

Histogrammes

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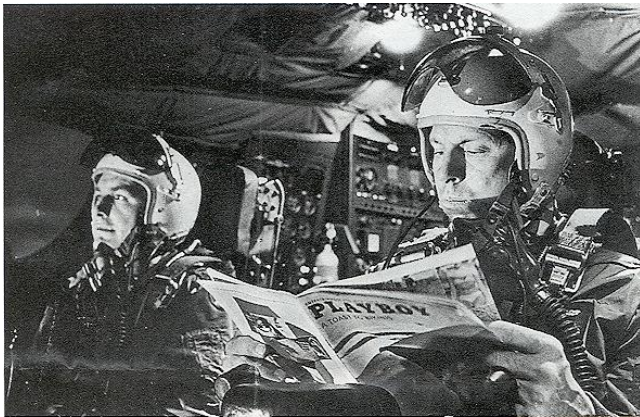
Modification de la visualisation: Histogrammes

Image I , M lignes, N colonnes, Comptes Numériques (CN) $\in [0, 255]$

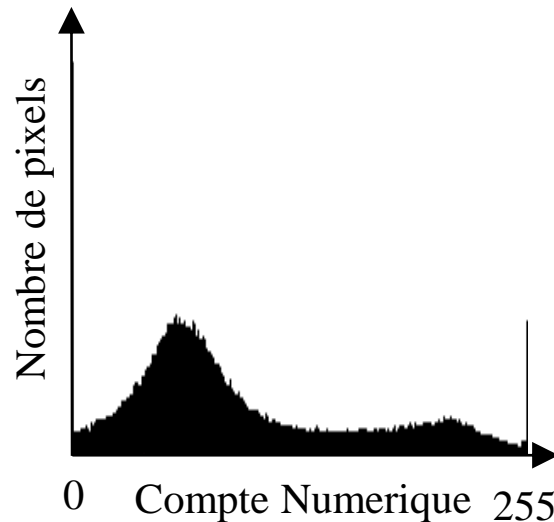
Histogramme: Fonction h telle que: $h(r_k) = n_k$
 $0 \leq h(r_k) \leq M.N$

$r_k = k^{\text{ième}} \text{ CN } (k=0,1,\dots, 255)$
 $n_k = \text{nbre pixels ayant pour CN } r_k$

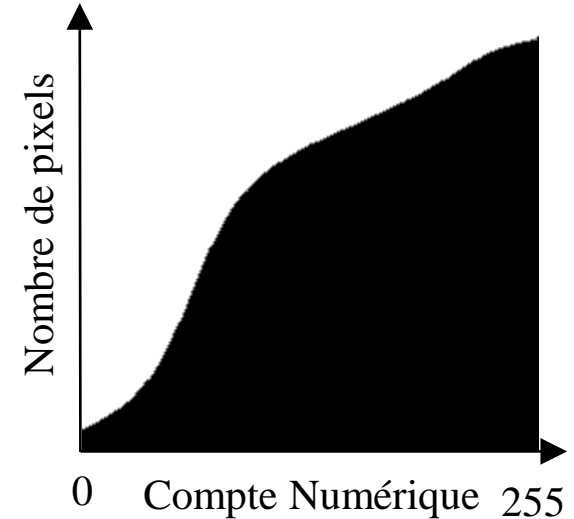
Image



Histogramme



Histogramme cumulé

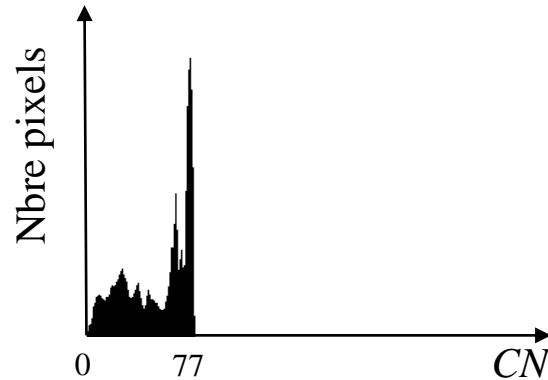
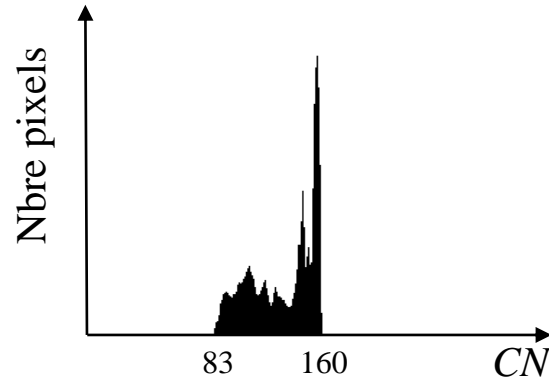


