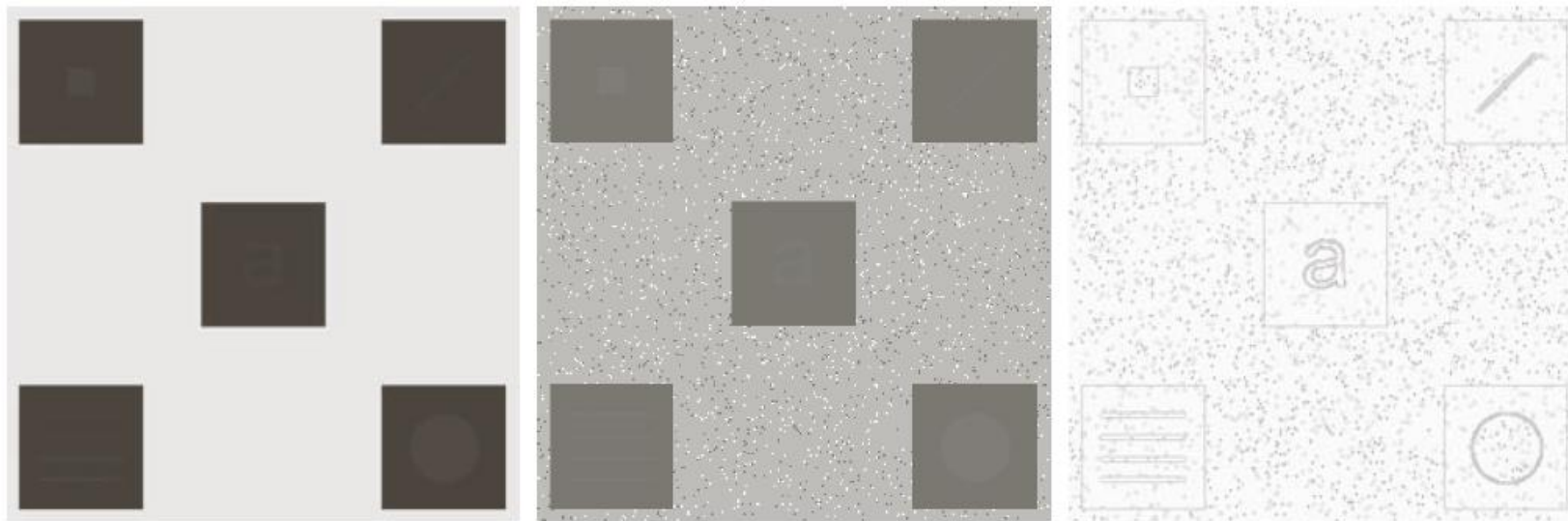


TDM	729.89	915.51	185.62	▲25.43%	FLR	660.27	745.28	85.01	▲12.88%
HUM	749.73	924.29	174.56	▲23.28%	UVD	155.59	181.57	25.98	▲16.70%
DMW	833.72	1004.01	170.29	▲20.43%	QUV	440.55	540.21	99.66	▲22.62%
YZJ	903.49	1127.46	223.97	▲24.79%	HZT	285.51	344.98	59.47	▲20.83%
GLY	982.07	1219.39	237.32	▲24.17%	PCW	811.44	1029.66	218.22	▲26.89%
VDA	113.74	143.41	29.67	▲26.09%	AIK	361.77	451.39	89.62	▲24.77%
UVV	468.08	535.41	67.33	▲14.38%	ZJJ	858.36	994.57	136.21	▲15.87%
HJS	545.49	659.05	113.56	▲20.82%	RHJ	894.79	1046.68	151.89	▲16.97%
EQC	566.96	664.69	97.73	▲17.24%	VOV	425.08	509.95	84.87	▲19.97%

PPJ	912.63	1038.36	125.73	▲13.78%	ZBK	391.59	491.48	99.89	▲25.51%
UAQ	1309.55	1655.62	346.07	▲26.43%	BNY	969.21	1130.65	161.44	▲16.66%
DAQ	1295.17	1641.66	346.49	▲26.75%	SDM	735.44	913.39	177.95	▲24.20%
PNR	654.33	775.84	121.51	▲18.57%	TQQ	1323.91	1646.42	322.51	▲24.36%
ZTM	581.00	705.22	124.22	▲21.38%	OIS	543.42	667.24	123.82	▲22.79%
YIB	1025.17	1222.56	197.39	▲19.24%					

