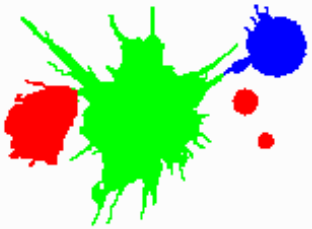
Sisteme software de prelucrarea imaginilor

Adobe Photoshop



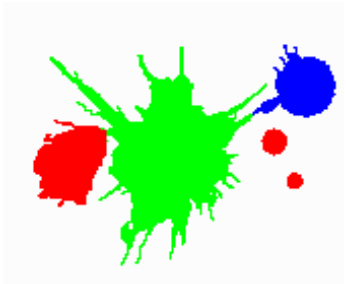
Sisteme Software de Prelucrarea Imaginilor
Conf. Dr. ing. Laura Florea
LAPI

Introducere

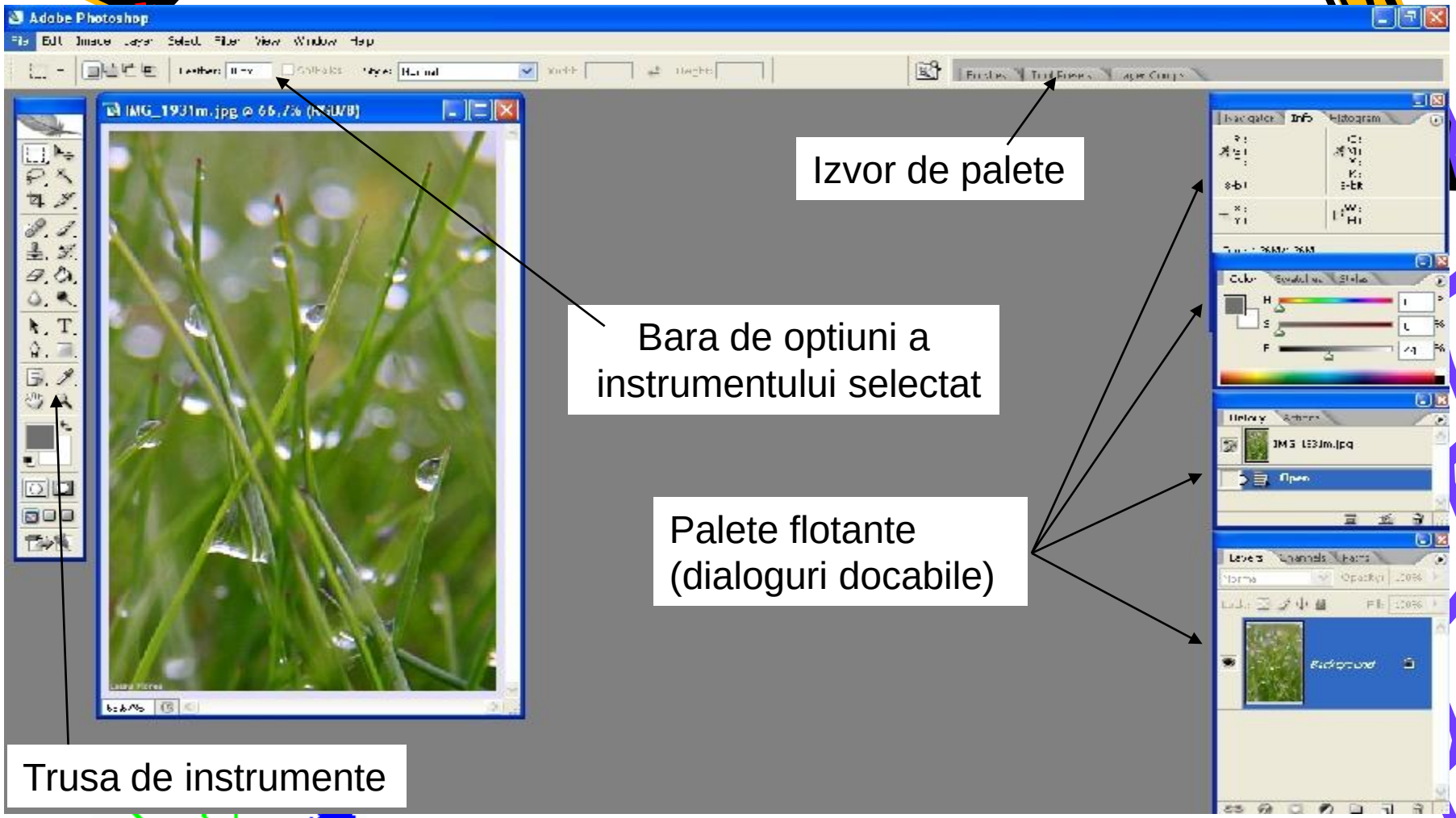
Adobe Photoshop:

- Cel mai cunoscut produs software pentru editare de imagini digitale, fotografii, grafica pentru tipar, video si Web

- Program cu o interfata intuitiva si care permite o multitudine de modificari necesare in mod curent profesionistilor şi nu numai: editari de luminozitate si contrast, culoare, aplicare de efecte pe imagine sau pe zone (selectii), retusare de imagini degradate etc



Photoshop CS2



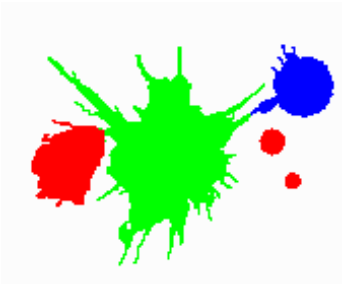
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Palete flotante

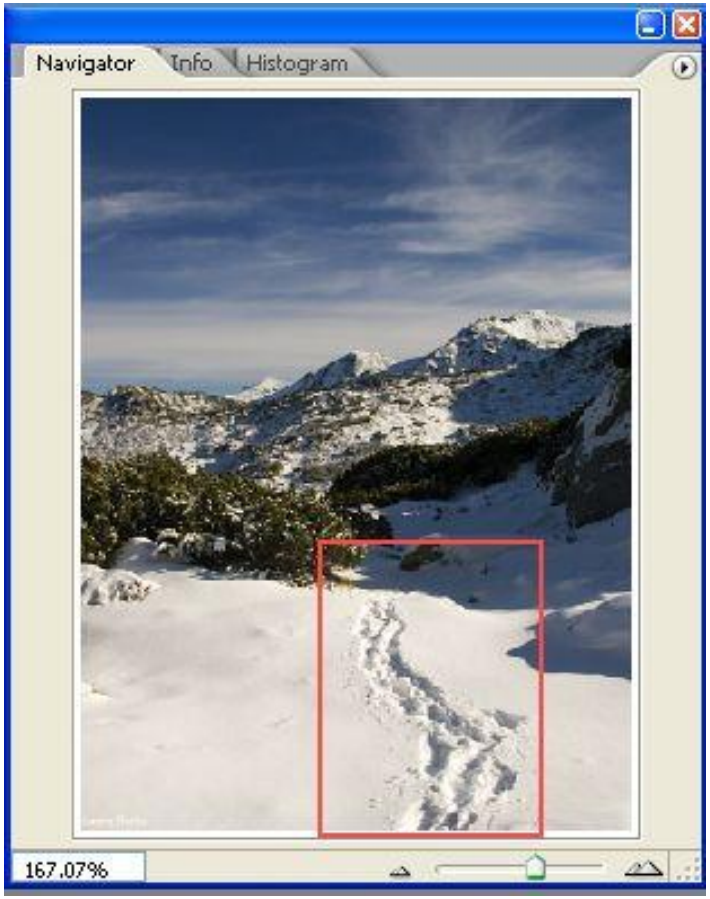
- Se pot selecta din meniul Window
- Ajuta utilizatorul in lucrul cu imagini
- Pot fi plasate oriunde pe ecran
- Fiecare paleta are in general mai multe optiuni apelabile prin click pe triunghiul din dreapta-sus
- Obs: Trusa de instrumente si bara de optiuni sunt considerate tot palete flotante





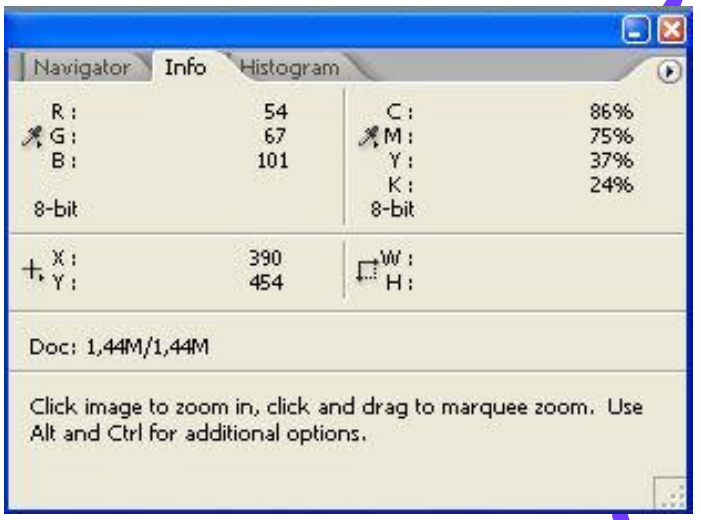
Paleta *Navigator*

- Contine un thumbnail al imaginii pe care e marcata zona vizibila la momentul curent
- Posibilitate de schimbare a zonei vizualizate si a nivelului de zoom



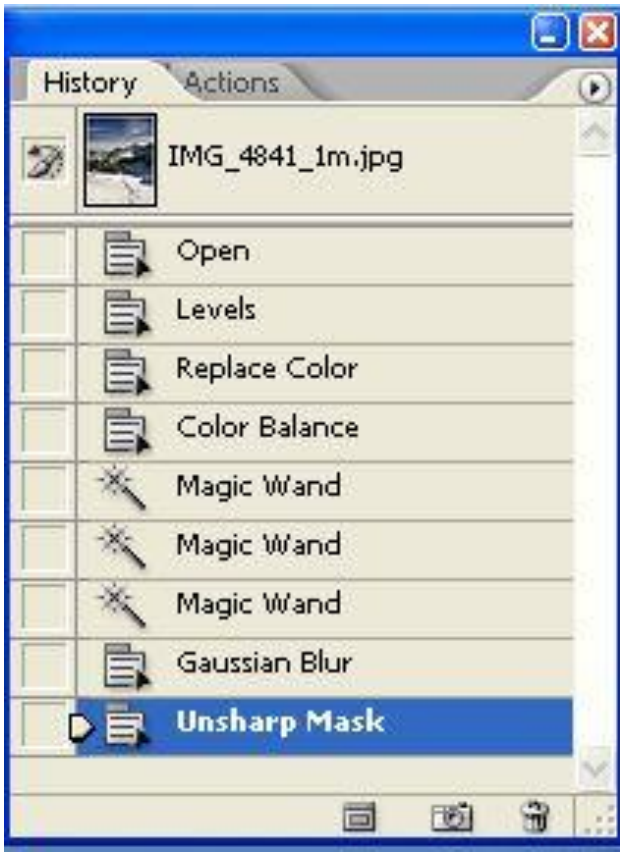
Paleta
Info

- Informatii despre pixelul (sau zona) pe care se afla cursorul la momentul actual
- In functie de optiunile selectate se pot afisa:
  - culorile sub forma: RGB, CMYK, Lab, Grayscale, Web, etc,
  - Dimensiunile in pixeli, inch, cm, etc



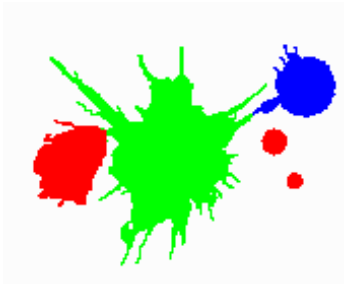
Paleta *History*

- Contine ultimele modificari facute imaginii
- Orice operatie facuta imaginii adauga o noua stare in paleta *History*
- Se poate face *Undo* dintr-un singur pas pentru mai multe modificari



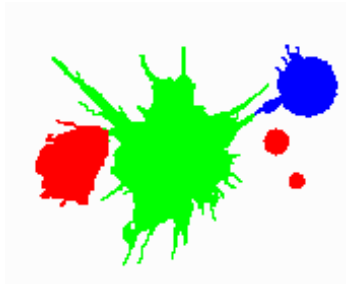
Imagine digitala rastru

- Sunt realizate din *pixeli.*
- Fiecare pixel e definit de *culoare* şi *poziţie* în cadrul imaginii.
- La editare se modifică in general grupuri de pixeli.
- Folosite în general pentru fotografii, imagini scanate, etc.



