Travail d’étude et de recherche

Graphe des coupes sur images de labels

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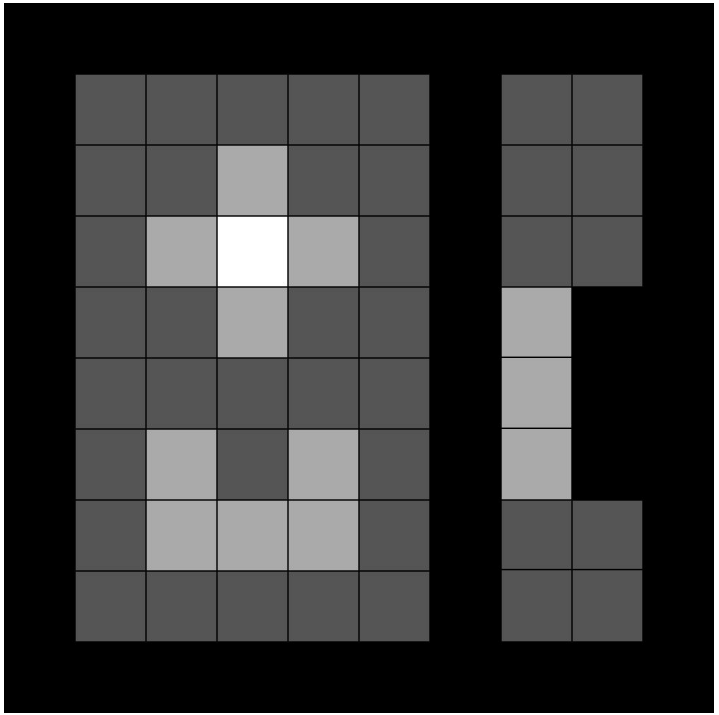
Contexte

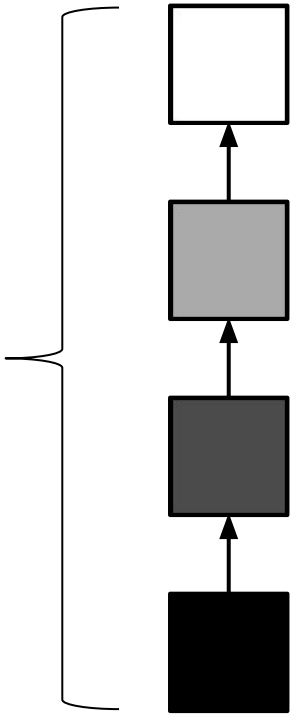
- morphologie mathématique
- opérateur(s) connexe(s)
- définition sur les images binaires
- extension aux images en niveaux de gris
- extension aux images multivaluées (RVB, multispectrales…)

Arbre des coupes

Une image $I : \Omega \rightarrow \{0, 85, 170, 255\}$



Ordre total usuel sur les intensités de gris



Arbre des coupes

Image *I*

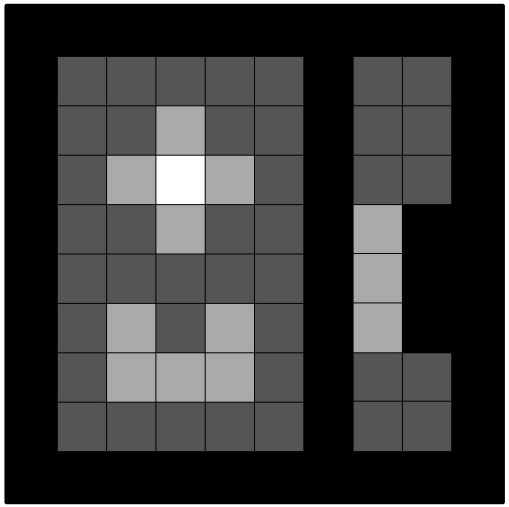
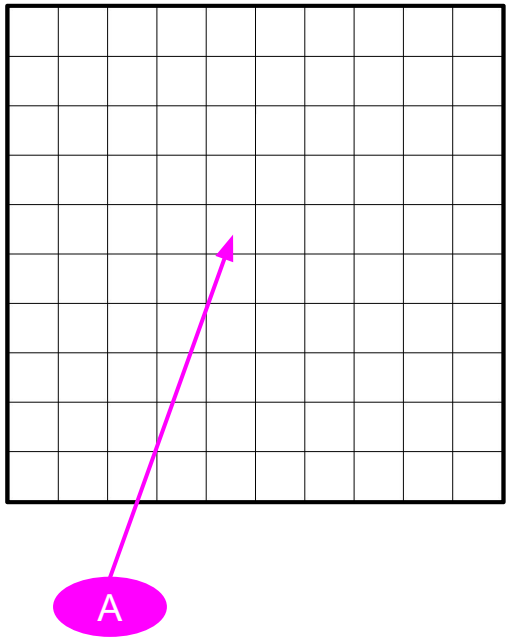
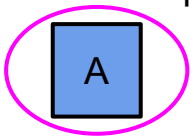