Histogram Processing and Histogram Statistics

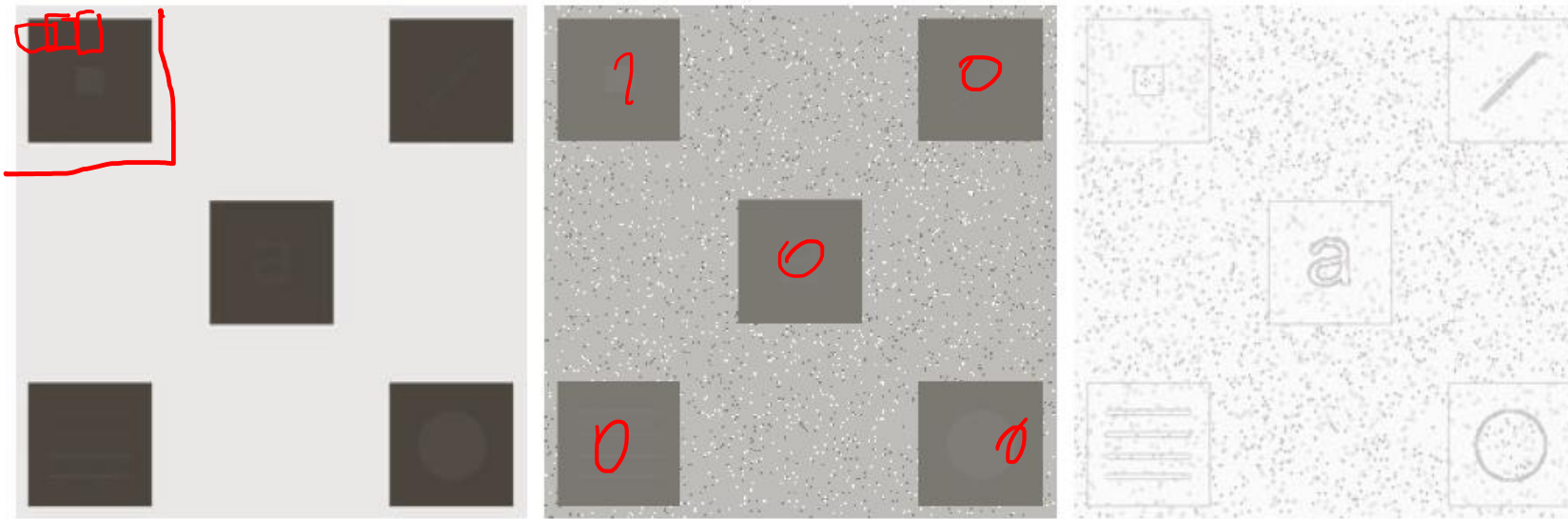
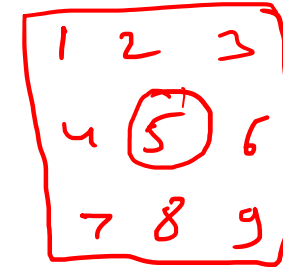
Local Histogram Processing



a b c

FIGURE 3.26 (a) Original image. (b) Result of global histogram equalization. (c) Result of local histogram equalization applied to (a), using a neighborhood of size 3×3 .

Local Histogram Processing



a b c

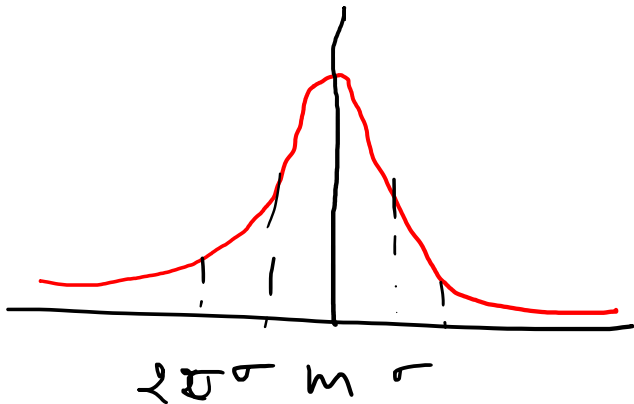
FIGURE 3.26 (a) Original image. (b) Result of global histogram equalization. (c) Result of local histogram equalization applied to (a), using a neighborhood of size 3×3 .