Imagine digitala rastru

- Informaţia din fiecare pixel poate fi reprezentată prin valori:
  - Scalare:
    - **imagini alb/negru**: nivelul de luminozitate.
    - **indexate**: indicele liniei din *harta de culori* unde se găseste culoarea pixelului.
  - Vectoriale (imagini true-color):
    - fiecare pixel conţine culoarea sa ce poate fi reprezentată în spaţii de culoare ca RGB (tipic),CMYK, Lab, HSV, etc.

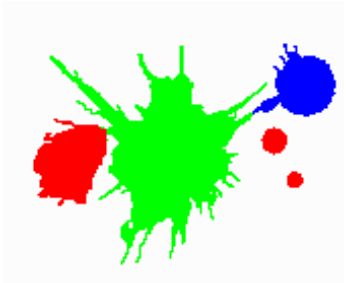




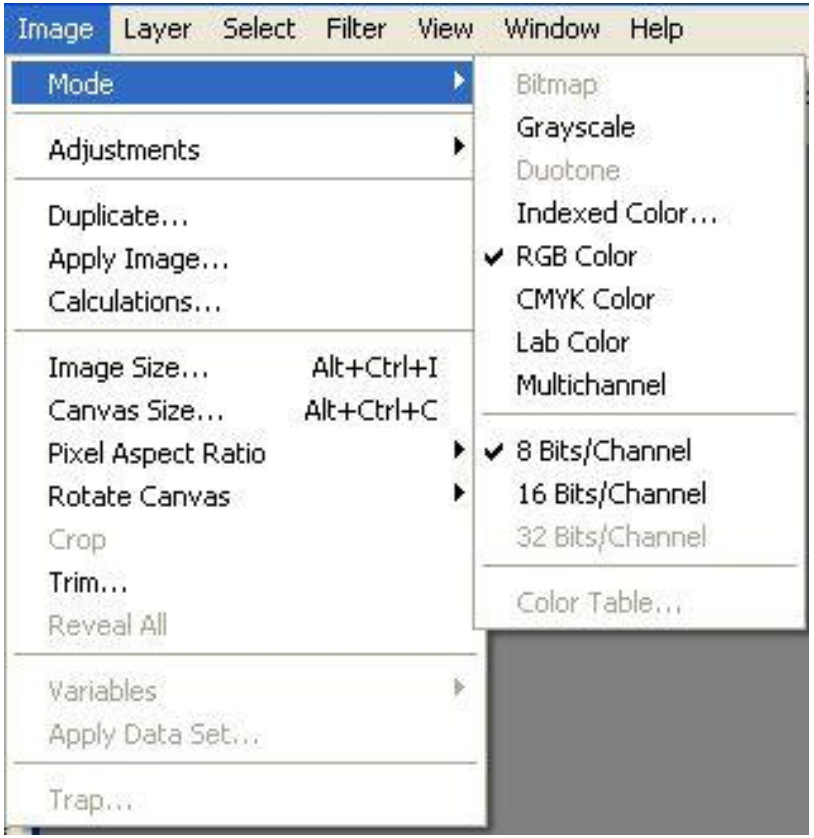
Imagine digitală de grafica vectoriala



- Sunt realizate din obiecte (linii, forme, blocuri de text) numite *vectori.*
- Fiecare vector are anumite *proprietăţi* (grosime, culoare) care pot fi manipulate şi care se păstrează la operaţii de transformări geometrice.
- Sunt folosite în general la ilustraţii, desene, sigle, logo-uri.
- De multe ori sunt exportate în format rastru pentru a fi folosite.
- Detalii intr-un curs viitor



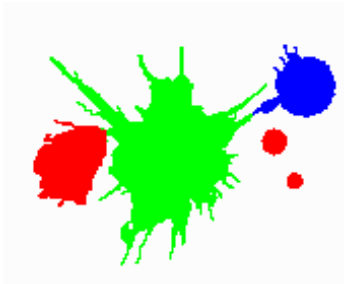
Imagine digitală
- clasificare -



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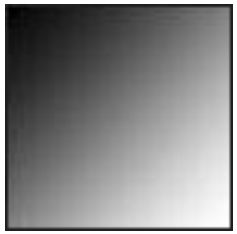
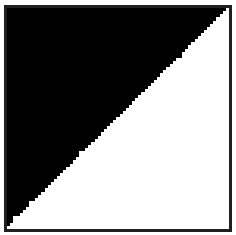
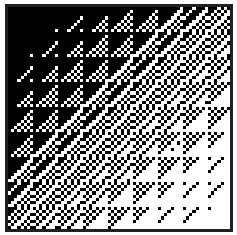
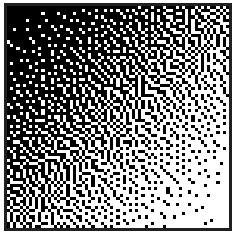
Imagini grayscale

- Imagini cu 256 niveluri de gri
- Prin convertirea unei imagini color la grayscale se pastreaza doar informatia de luminozitate, informatia de culoare se pierde



Imagini *Bitmap*

- Imagini binare alb/negru
- Se pot converti numai imaginile *Grayscale*
- Tipuri de dithering posibile:
  - 50% threshold
  - Pattern
  - Diffusion
  - Halftone
  - Custom Pattern

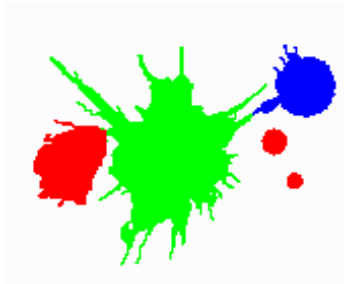





Floyd-Steinberg Dithering

- Are la baza impartirea erorii
- Pentru fiecare pixel:
  1. gaseste cea mai apropiata culoare
  2. calculeaza eroarea dintre culoarea initiala si cea finala
  3. imparte aceasta eroare la pixelii vecini nevizitati cu ponderile:

	X	7
3	5	1

Cand se ajunge la pixelii urmatori se adauga eroarea si se continua ca mai sus



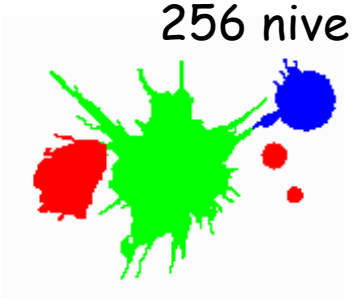
Floyd-Steinberg Dithering



256 niveluri de gri



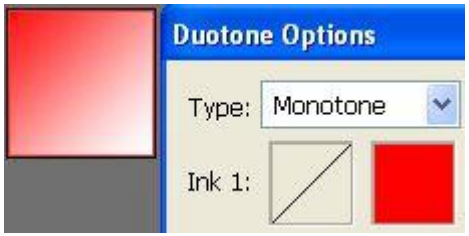
2 niveluri de gri: alb si negru

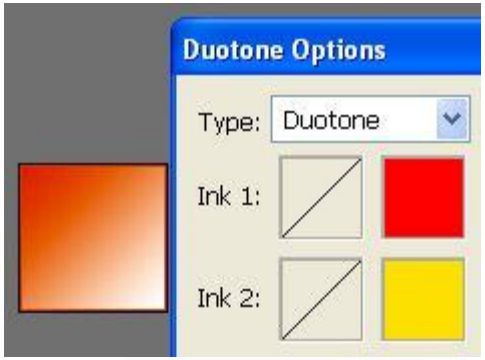


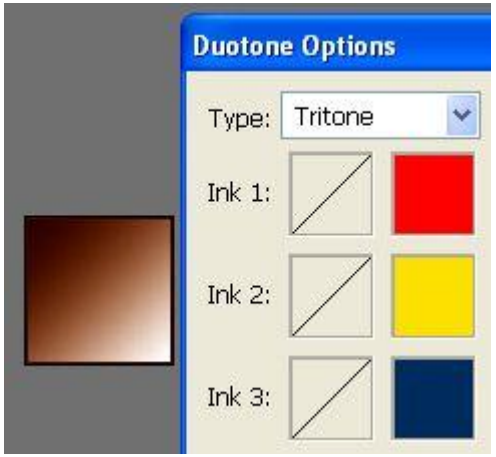
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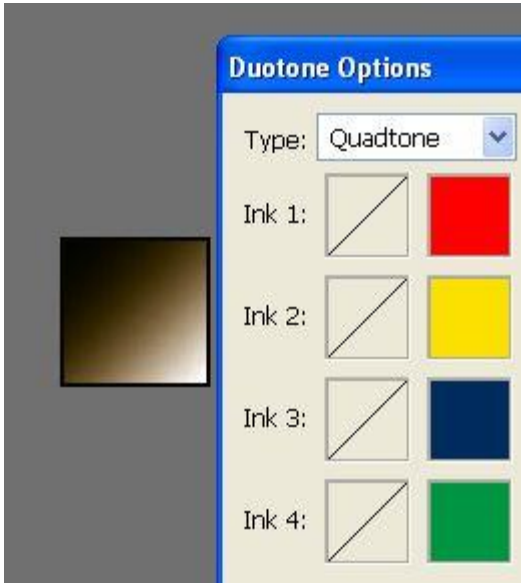
Imagini monotone, duotone, tritone, quadtone

- Imagini cu 1, 2, 3, 4 nuante de culoare.
- Se pot converti numai imagini *grayscale*





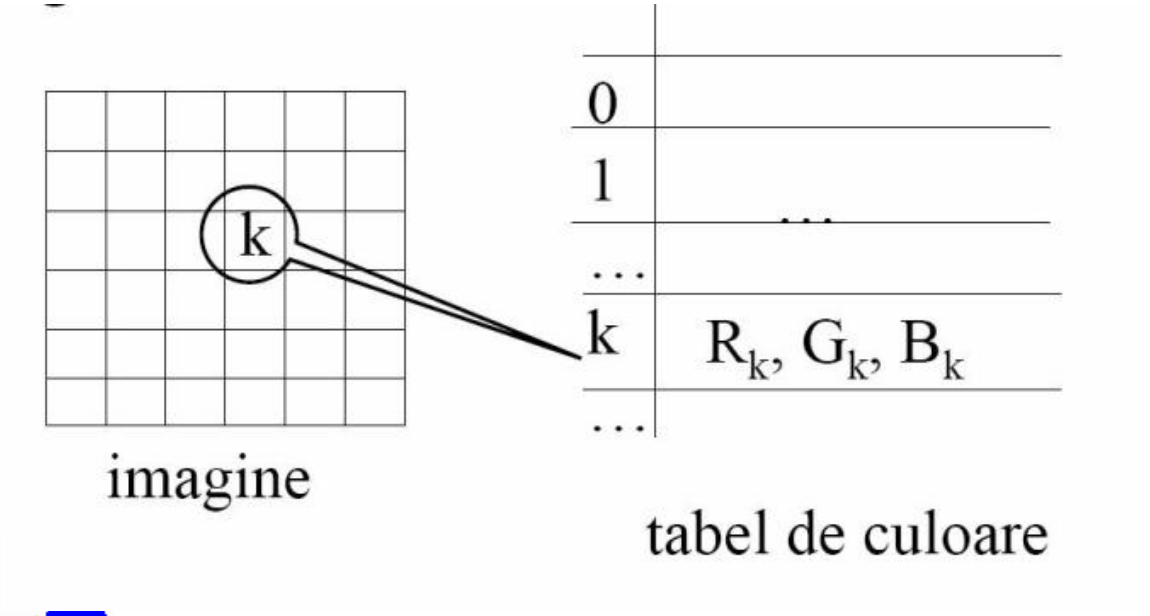




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Imagini indexate

- **Imagini indexate**: fiecare pixel conţine adresa la care se găseşte culoarea sa în harta de culori.
- Au maxim 256 culori