Image *I* seuillée pour v = **0**



Arbre des coupes



Arbre des coupes

Image *I*

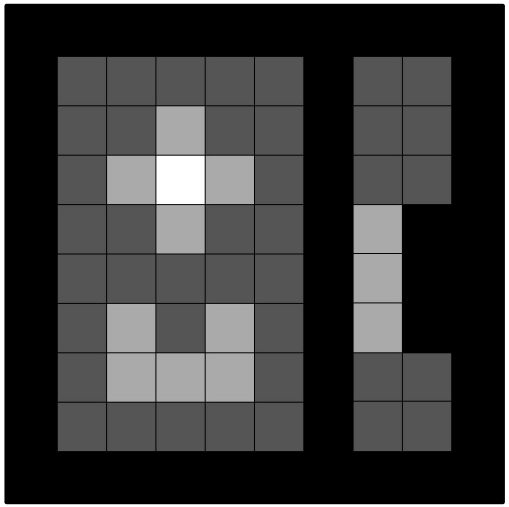
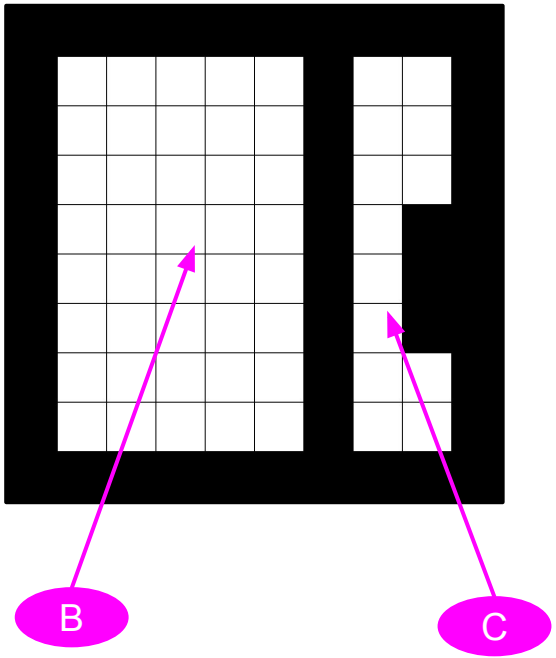
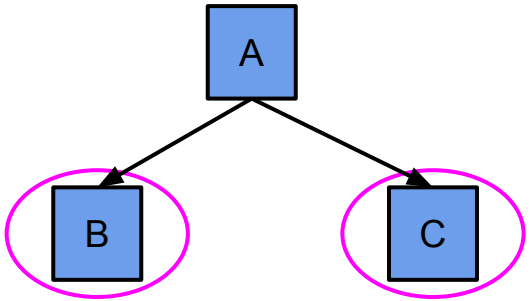