Mean

$$m = \frac{1}{MN} \sum_{x=0}^{M-1} \sum_{y=0}^{N-1} f(x, y)$$

Variance

$$\sigma^2 = \frac{1}{MN} \sum_{x=0}^{M-1} \sum_{y=0}^{N-1} [f(x, y) - m]^2$$



Mean
(Avg. Intensity)

$$m = \sum_{i=0}^{L-1} r_i P(r_i)$$

$$P(r_i) = \frac{n_i}{MN}$$

Variance
(Intensity Contrast)

$$\mu_2(r) = \sum_{i=0}^{L-1} (r_i - m)^2 P(r_i)$$

2-bit $\Rightarrow (0, 1, 2, 3)$

5x5

0	0	1	1	2
1	2	3	0	1
3	1	2	2	0
2	3	1	0	0
1	1	3	2	2

$$m_s = 1.44$$

$$m_I = 1.44$$

$$P(r_0) = \frac{6}{25}$$

$$P(r_1) = \frac{7}{25}$$

$$P(r_2) = \frac{7}{25}$$

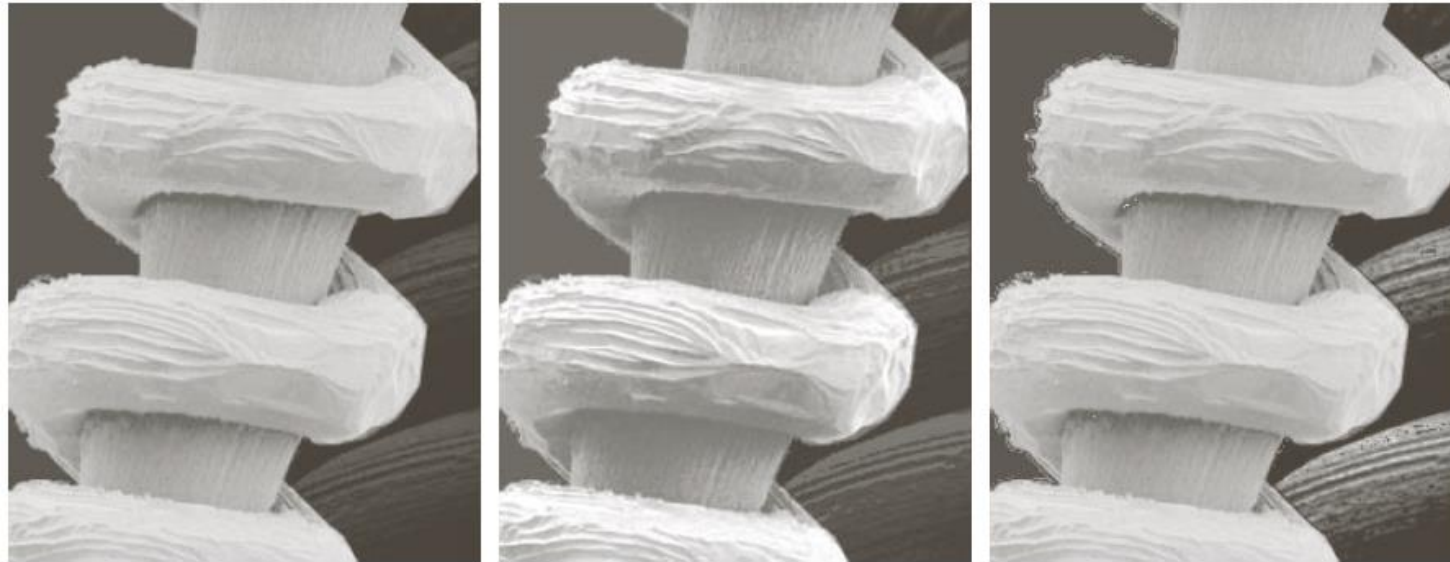
$$P(r_3) = \frac{5}{25}$$

Local Processing

$$m_{S_{xy}} = \sum_{i=0}^{L-1} r_i p_{S_{xy}}(r_i)$$

$$\sigma_{S_{xy}}^2 = \sum_{i=0}^{L-1} (r_i - m_{S_{xy}})^2 p_{S_{xy}}(r_i)$$

Using Histogram Statistics for Image Enhancement



a b c

FIGURE 3.27 (a) SEM image of a tungsten filament magnified approximately $130\times$. (b) Result of global histogram equalization. (c) Image enhanced using local histogram statistics. (Original image courtesy of Mr. Michael Shaffer, Department of Geological Sciences, University of Oregon, Eugene.)

Using Histogram Statistics for Image Enhancement

$$g(x, y) = \begin{cases} E \cdot f(x, y) & \text{if } m_{S_{xy}} \leq k_0 m_G \text{ AND } k_1 \sigma_G \leq \sigma_{S_{xy}} \leq k_2 \sigma_G \\ f(x, y) & \text{otherwise} \end{cases}$$