Histogramme cumulé: $h(r_k) \leq n_k$

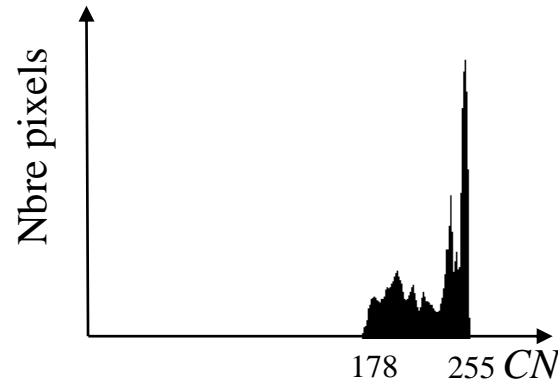
Histogramme normalisé: $p(r_k) = n_k / M.N$ $0 \leq p(r_k) \leq 1$
 $p(r_k) \approx \text{probabilité d'occurrence du compte numérique } r_k$

Modification d'histogrammes

Image originale I



$$A = I - 83$$
$$T(r) = r - 83$$



$$A = I + 96$$
$$T(r) = r + 96$$

☞ *Modification de la luminosité de l'image*

Modification d'histogrammes: recadrage

image originale I

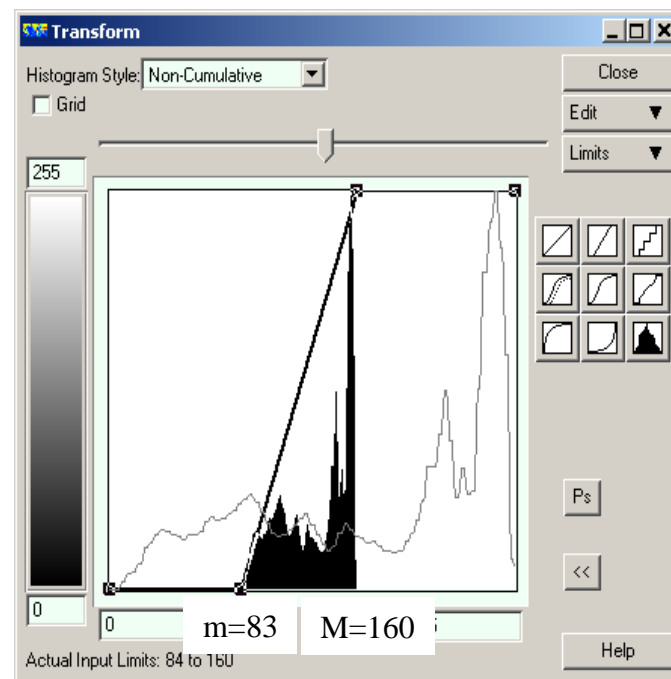


$$\begin{aligned} \min(I) &= m \\ \max(I) &= M \end{aligned}$$

$$T(r) = (r - m) \frac{255}{M - m}$$

$$A = (I - m) \frac{255}{M - m}$$

image après recadrage de son histogramme



☞ *Modifie le contraste de l'image*