Image *I* seuillée pour v = **85**



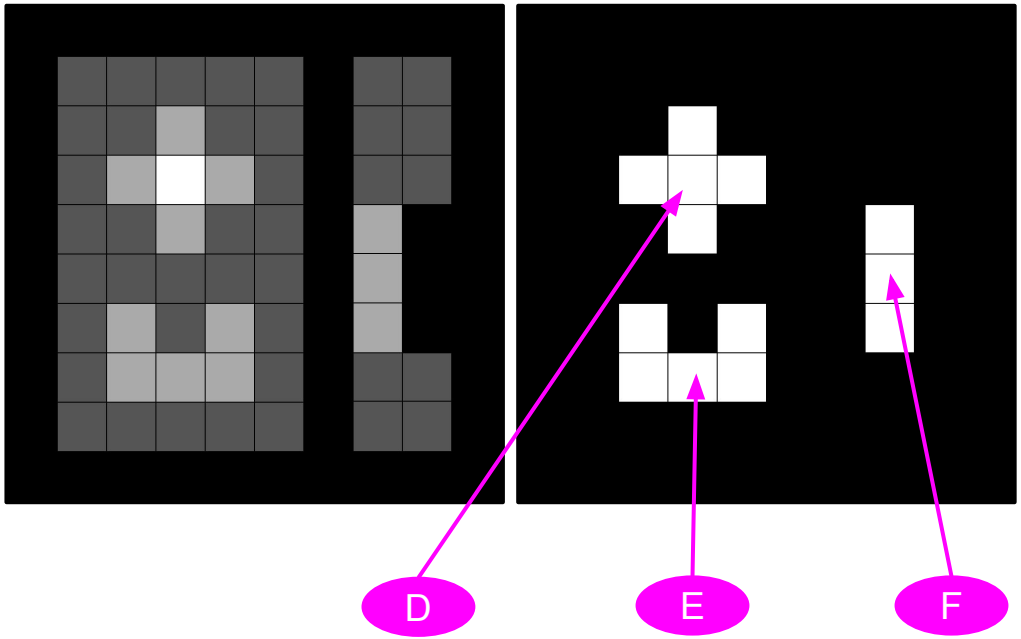
Arbre des coupes



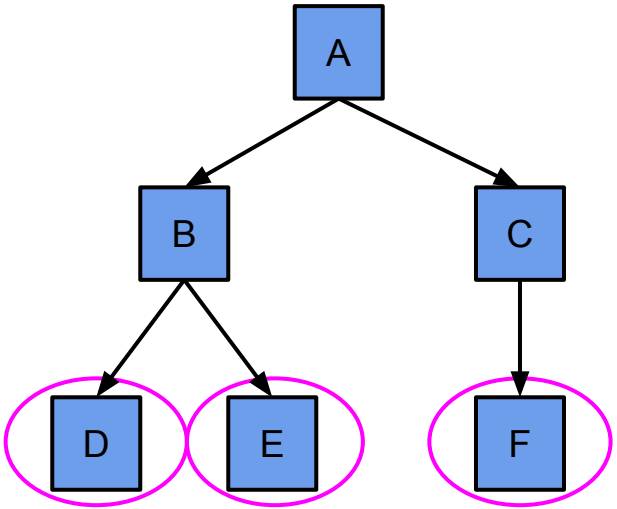
Arbre des coupes

Image *I*

Image *I* seuillée pour v = **170**



Arbre des coupes



Arbre des coupes

Image *I*

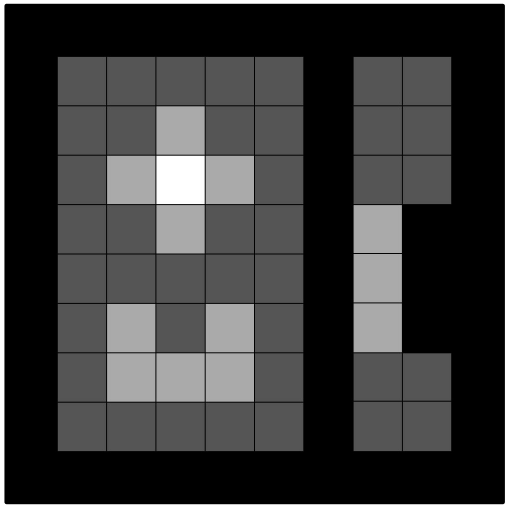
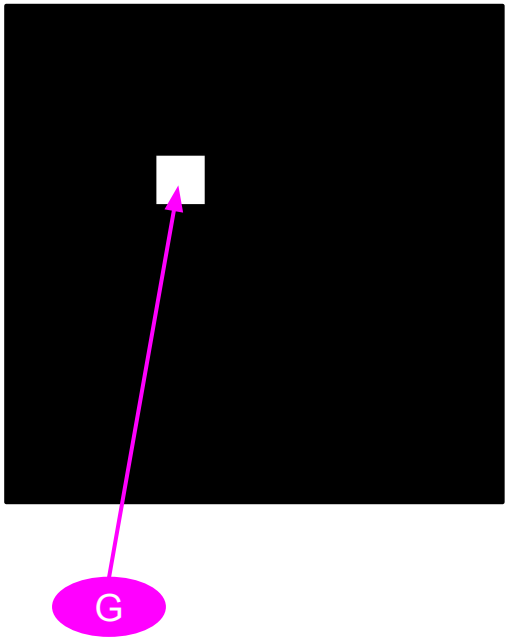
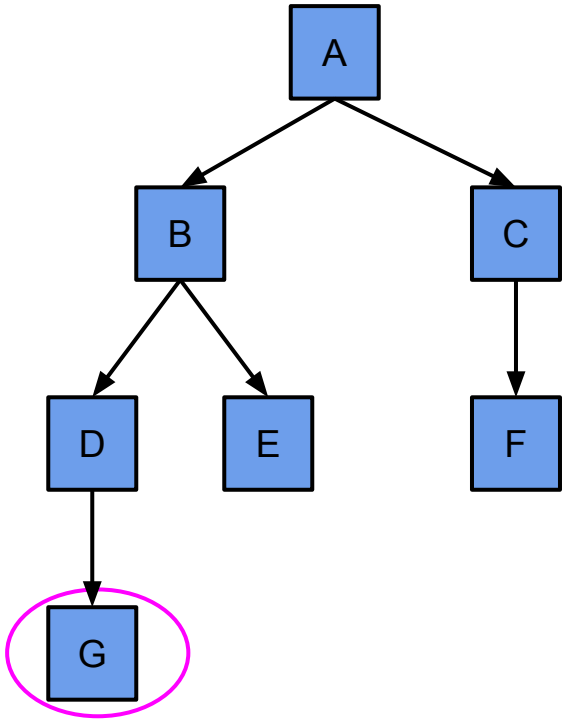