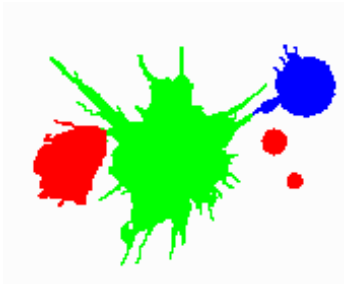


Imagini indexate
- exemplu -

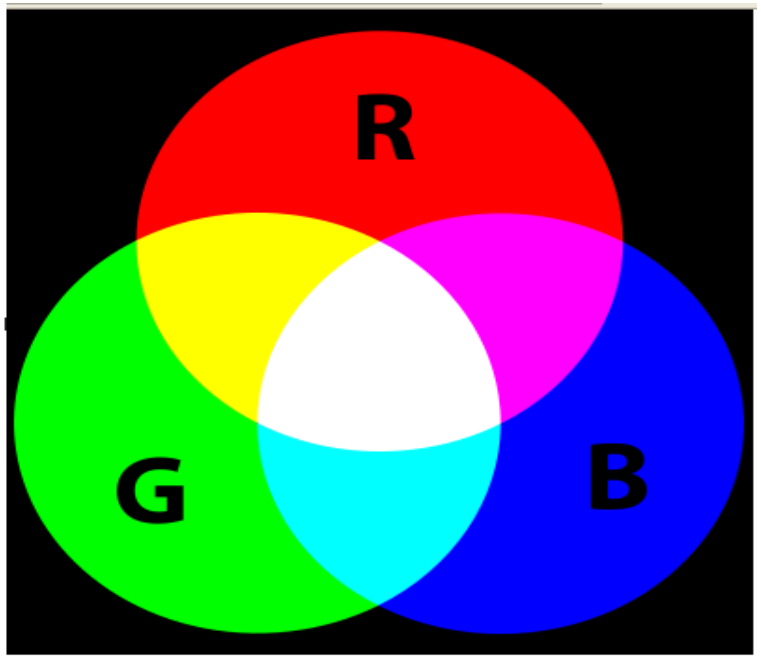
3	3	3	3	3	3	3	3	3	3	3
3	3	3	3	2	3	3	3	3	3	3
3	3	3	2	2	2	3	3	3	3	3
3	3	2	2	1	2	2	3	3	3	3
3	3	3	2	2	2	3	3	3	3	3
3	3	3	3	2	3	3	3	3	3	3
3	3	3	3	0	3	3	3	3	3	3
3	3	3	3	0	3	0	3	3	3	3
3	3	3	3	0	0	3	3	3	3	3
3	3	3	3	0	3	3	3	3	3	3

Imagini RGB

- Format de imagine in care sunt accesibile toate uneltele si filtrele
- O culoare poate fi obţinută *adunând* trei culori primare (roşu, verde şi albastru) în cantităţi corespunzătoare.
- Fiecare pixel va conţine 3 numere (uzual de la 0 la 255).
- Informaţia ce descrie fiecare culoare primară a imaginii se numeşte ***canal***.

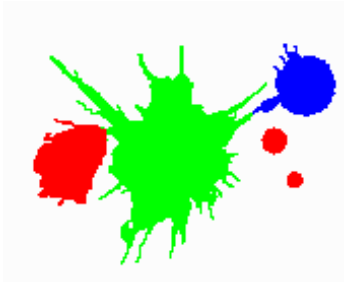


Imagini RGB
– culori aditive -

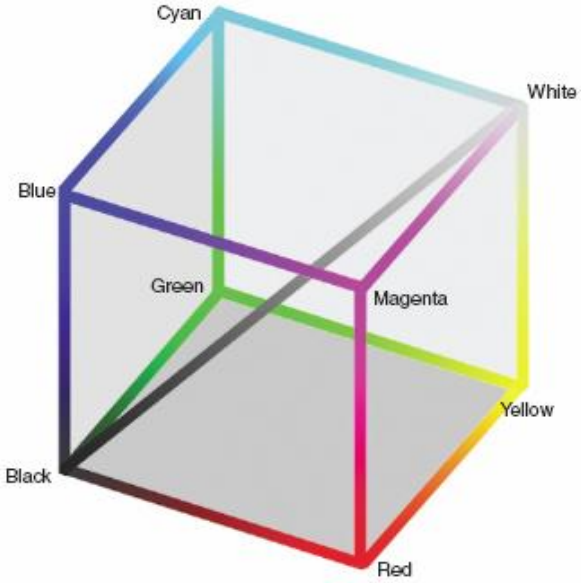


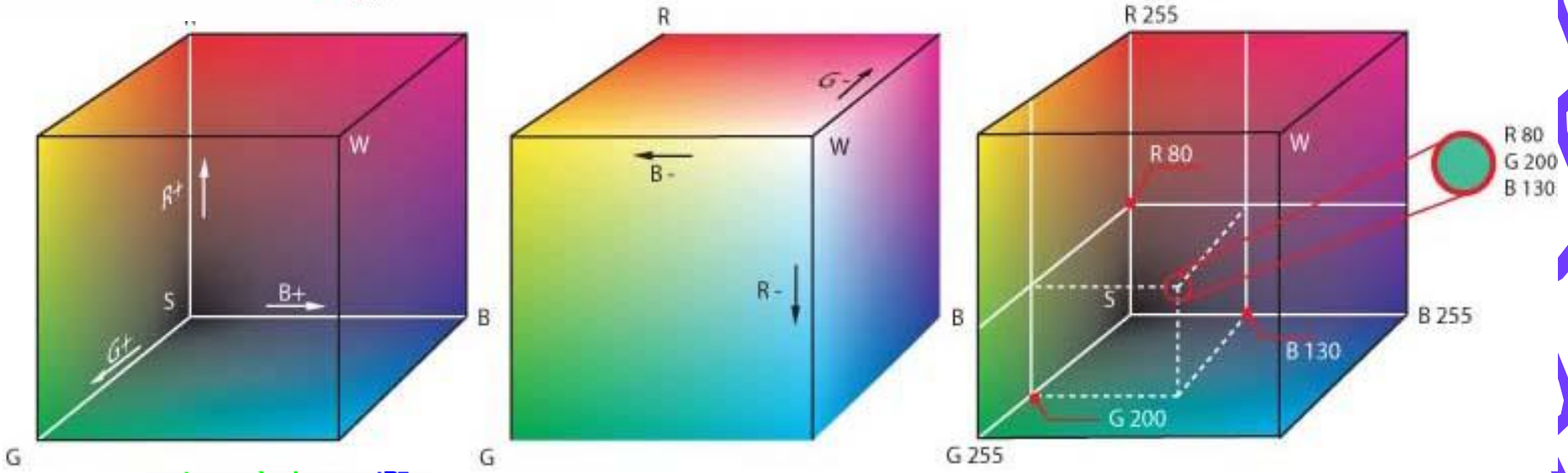
- Sistemul de culoare asociat modului de redare al monitoarelor şi televizoarelor.
- porneşte de la negru şi pe măsură ce se adaugă mai multă culoare, rezultatul devine tot mai alb.

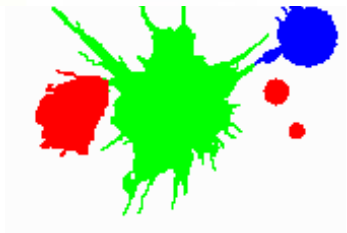
Amestec de lumină



Imagini RGB







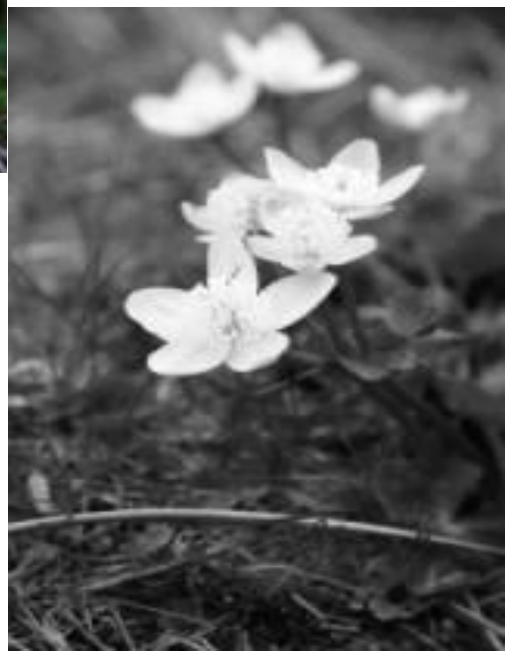
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Imagini RGB



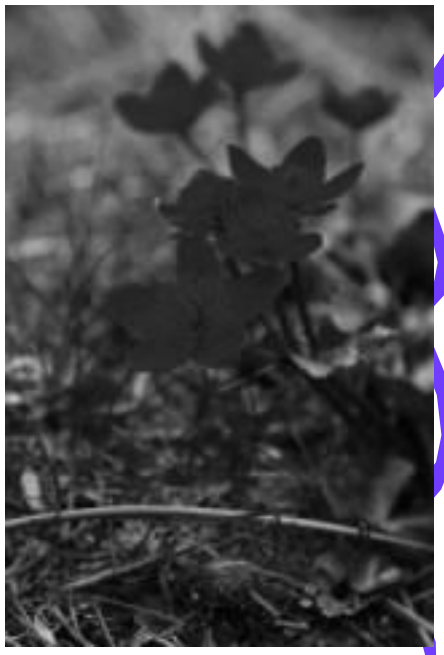
Imagine originala



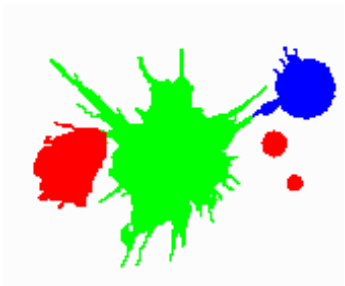
Canalul R



Canalul G

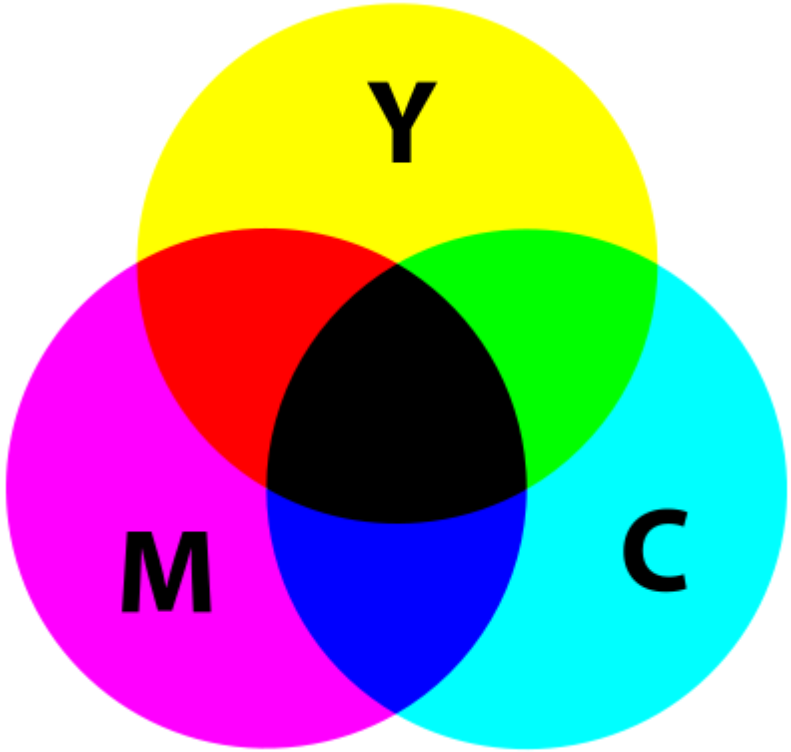


Canalul B



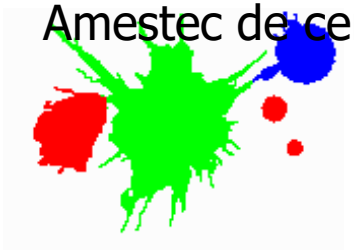
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CMYK
– culori substractive -



C = Cyan
M = Magenta
Y = Yellow
K = Black

- întâlnit la printări.
- pornind de la alb, cu cât este adăugată mai multă culoare, cu atât rezultatul final este mai închis.



