Pertemuan 10
HISTOGRAM

- Pertemuan ini membahas tentang :
  - Pembuatan Histogram
  - Algoritma Perhitungan
  - Pengubahan Histogram
  - Perataan Histogram (Histogram Equalization)
  - Spesifikasi Histogram

Pembuatan Histogram

- Histogram Citra adalah

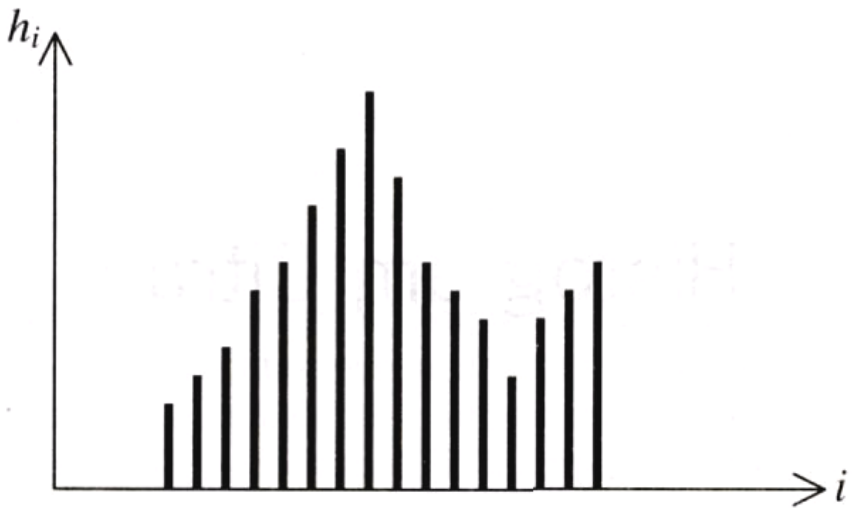
$$h_i = \frac{n_i}{n} \quad , i = 0, 1, \ldots, L-1$$

- Dimana

L = derajat keabuan

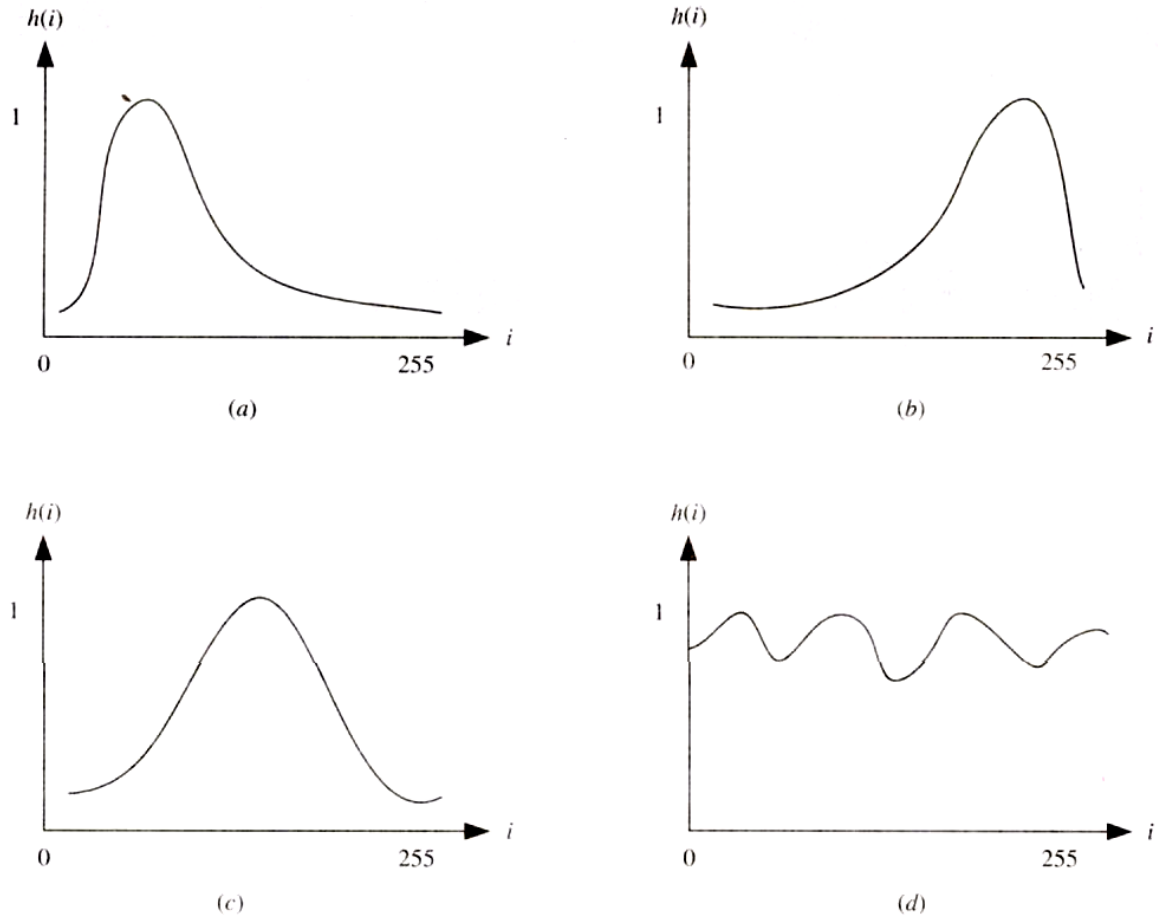
n_i = jumlah *pixel* yang memiliki derajat keabuan i