Image *I* seuillée pour v = **255**

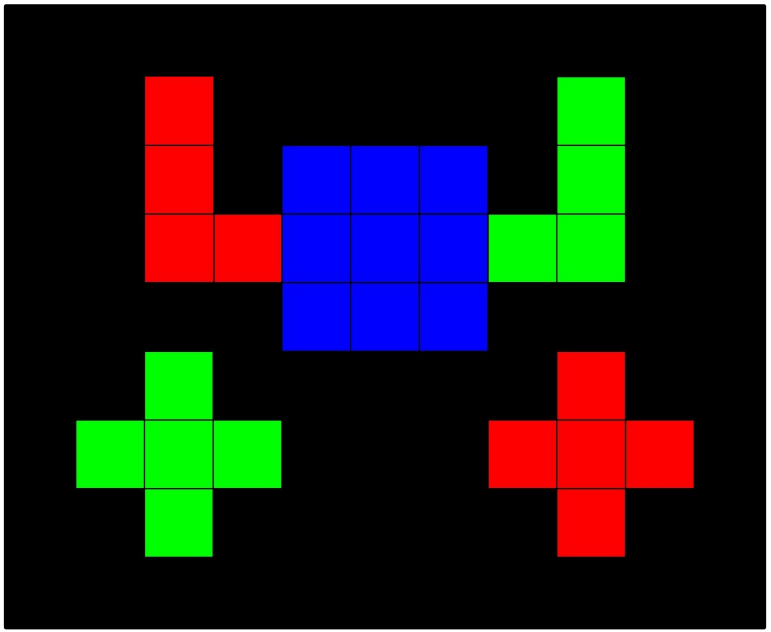


Arbre des coupes



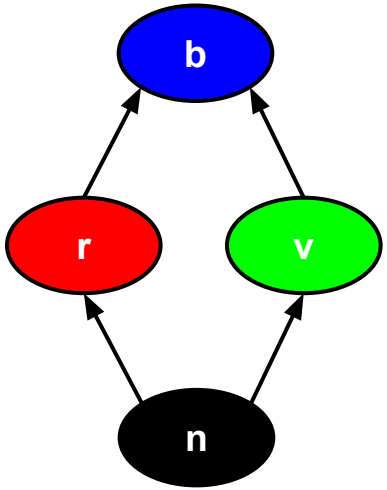
Graphe des coupes

Une image $I : \Omega \rightarrow \{\mathbf{n}, \mathbf{r}, \mathbf{v}, \mathbf{b}\}$



Label	RVB
n	(0,0,0)
r	(255,0,0)
v	(0,255,0)
b	(0,0,255)

Diagramme de Hasse $\mathfrak{H}$: réduction transitive de la relation de couverture (ordre partiel)