Amestec de cerneală

CMYK



Imagine originala



Canalul C



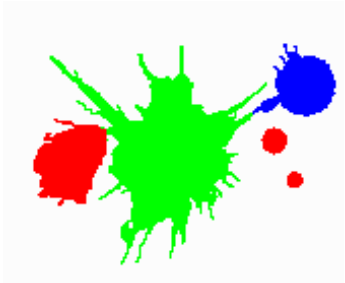
Canalul M



Canalul Y



Canalul K



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RGB->CMYK



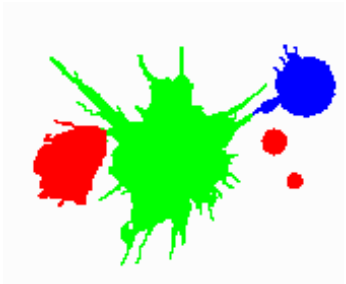
Black = minimum(1-Red,1-Green,1-Blue)

Cyan = (1-Red-Black)/(1-Black)

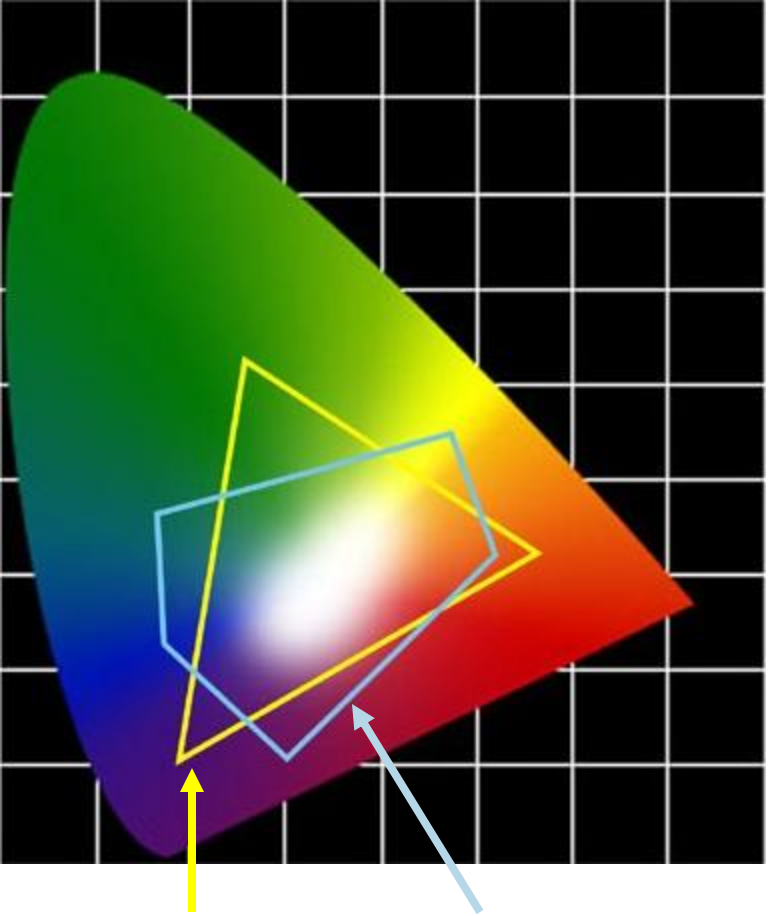
Magenta = (1-Green-Black)/(1-Black)

Yellow = (1-Blue-Black)/(1-Black)

unde Red, Green, Blue au valori în [0,1]

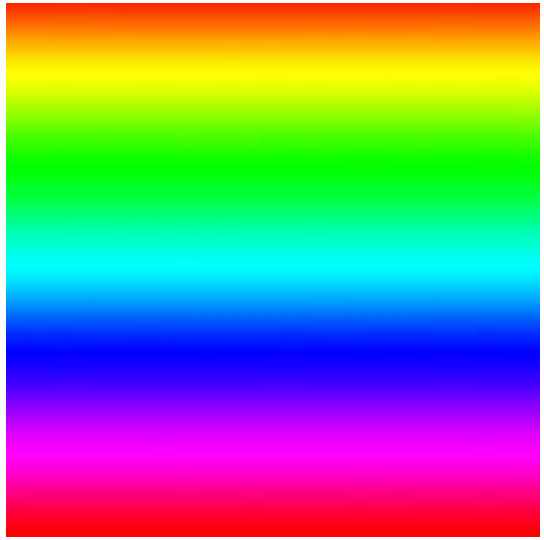


RGB->CMYK



RGB gamut

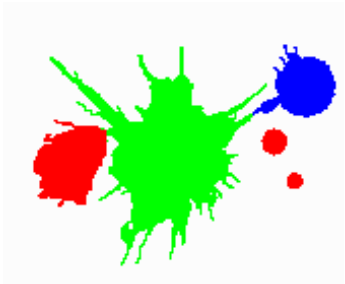
CMYK gamut



Imagine RGB



Imagine CMYK



Sisteme Software de Prelucrarea Imaginilor

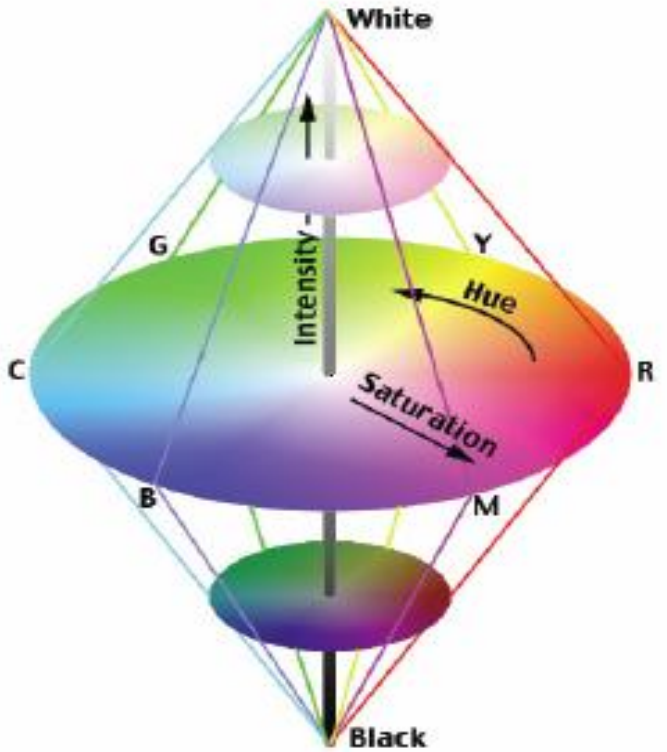
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HSI / HSB / HSV

H = Hue (nuanţă)
S = Saturation (puritate)
I = Intensity (intensitate)
B = Brightness
V = Value

• Avantaj: mult mai intuitiv.

• Nu exista ca mod de culoare separat

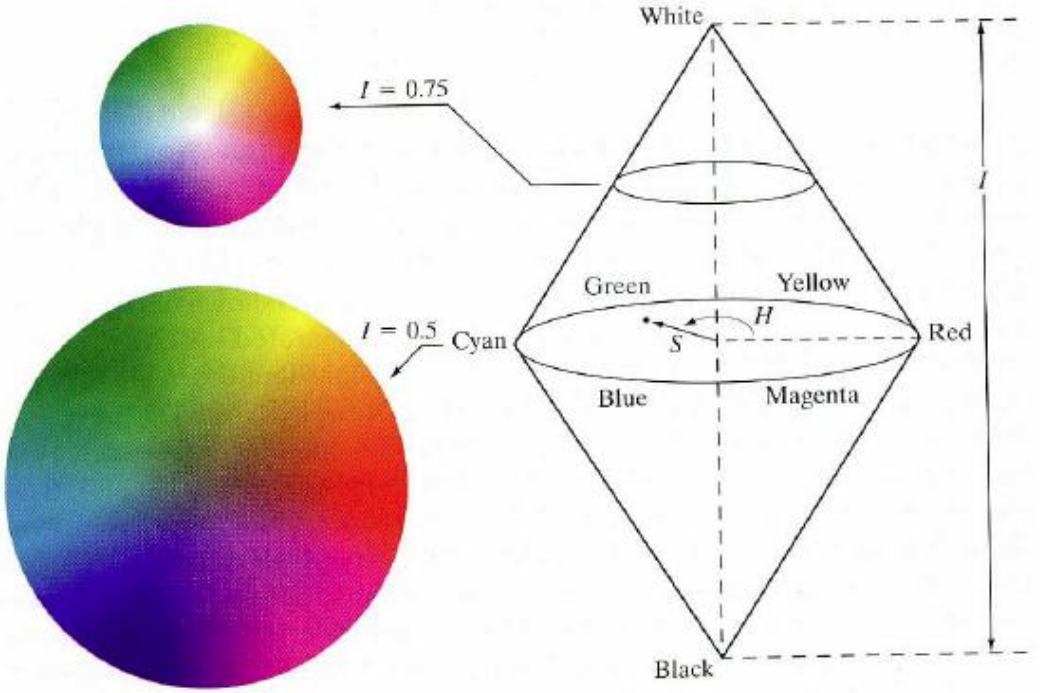


HSI / HSB / HSV

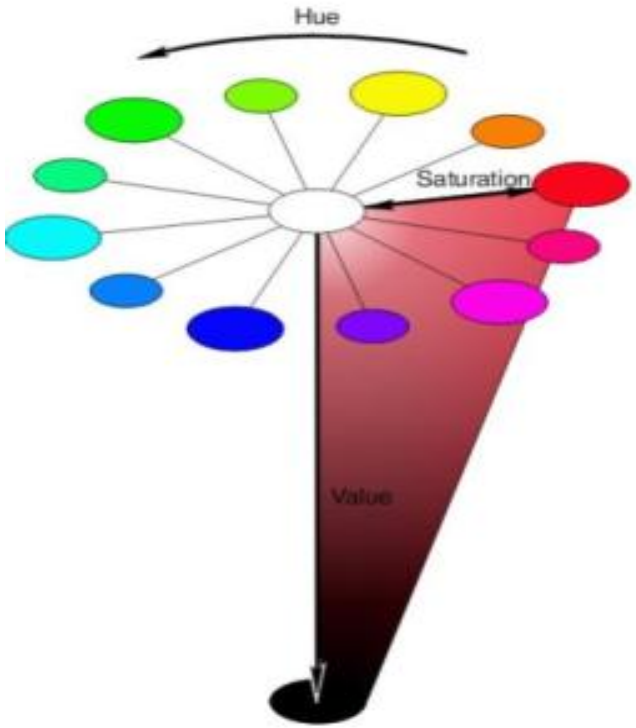
Dezavantaj:

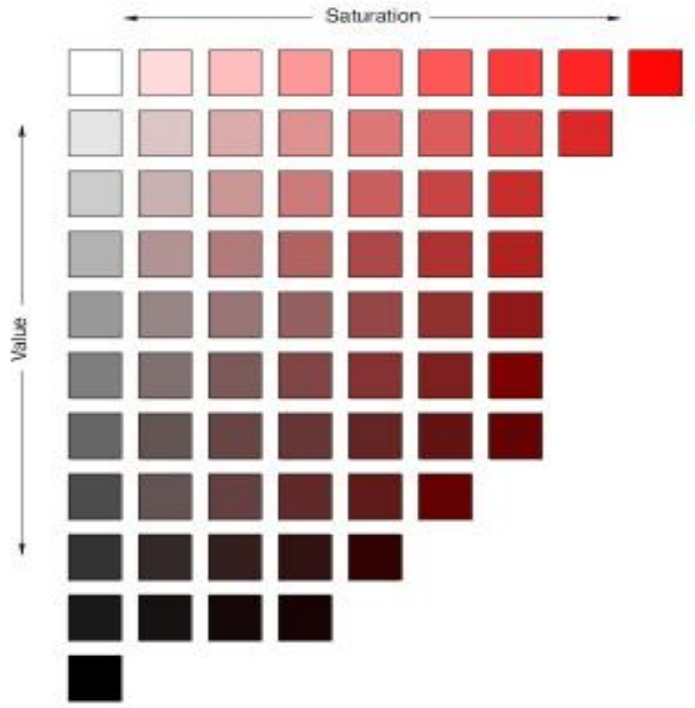
greu de definit

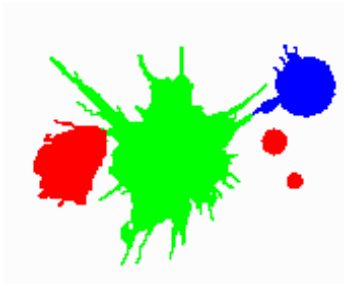
şi folosit d.p.d.v. matematic.