n = jumlah seluruh *pixel* di dalam citra



Pembuatan Histogram

- Ciri citranya
  a) Gelap
  b) Terang
  c) Normal
  d) Normal Brightness dan Contrast



Algoritma Histogram

- Contoh, citra 8x8 dengan skala keabuan 0 - 15

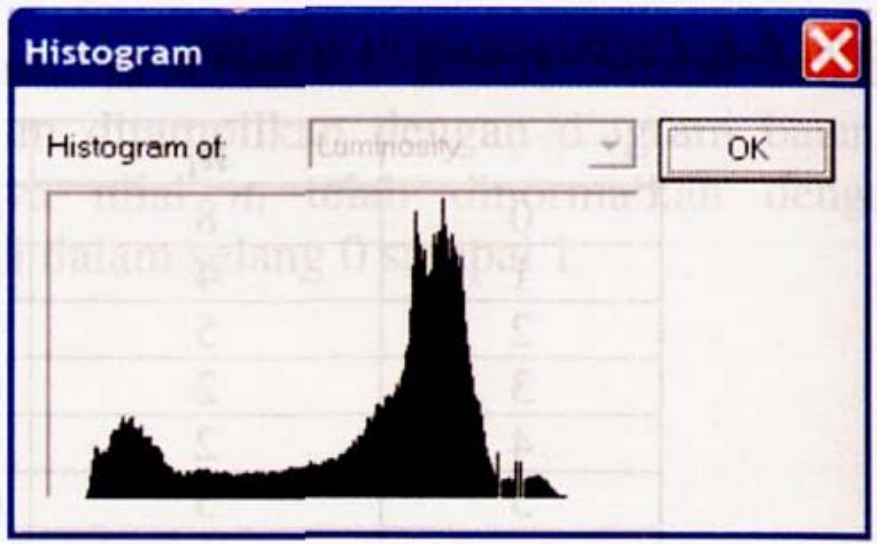
$$\begin{bmatrix} 3 & 7 & 7 & 8 & 10 & 12 & 14 & 10 \\ 2 & 0 & 0 & 0 & 1 & 8 & 15 & 15 \\ 14 & 6 & 5 & 9 & 8 & 10 & 9 & 12 \\ 12 & 12 & 11 & 8 & 8 & 10 & 11 & 1 \\ 0 & 2 & 3 & 4 & 5 & 13 & 10 & 14 \\ 4 & 5 & 0 & 0 & 1 & 0 & 2 & 2 \\ 15 & 13 & 11 & 10 & 9 & 9 & 8 & 7 \\ 2 & 1 & 0 & 10 & 11 & 14 & 13 & 12 \end{bmatrix}$$

	n_i	$h_i = n_i/n \quad (n = 64)$
0	8	0.125
1	4	0.0625
2	5	0.078125
3	2	0.03125
4	2	0.03125
5	3	0.046875
6	1	0.015625
7	3	0.046875
8	6	0.09375
9	3	0.046875
10	7	0.109375
11	4	0.0625
12	5	0.078125
13	3	0.046875
14	4	0.0625
15	3	0.046875

Pembuatan Histogram

- Contoh citra hitam-putih

(a) kapal 512 x512, 8-bit

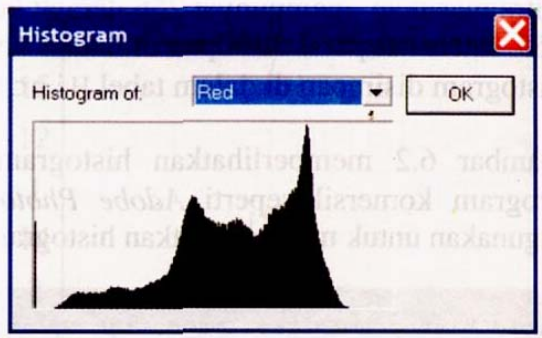


(b) Histogram citra kapal (*by PolyView*)