Graphe des coupes

Image *I*

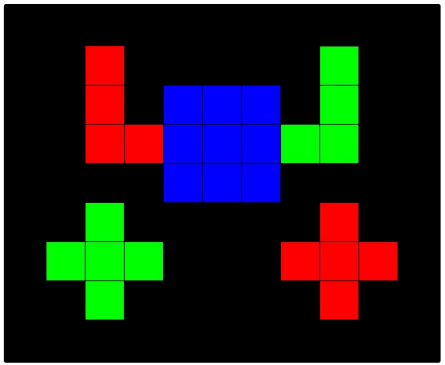


Image I seuillée pour *v* = **n**

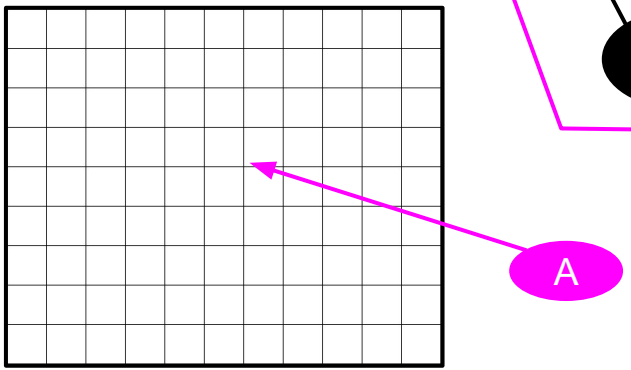
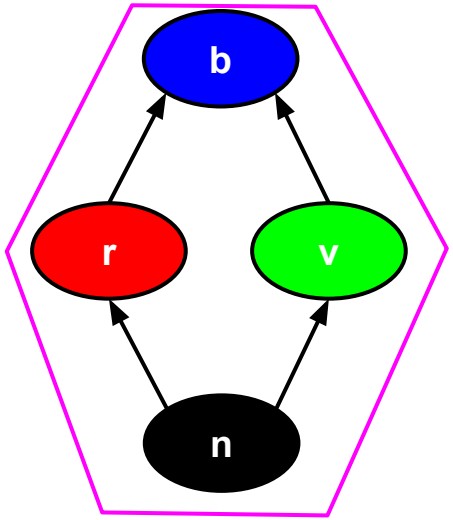
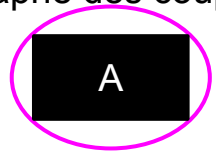


Diagramme de Hasse $\mathfrak{T}$



Graphe des coupes $\mathfrak{G}$



Graphe des coupes

Image *I*

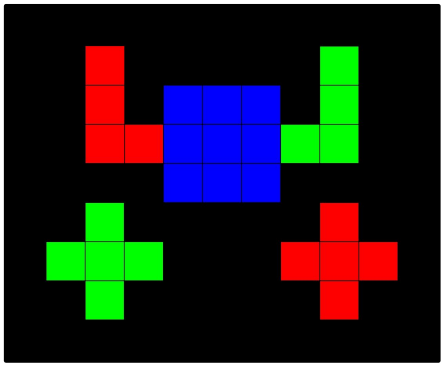


Image I seuillée pour *v* = **r**

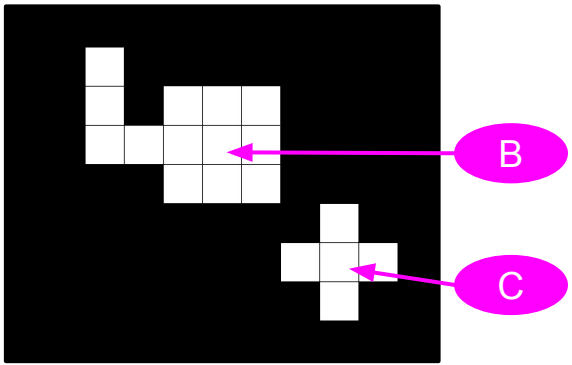
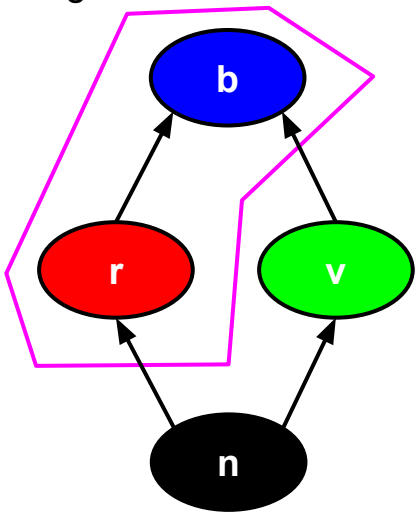
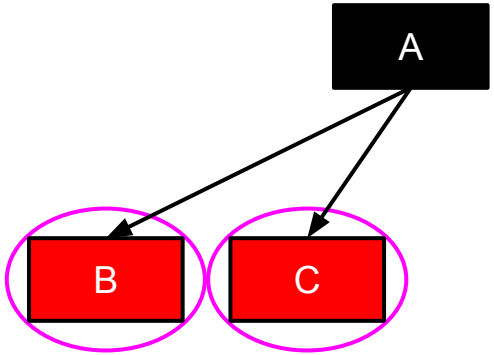