HSI / HSB / HSV







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HSI / HSB / HSV



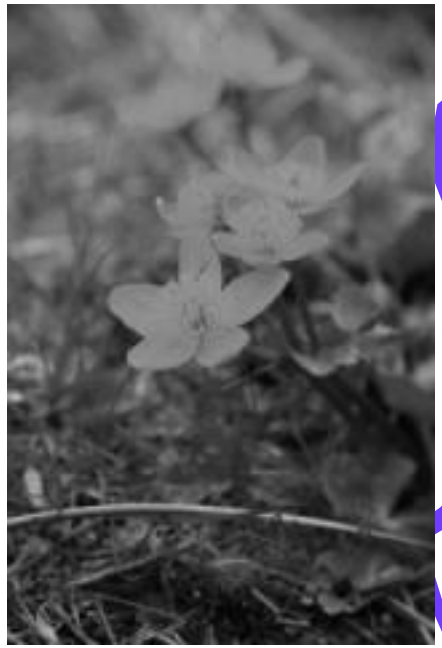
Imagine originala



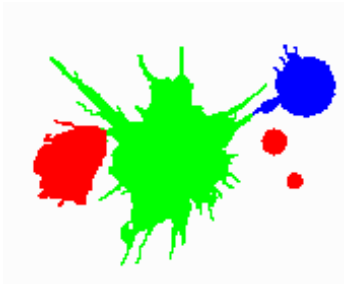
Canalul **H**



Canalul **S**



Canalul **I**



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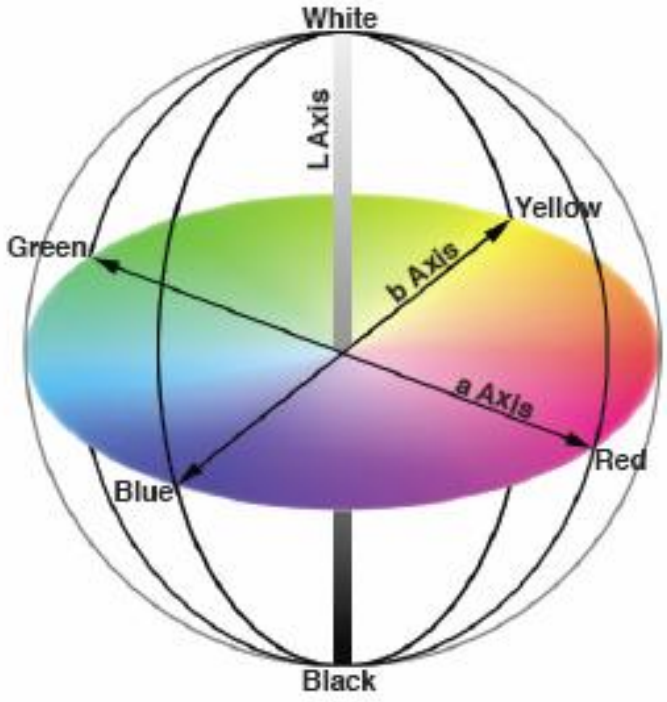
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Imagini Lab

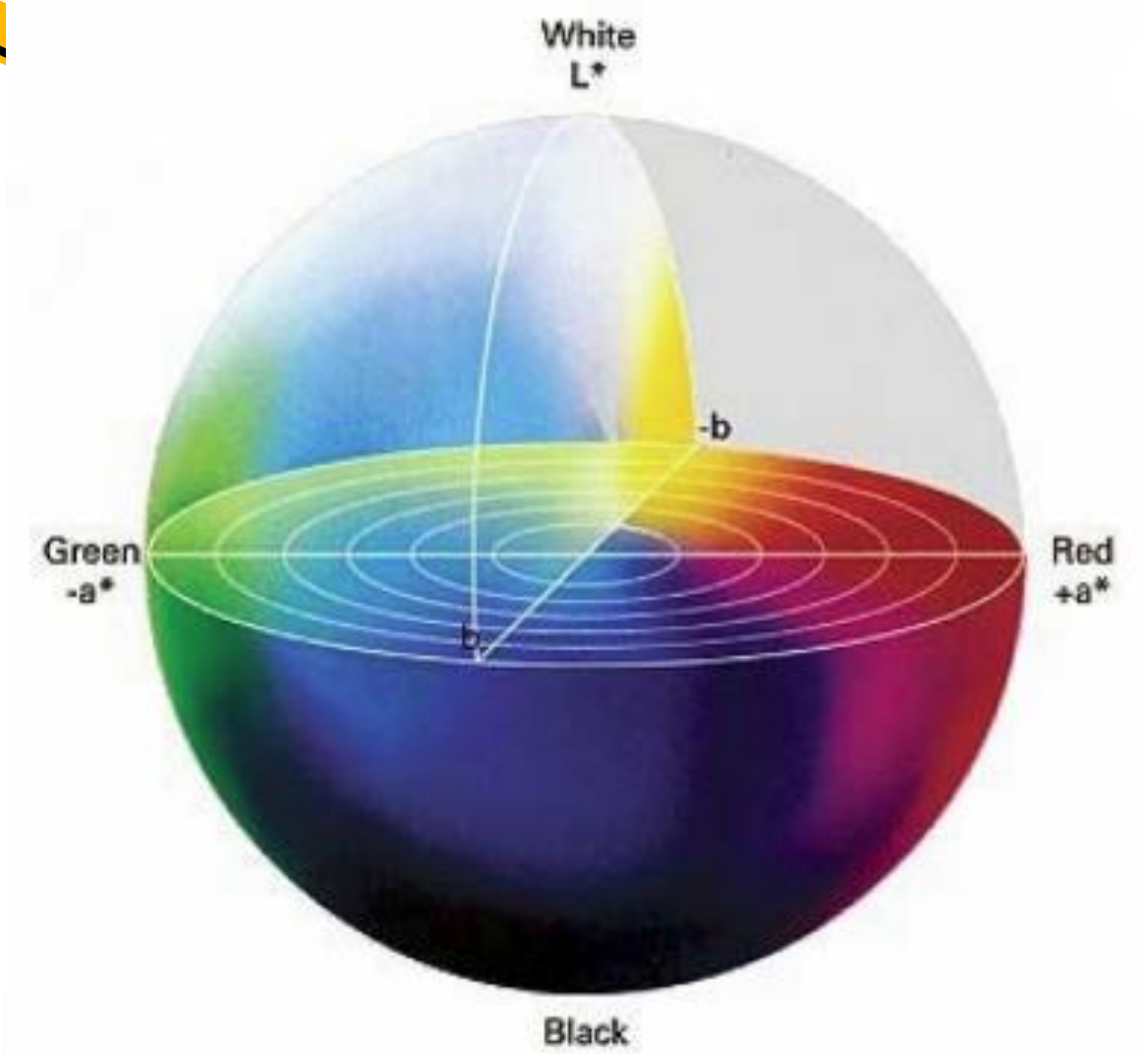
L = Lightness (luminozitate)
a,b = crominance (culoare)

Un compromis între RGB şi HSI

Utilizat în aplicaţii de prelucrare automată a imaginilor



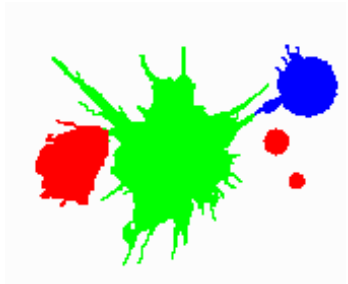
Lab



Imaginile digitale in Photoshop

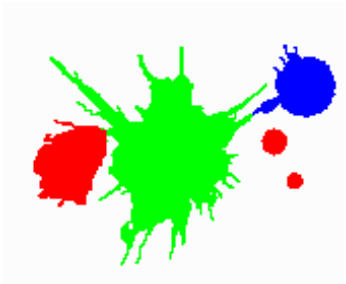
- Matrice cu mai multe dimensiuni:
  - **Straturi (layers)**

- Pot sa mai contina:
  - Masti de selectie
  - Canale suplimentare
  - Cai



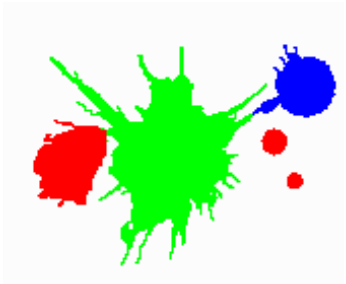
Histograma

- Instrument esențial în fotografia digitală
- Oferă informații legate de imagini:
  - dacă expunerea este corectă;
  - dacă avem contraste puternice;
  - dacă anumite prelucrări se pot efectua fără a afecta negativ imaginea.



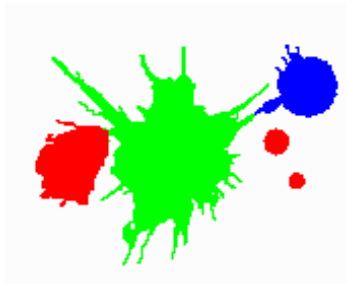
Tipuri de histograme

- Histograma de luminozitate
- Histograma fiecarui canal de culoare
- Histograma de culori
- Histograma RGB



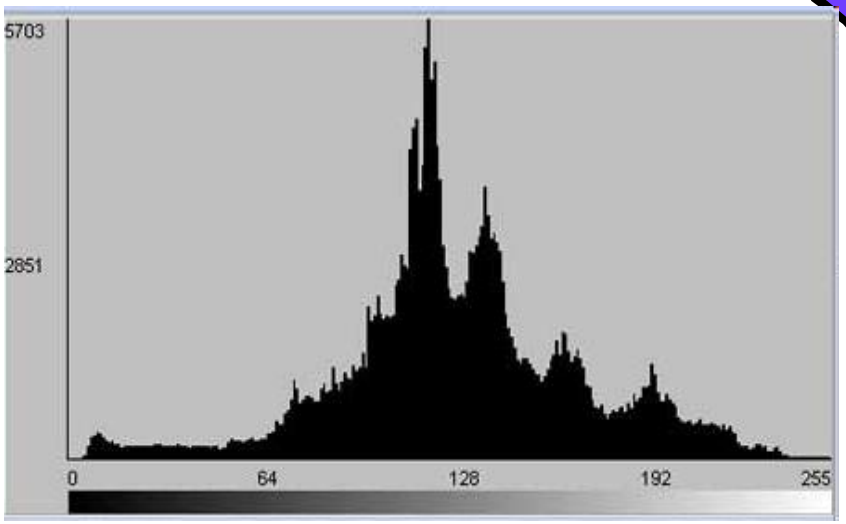
Histograma de luminozitate

- Graficul distribuției luminanței dintr-o imagine
- Poartă informații despre nivelul de gri, nu despre culoare
- Cum se construieşte:
  - pentru fiecare pixel se calculează luminanța:
    - Y = 0.59G + 0.3R + 0.11B
  - se numără pixelii identici pentru fiecare valoare de luminanță (de la 0 la 255)



Construcția histogramei de luminozitate



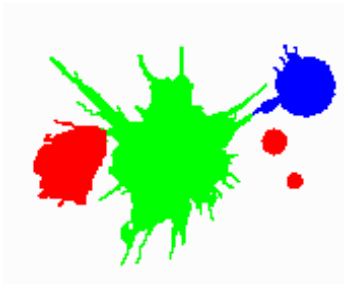


- pe orizontală: valorile de luminozitate ale pixelilor (de la 0-negru la 255-alb)
- pe verticală: numărul de pixeli pentru fiecare valoare de luminozitate normat (sau nu) la numarul de pixeli din imagine

Histograma fiecarui canal de culoare

- Distribuția luminozității pentru fiecare canal de culoare (Red, Green, Blue) din imagine

- Utilă în determinarea culorilor pronunțate
  - regiunile caracterizate de o componentă de culoare saturată sunt lipsite de textură