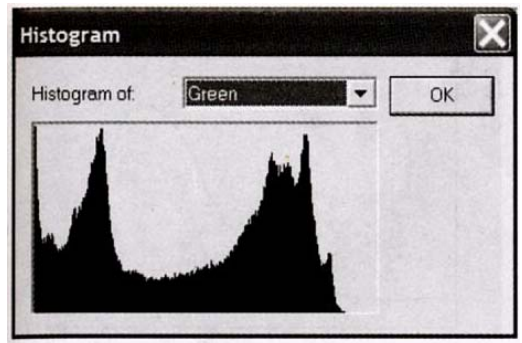
Pembuatan Histogram

- Contoh citra berwarna

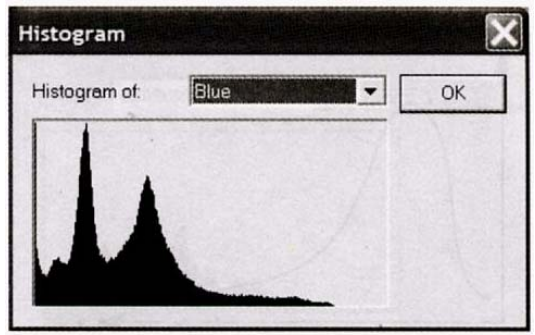
(a) *pepper (color)*, 512x512, 24-bit



(b) Histogram untuk kanal merah

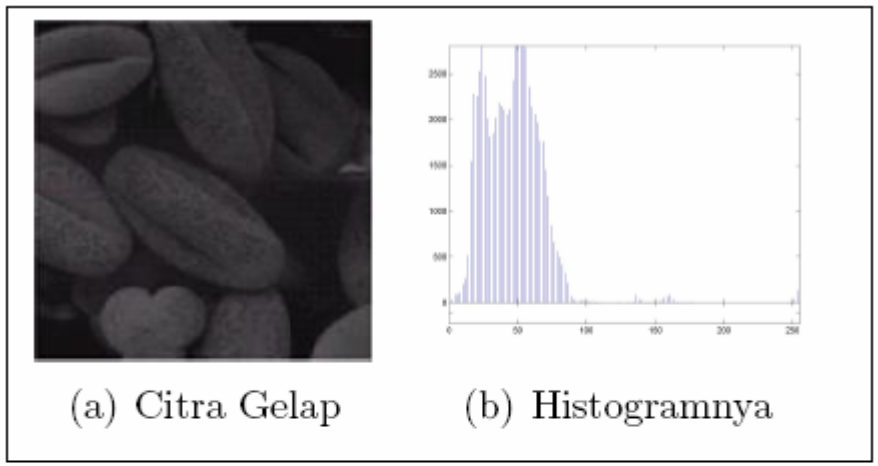


(c) Histogram untuk kanal hijau

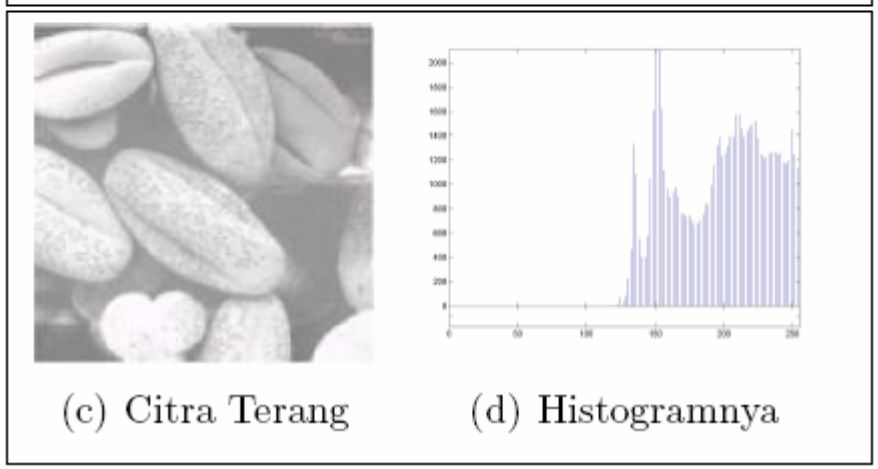


(d) Histogram untuk kanal biru

Pengubahan Histogram



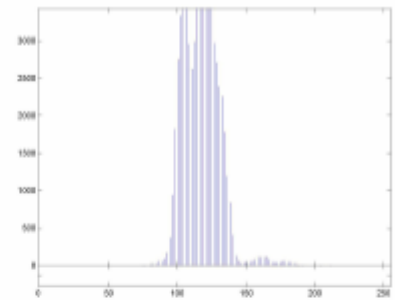
(a) Citra Gelap (b) Histogramnya