Diagramme de Hasse $\mathfrak{T}$



Graphe des coupes $\mathfrak{G}$



Graphe des coupes

Image *I*

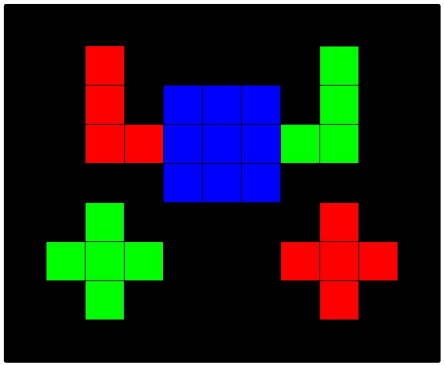


Image I seuillée pour *v* = **v**

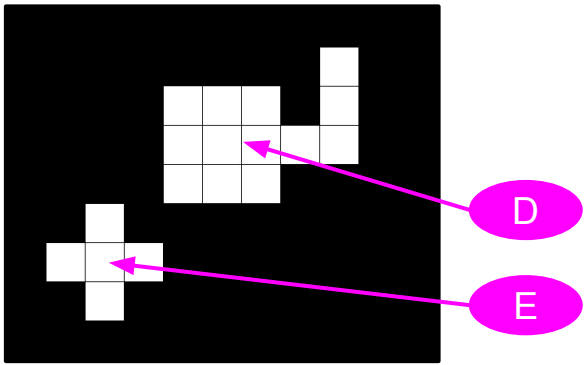
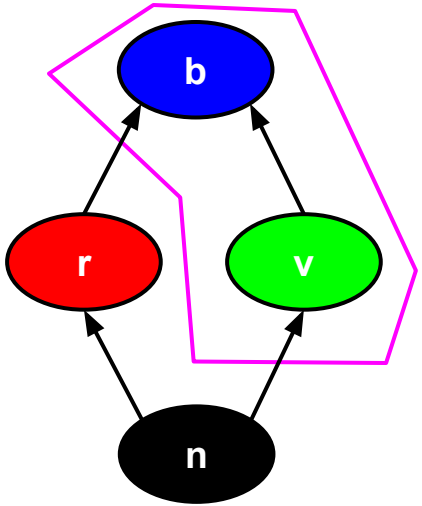
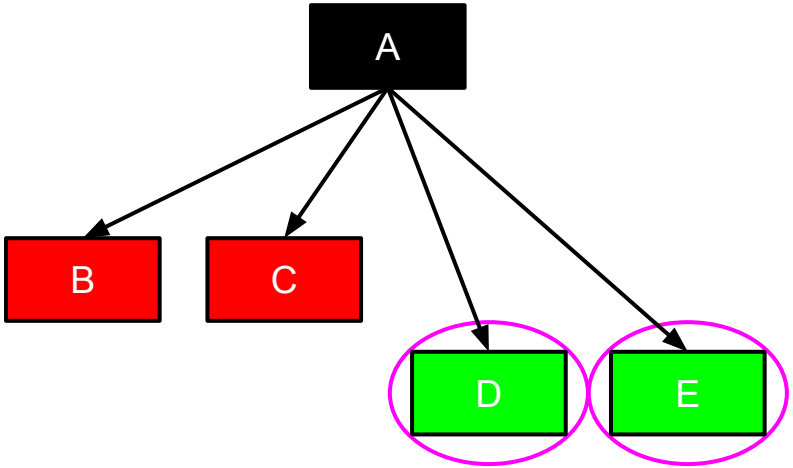