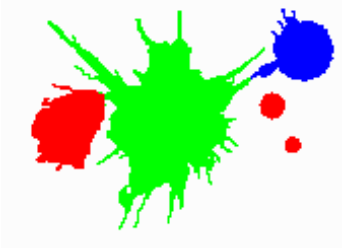












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RED

GREEN

BLUE



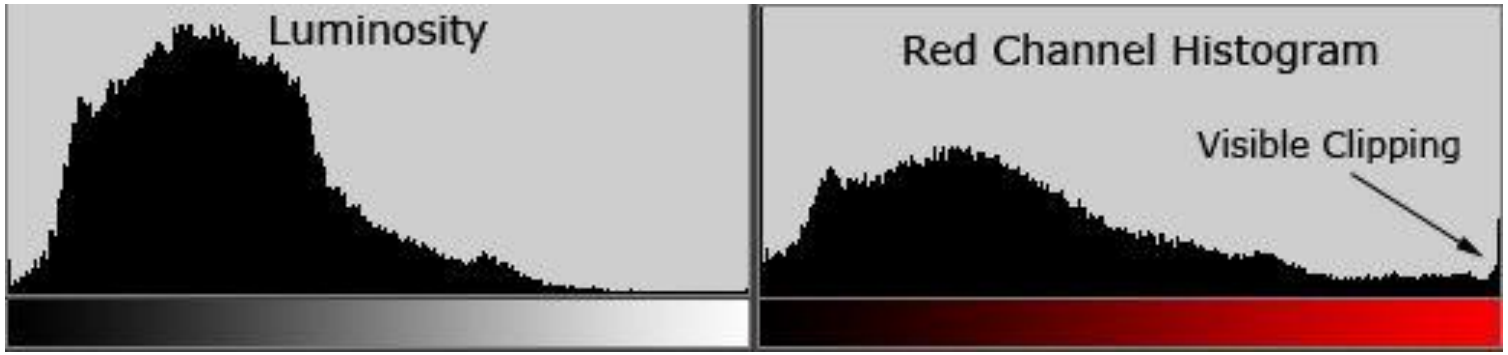




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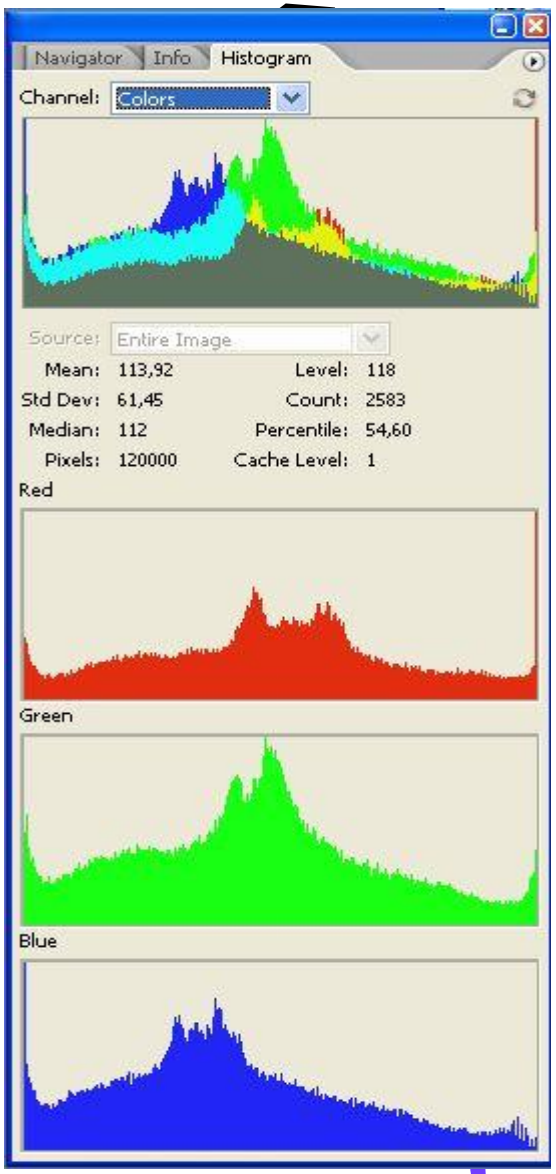
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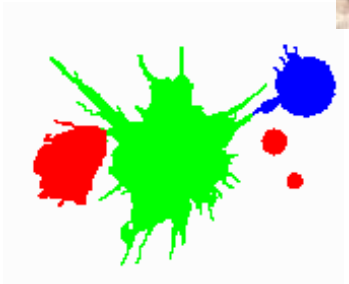
Histograma de culori

- Este formata din cele trei histograme ale canelelor de culoare suprapuse



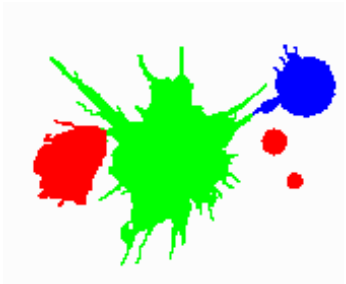


Photoshop CS2



Histograma RGB

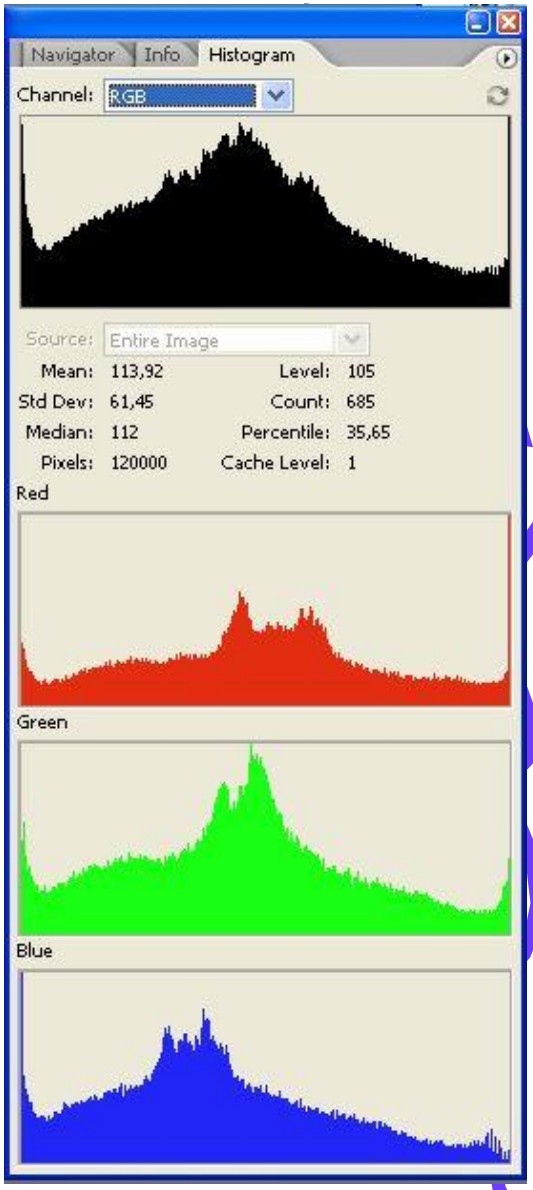
- Histograma cea mai des întâlnită la camerele digitale
- Construcție:
  - histograma RGB generează histogramele de culoare, după care se însumează valorile acestora, indiferent de localizarea pixelilor în cele trei histograme
- Avertizează suprasaturația, însă nu poate decide proveniența acesteia



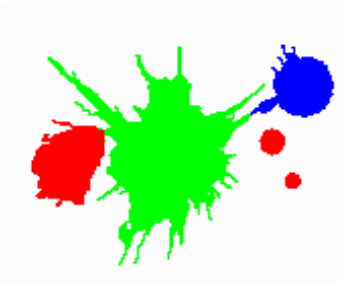


Histograma RGB





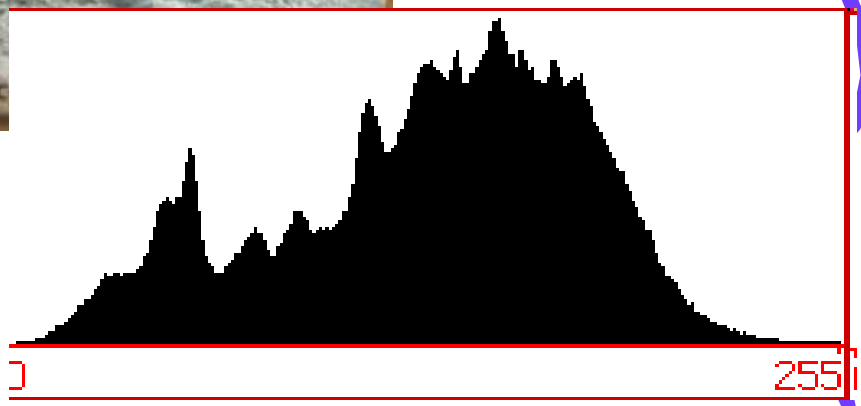
Photoshop CS2



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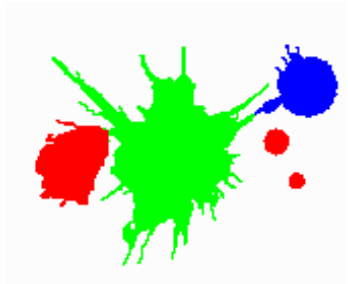


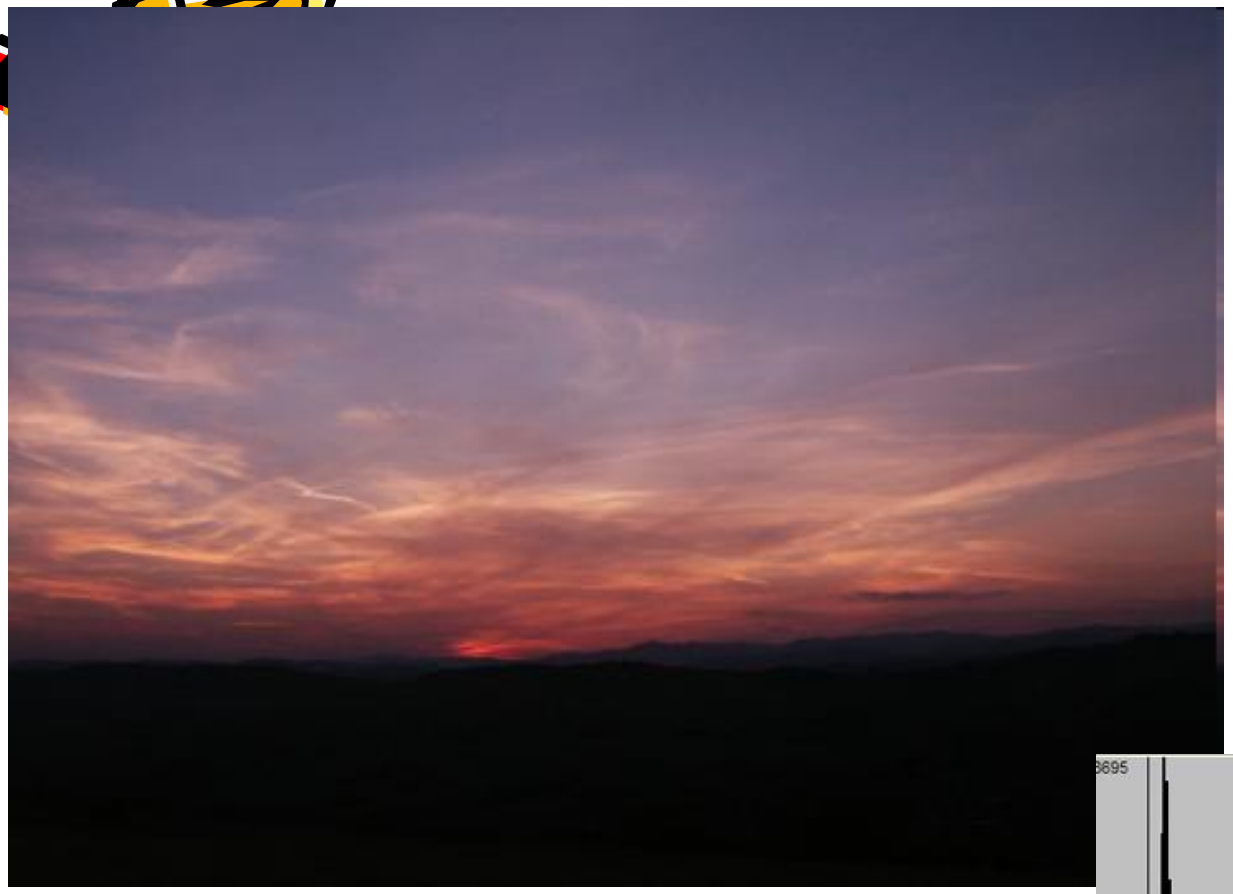
Sisteme Software de Prelucrarea Imaginilor

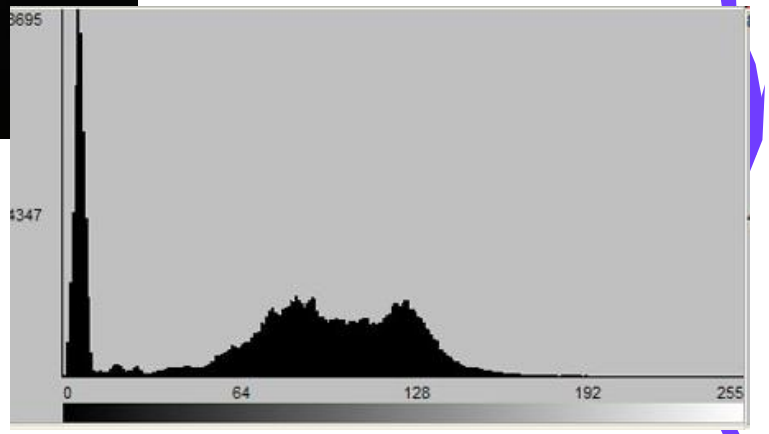
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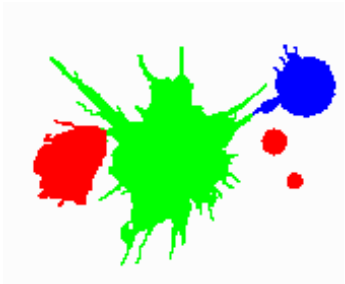
Cum interpretăm histograma?