(c) Citra Terang (d) Histogramnya

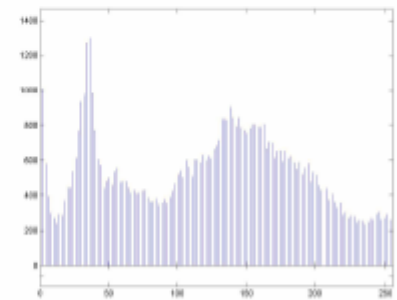
Pengubahan Histogram

(e) Citra Kontras Rencah



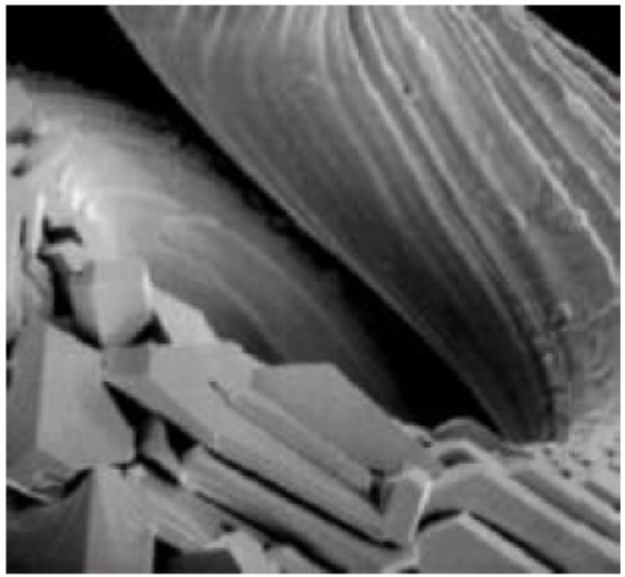
(f) Histogramnya

(g) Citra Kontras Tinggi

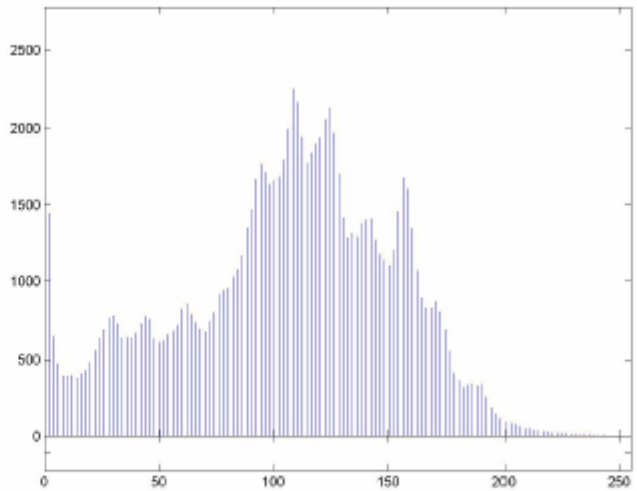


(h) Histogramnya

Pengubahan Histogram



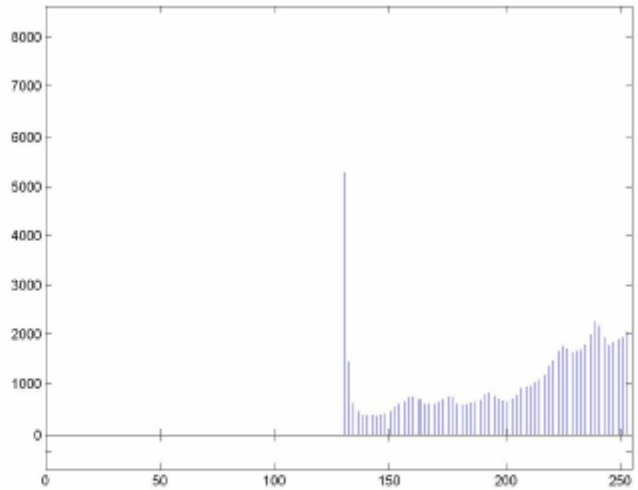
(a) Citra Asli



(b) Histogram Citra Asli

Pengubahan Histogram