Diagramme de Hasse $\mathfrak{T}$



Graphe des coupes $\mathfrak{G}$



Graphe des coupes

Image *I*

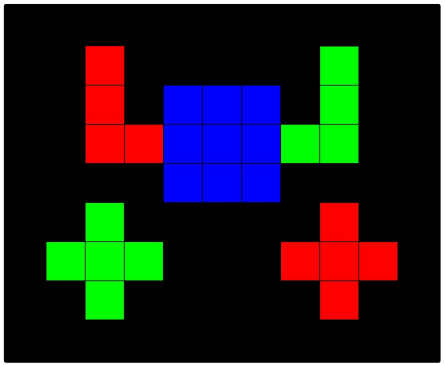


Image I seuillée pour *v* = **b**

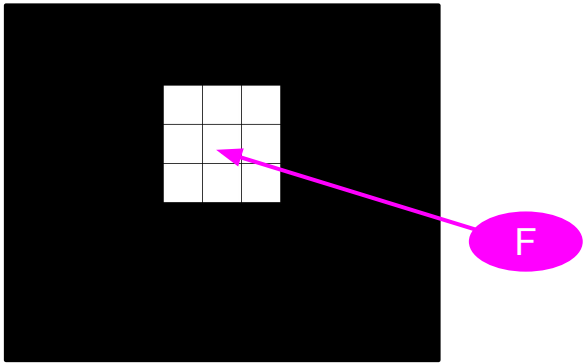
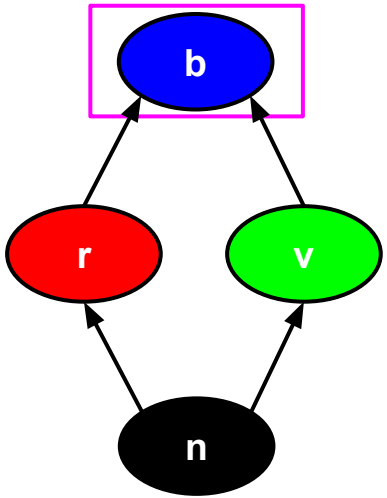
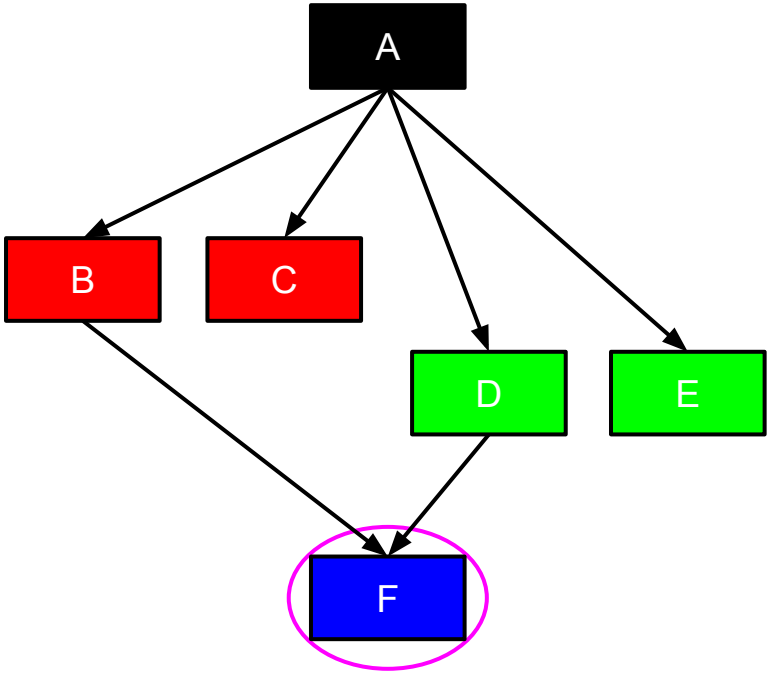


Diagramme de Hasse $\mathfrak{T}$

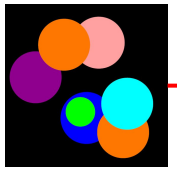


Graphe des coupes $\mathfrak{G}$



Programme existant

Image RVB



classe Image

classe RAG

classe Ordering :
ordre marginal sur RVB

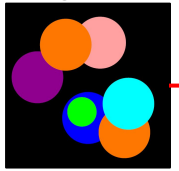
$v_1, v_2 \in [0;255]^3 \text{ ✖ } [0;255]^3$
$v_1 \leqslant v_2 \Leftrightarrow (R_{v1} \leqslant R_{v2}) \wedge (V_{v1} \leqslant V_{v2}) \wedge (B_{v1} \leqslant B_{v2})$

classe CGraph
(variante Ğ)