- Histograma unei fotografii subexpuse
  - prezintă luminozitate scăzută, tonuri spre negru => se aglomerează la stânga
  - zonele albe sunt redate prin tonuri de gri, iar zonele de umbră apar negre
  - se pierd detaliile de umbră şi nu mai pot fi recuperate prin prelucrări ulterioare









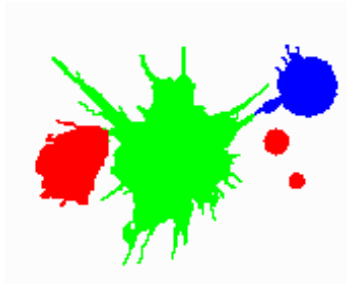
Sisteme Software de Prelucrarea Imaginilor

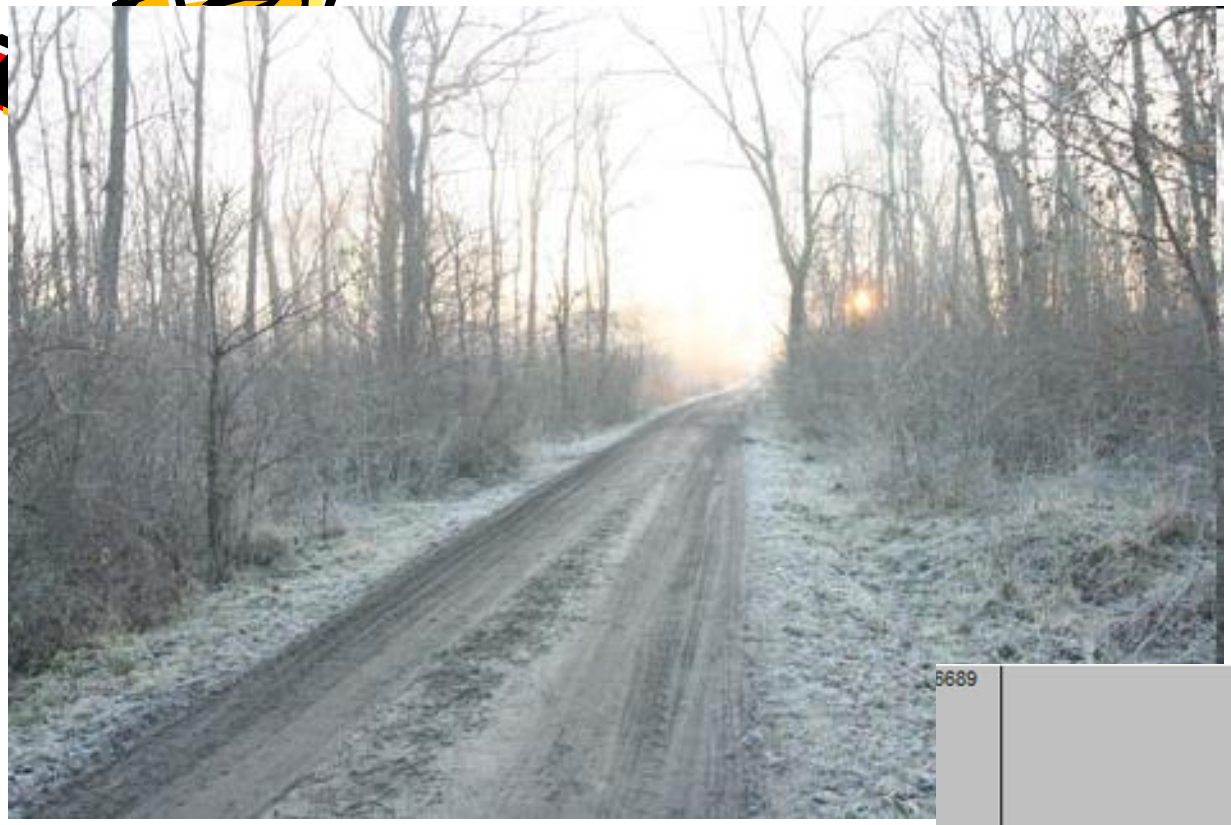
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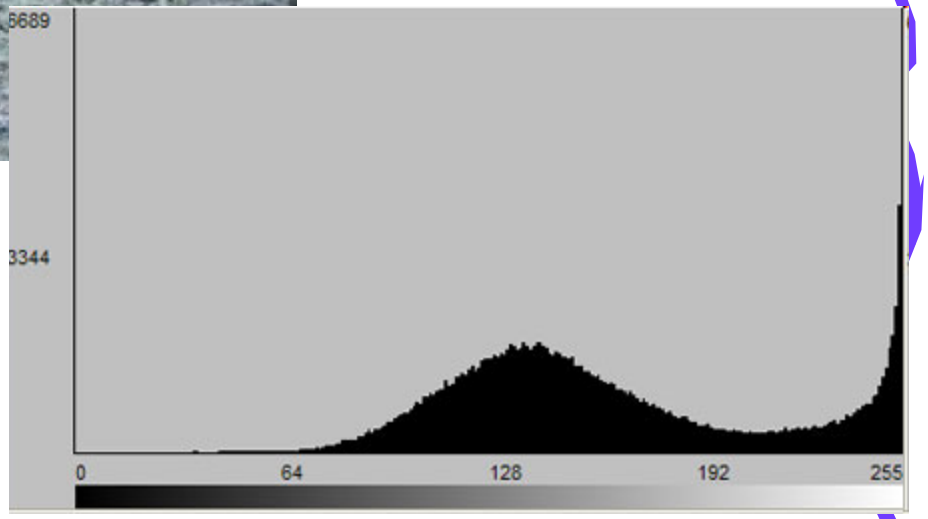
Cum interpretăm histograma?

- Histograma unei fotografii supraexpuse
  - prezintă luminozitate ridicată, tonuri spre alb

    => se aglomerează la dreapta
  - zonele albe apar “arse”, iar zonele negre nu există
  - se pierd detaliile luminoase şi nu mai pot fi recuperate prin prelucrări ulterioare







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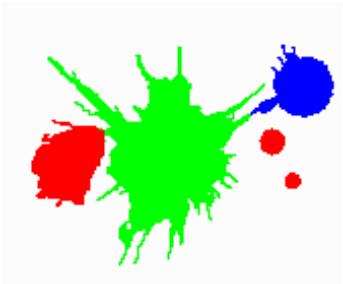
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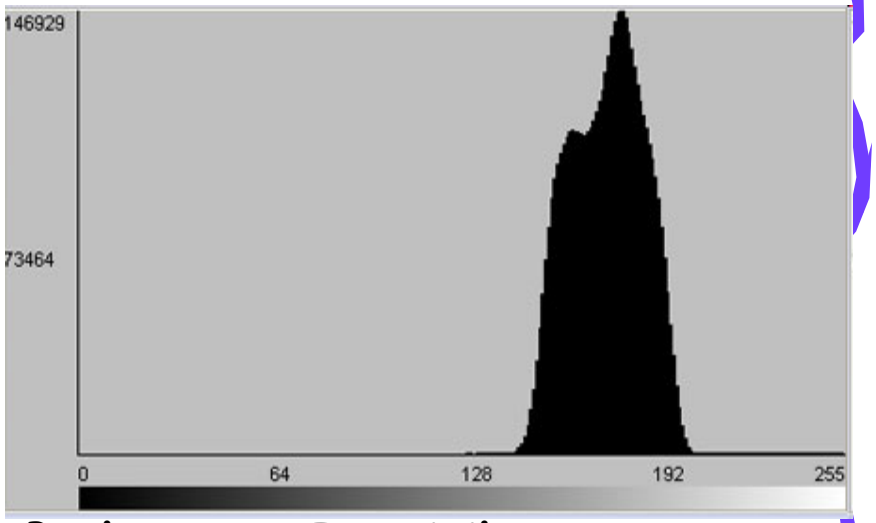
Cum interpretăm histograma?



- Histograma unei fotografii lipsite de contrast
  - zona tonală este îngustă
  - la extremități valorile sunt nule
  - exemplu: subiecte iluminate uniform, cadre pe timp de ceață







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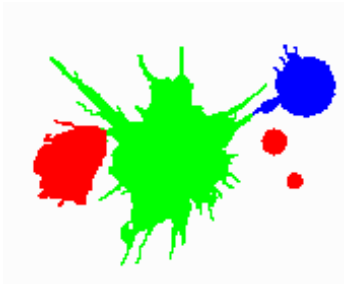
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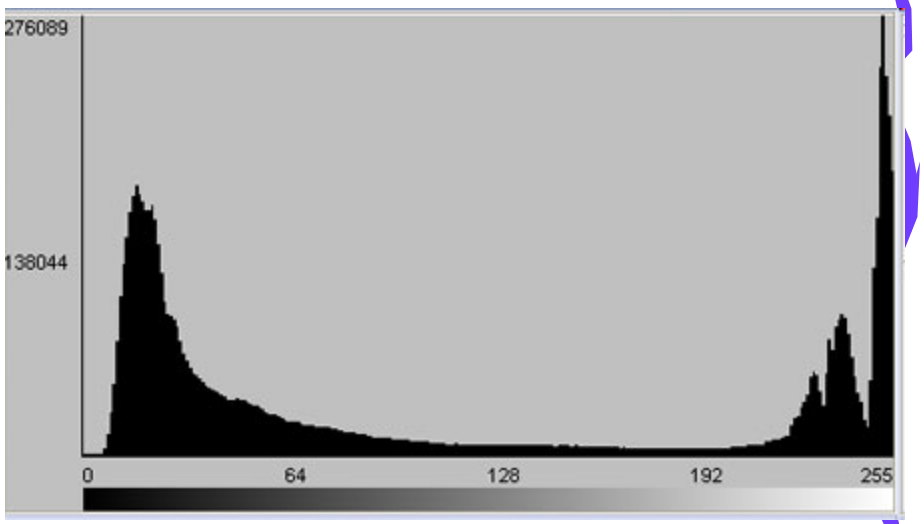
Cum interpretăm histograma?