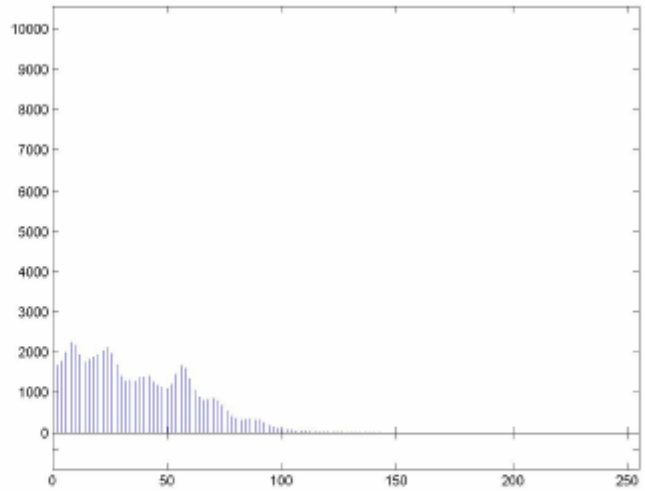
(c) Citra Asli ditambah tingkat keabuan 130



(d) Histogramnya

Pengubahan Histogram

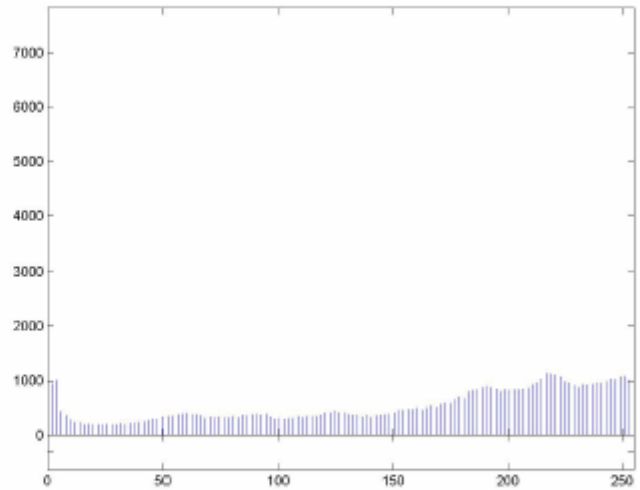
(e) Citra Asli dikurangi tingkat keabuan 100



(f) Histogramnya

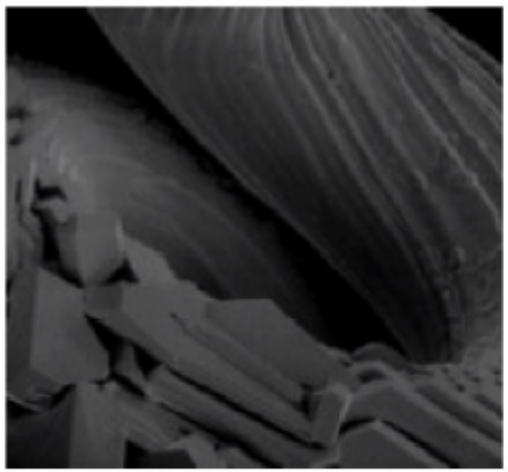
Pengubahan Histogram

(c) Citra Asli dikalikan 2

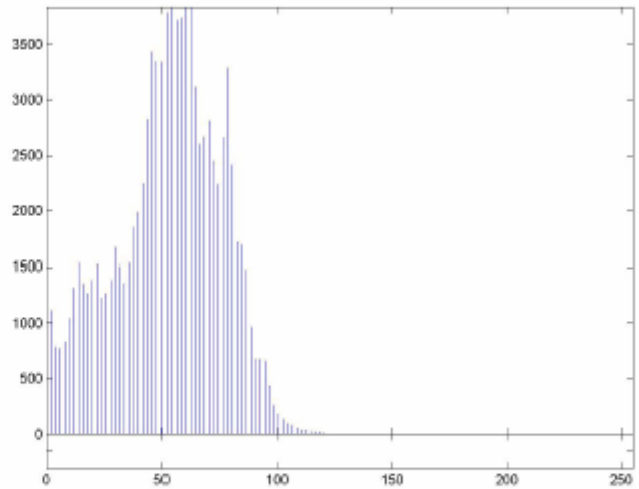


(d) Histogramnya

Pengubahan Histogram



(e) Citra Asli dikalikan 0.5



(f) Histogramnya