Modification d'histogrammes: recadrage

image originale I



$$\begin{aligned} \min(I) &= 0 \\ \text{Max}(I) &= 255 \end{aligned}$$

$$T(r) = m + r \frac{M - m}{255}$$

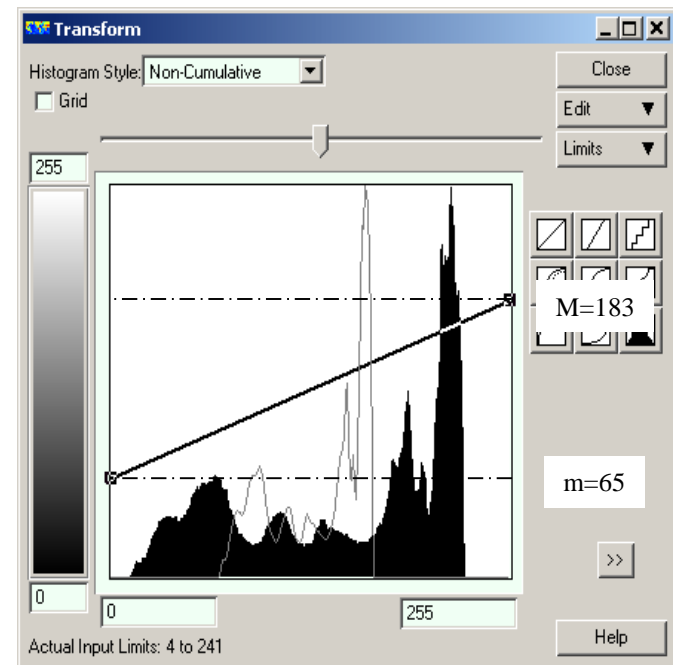


image après recadrage de son histogramme



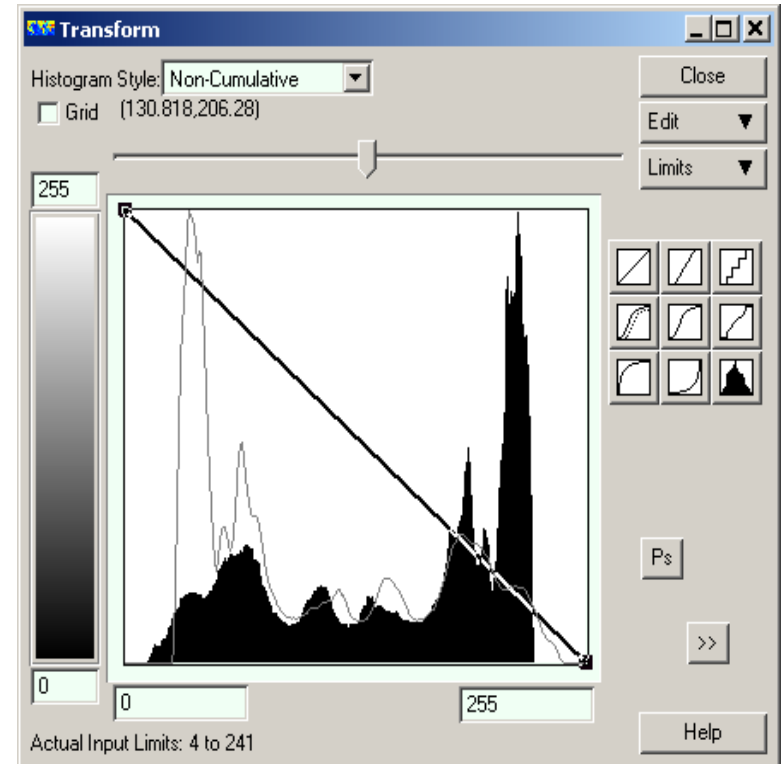
☞ *Modifie le contraste de l'image*

Inversion d'histogramme

image originale



Résultat après inversion de l'histogramme



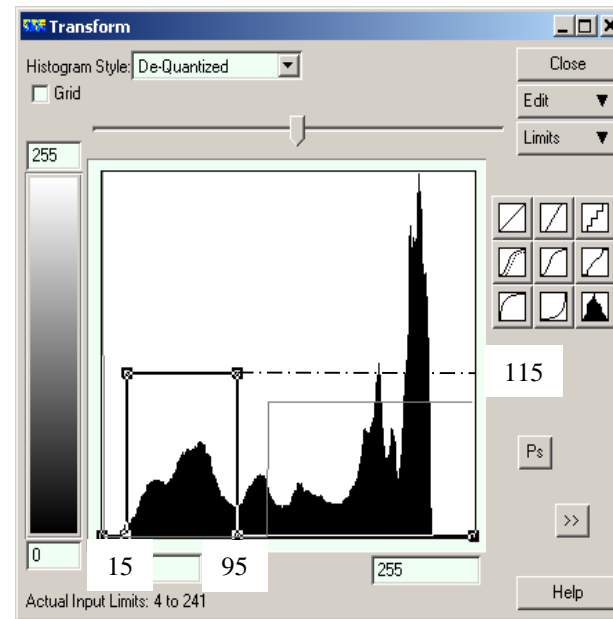
$$T(r) = 255 - r$$
$$A = 255 - I$$

Extraction d'une fenêtre d'intensité

image originale



Résultat

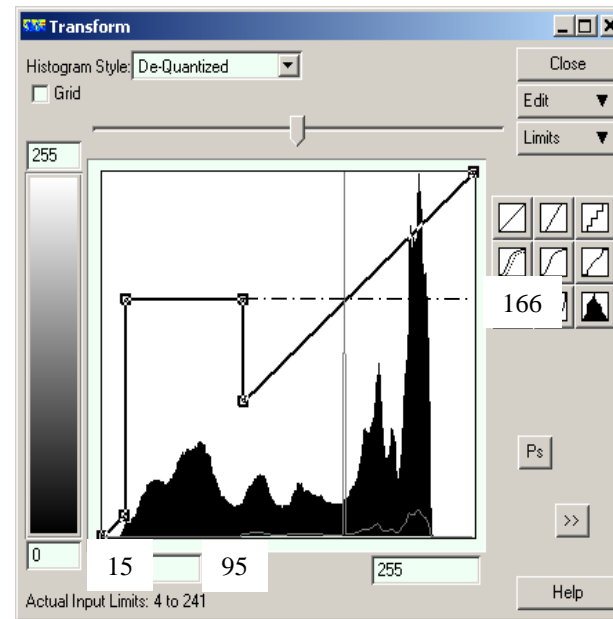


Extraction d'une fenêtre d'intensité

image originale



Résultat



Egalisation d'histogramme (linéaire)

histogramme idéal:

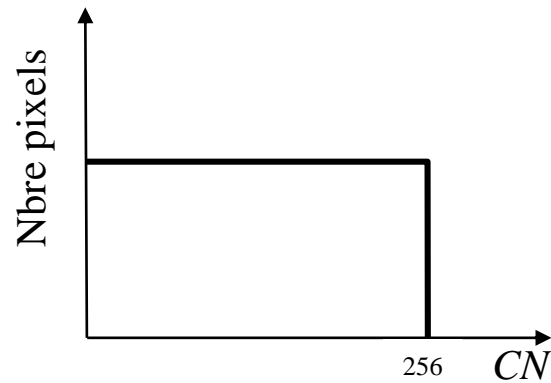
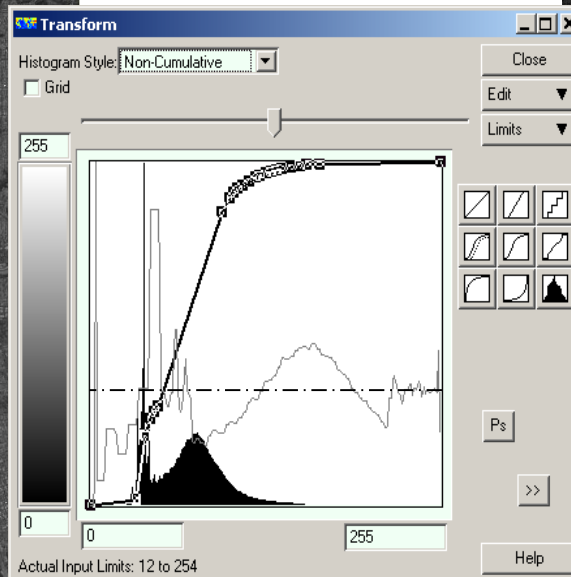
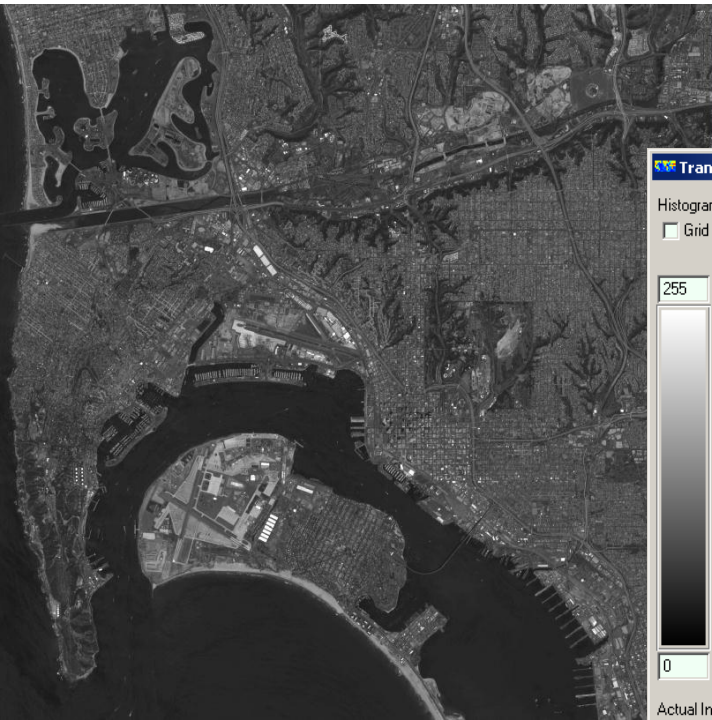


image originale



Egalisation d'histogramme (gaussienne)

histogramme idéal:

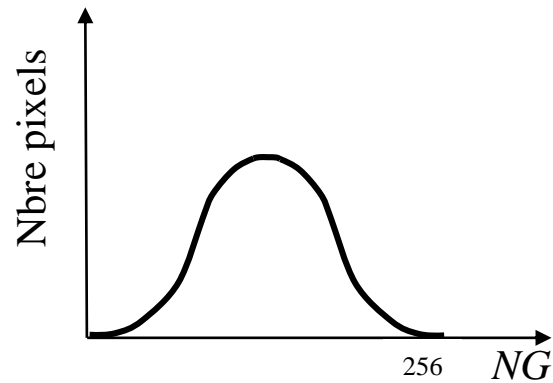


image originale