- Histograma unei fotografii de contrast excesiv
  - zona tonală este largă
  - tonurile se aglomerează spre extremități, cu umbre pronunțate şi lumini puternice, chiar “arse”
  - exemplu: cadre realizate în lumina soarelui, cu precădere în jurul orelor 12-13







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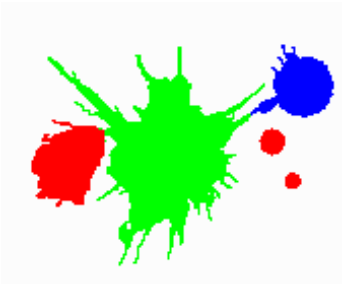
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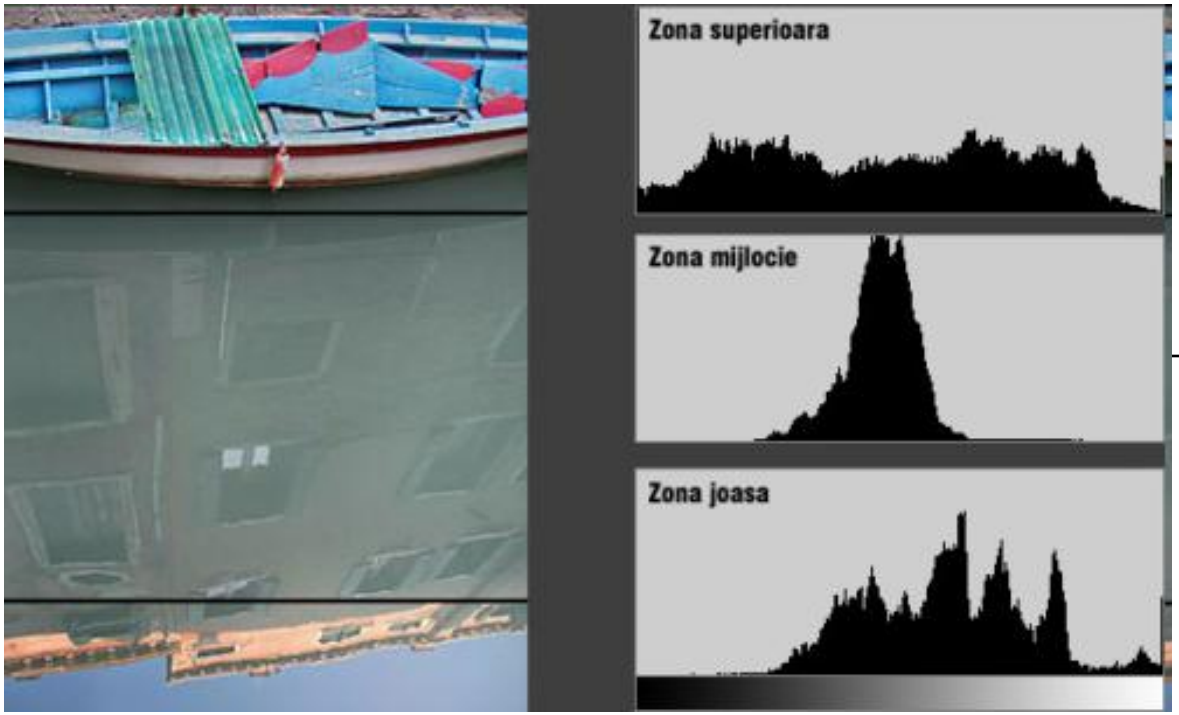


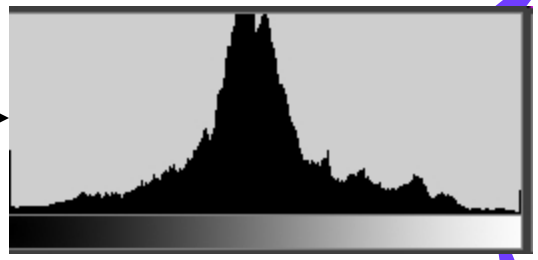
Cum interpretăm histograma?



- Contrastul poate varia în cadrul aceleiaşi imagini:
  - se împarte imaginea în zone distincte, fiecare cu histogramă proprie
  - histograma imaginii este suma histogramelor componente





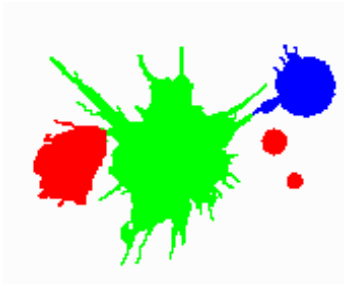


Sisteme Software de Prelucrarea Imaginilor

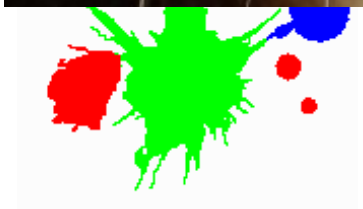
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Imagini Low Key

- Sunt caracterizate de tonuri joase
- În fotografia tradițională se foloseşte tehnica “three-point lighting”, cu trei surse de lumină:
  - Key light => accentuează contururile obiectului
  - Fill light => controlează contrastele
  - Back light => efect de “strălucire” a contururilor obiectului
- Senzație de dramatism







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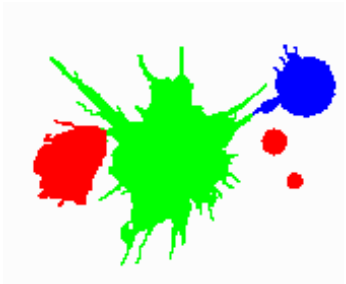


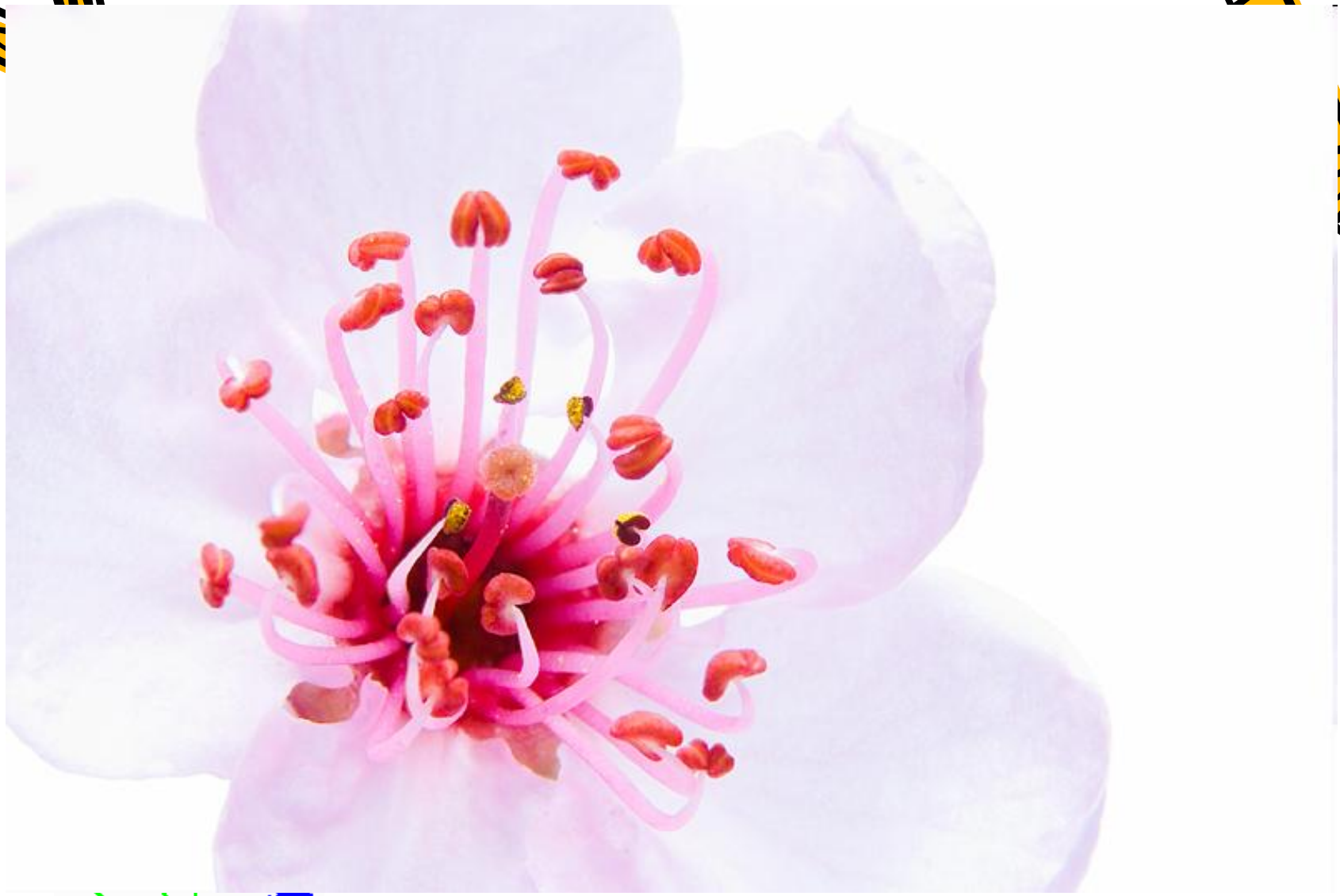
Sisteme Software de Prelucrarea Imaginilor

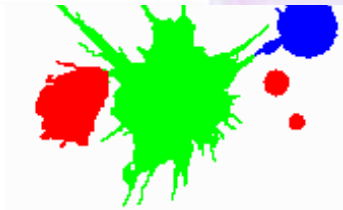
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Imagini High Key

- Sunt caracterizate de tonuri înalte
- Se obțin prin iluminarea subiectului cu mai multe surse de lumină “soft ligths”
- Senzație de optimism, puritate, gingăşie



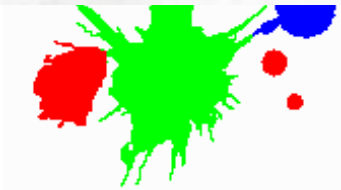




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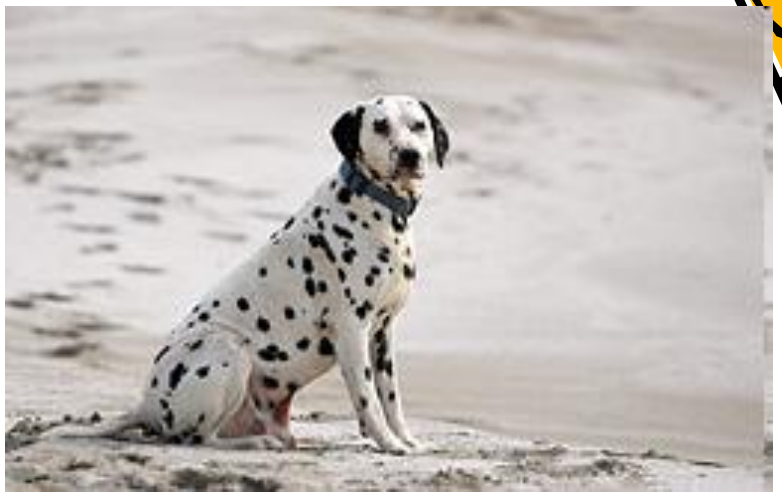




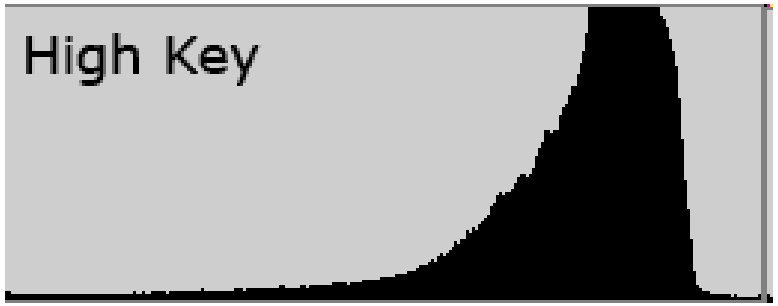
Sisteme Software de Prelucrarea Imaginilor

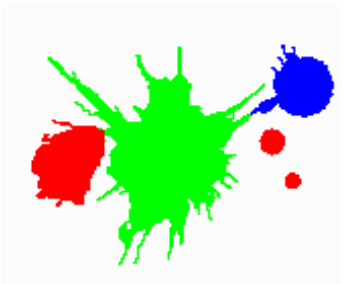
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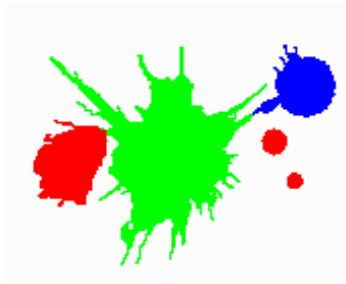


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Paleta *Histogram*

- Photoshop CS2: poate afisa oricare din histogramele mentionate
- Poate afisa date statistice despre histograma: valoare medie, dispersia, valoarea mediana, numarul de pixeli, numarul de pixeli de o anumita valoare si procentul lor in imagine
- Se modifica odata cu modificarea imaginii



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- Multumesc pentru ajutor masterandei Bunea Anemona (TAID 2010)!

