

Exercise 1 : (12 points)

An image, a portion of which is shown below, has undergone several operations (results rounded)

Une image dont une partie est donnée ci-dessous a subi plus opérations (résultats arrondis):

0	0	6	6	7	7	3	4
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0	0	6	6	7	7	4	3
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0	0	7	7	7	7	2	3
0	0	7	7	7	7	3	4
0	0	7	7	7	7	4	5

- Gaussian filter, Horizontal gradient, Vertical gradient, Filtre de Sobel.

- LBP, uniform rotation-invariant LBP

- GLCM

- Wavelet decomposition / Décomposition en Ondelettes

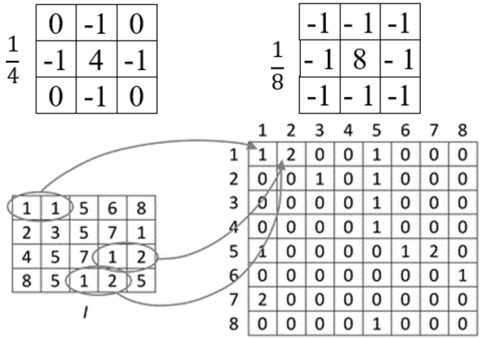
- Back-Projection

Identify each operation (justify your answer) / Identifier chaque opération en justifiant vos réponses.

20

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$$T(x_k) = (L_{gray} - 1) \sum_{j=0}^k p(x_j) = \frac{(L_{gray}-1)}{N_{pixels}} \sum_{j=0}^k n_j$$

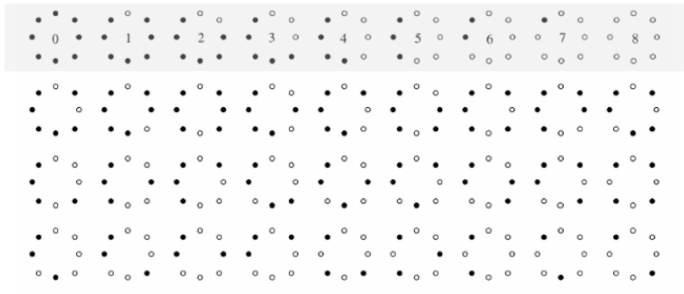
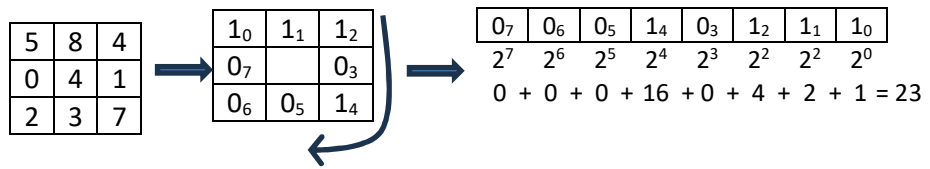
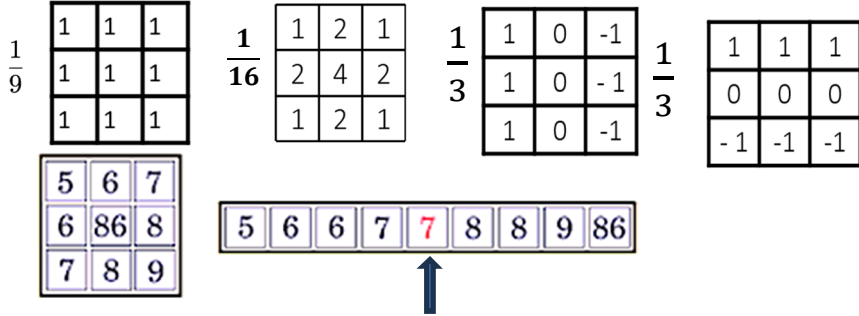


Gradient k = 2
 → g = [1 0 -1]
 (G_x) = 78 - 89 = -11
 (G_y) = 68 - 56 = 8
 Gradient Magnitude
 → √(11² + 8²) = 13.6

121	10	78	96	125
48	152	68	125	111
145	78	85	89	65
154	214	56	200	66
214	87	45	102	45

Magnitude		1							
Bin	0	20	40	60	80	100	120	140	160

Nom&Prénom:.....



Exercise 2 : (4 points) 0.25

The following keywords are related to 3 classification methods. Place them in the table below, naming each technique
 Les mots-clés suivants sont liés à 3 méthodes de classification. Les mettre dans le tableau en nommant la méthode :

- Minimum distance - Activation function - Nearest neighbors - Kernel (noyau) function - Separation hyperplane - Hidden layers (Couches cachées)- Synaptic weights (Poids synaptiques) - Maximum margin (Marge) - Support vectors, Non-parametric classification - Lazy learning - Neurons.

Technique Name 0.25 Nom de la technique	Keywords /Mots-clés 0.25
kNN	Minimum distance - Nearest neighbors - Non-parametric classification - Lazy learning
Neural Network	Activation function - Hidden layers - Synaptic weights - Neurons
SVM	Kernel (noyau) function - Separation hyperplane - Maximum margin - Support vectors

Exercise 3 : (4 points)

Reorder lines code logically by putting the correct number/Remettre en ordre en mettant le bon numéro de ligne

N°	Line codes (-0.25 peu d'erreurs ou +0.5 si peu de réponses justes)
8 (7)	cluster_centers = ms.cluster_centers_
5	bandwidth = estimate_bandwidth(AV, quantile=.06, n_samples=3000)
3	AV = np.reshape(A, [-1, 3])
9	AV_seg = cluster_centers[labels.flatten()]
7 (8)	labels = ms.labels_
1	from sklearn.cluster import MeanShift, estimate_bandwidth, import cv2
11 (10)	A_reg=np.uint8(A_reg)
4	AV = np.float32(AV)
6	ms = MeanShift(bandwidth=bandwidth, bin_seeding=True, max_iter=300).fit(AV)
10 (11)	A_reg = AV_seg.reshape((A.shape))
2	A = cv2.imread('fge3.jpg')