écriture au format DOT

Développement

Image RVB



classe Image

classe RAG

classe CGraph
(variante)

classe LabelOrdering

Appairage
RVB ⇔ Labels

classe Index

Diagramme de
Hasse (DOT)

classe HasseDiagram

écriture au format DOT

Optimisations

concret abstraction 1 abstraction 2

RVB	Label
0,0,0	noir
255,0,0	rouge
...	...

Label	ID
noir	0
rouge	1
...	...

optimisation mémoire

i / j	0	1	...
0			
1			
...			

optimisation temporelle

Résultats

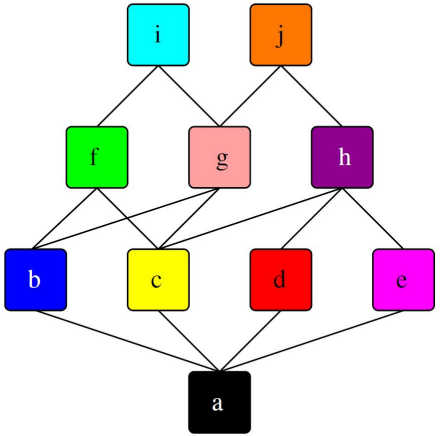
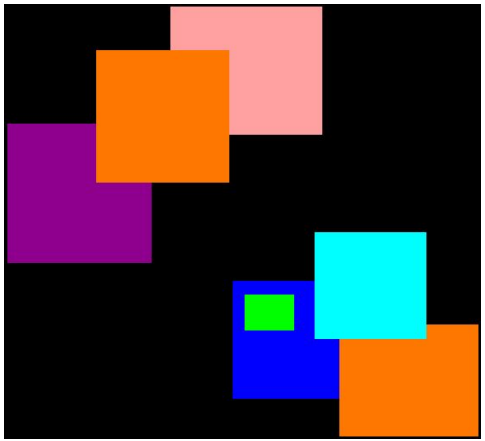


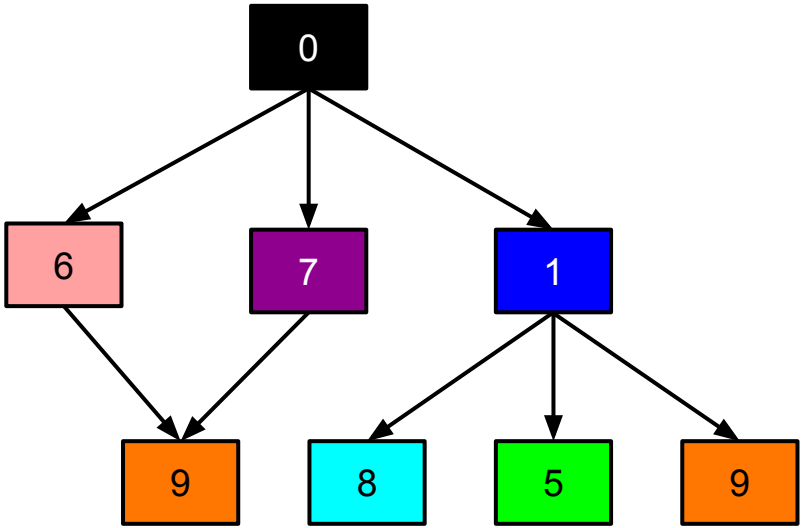
Diagramme de Hasse et image de test



Appairage RVB ⇔ Labels ⇔ ID

Label	RVB	ID
a	0,0,0	0
b	0,0,255	1
c	255,255,0	2
d	255,0,0	3
e	255,0,255	4
f	0,255,0	5
g	255,161,161	6
h	143,0,143	7
i	0,255,255	8
j	254,119,0	9

Graphe des coupes obtenu



[B.Naegel, N.Passat "Colour image filtering with component-graphs" International conference on Pattern Recognition (ICPR), p.1621-1626, IEEE, Stockholm, Sweden, 2014]

Merci de votre attention

Avez-vous des questions ?