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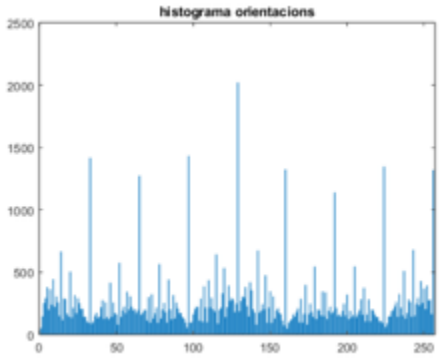
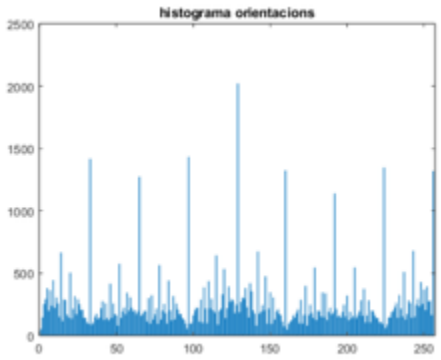
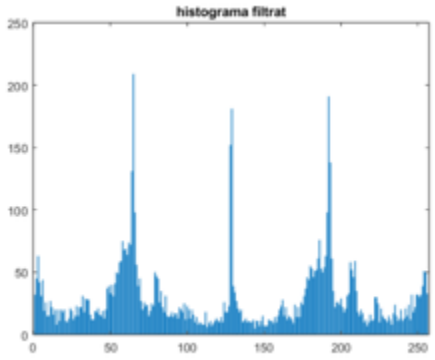
# Histogrames d'orientació

```
im = imread("cameraman.jpg");
figure; imshow(im); title('im original');
pause(0.5);

im = double(im);
sob = fspecial('sobel')/4;
Gx = imfilter(im,sob,'conv');
Gy = imfilter(im,sob',conv');
alfa = uint8(255*(atan2(Gy,Gx)+pi)/2/pi);

figure; imshow(alfa); title('direcció del gradient');
pause(0.5);

h = imhist(alfa);
figure; bar(h); title('histograma orientacions');
pause(0.5);
```


```
mod = sqrt(Gy.^2+Gx.^2);
cont = mod>50;

figure; imshow(cont); title('filtrat per modul');
pause(0.5);

bones = alfa(cont);
h2 = imhist(bones);

figure; bar(h2); title('histograma filtrat');
pause(0.5);
```

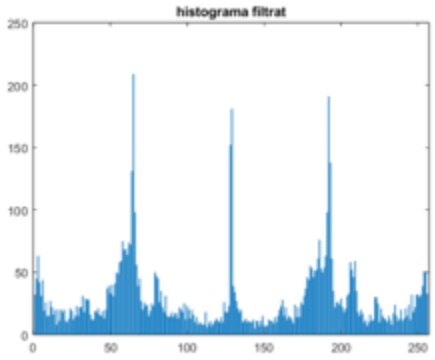


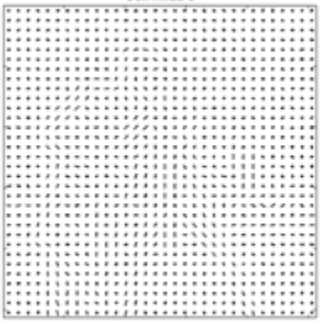

# HOG robustos a cambis d'iluminació

cada histograma es un conjunto de características

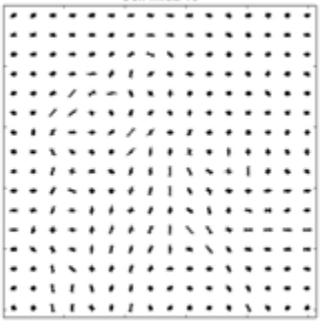
```
[hog_1, vis_1] = extractHOGFeatures(im, 'CellSize', [8,8]);

figure; plot(vis_1); title('Cell mida 8');
pause(0.5);

[hog_2, vis_2] = extractHOGFeatures(im, 'CellSize', [16,16]);

figure; plot(vis_2); title('Cell mida 16');
pause(0.5);

[hog_3, vis_3] = extractHOGFeatures(im, 'CellSize', [64,64]);

figure; plot(vis_3); title('Cell mida 64');
pause(0.5);

[hog_4, vis_4] = extractHOGFeatures(im, 'CellSize', [1,1]);

figure; plot(vis_4); title('Cell mida 2');
pause(0.5);
```



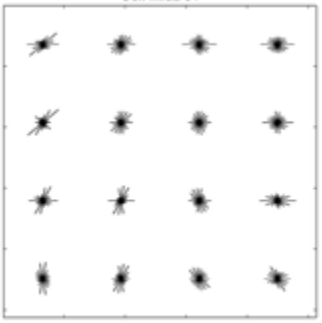
Cell mida 8



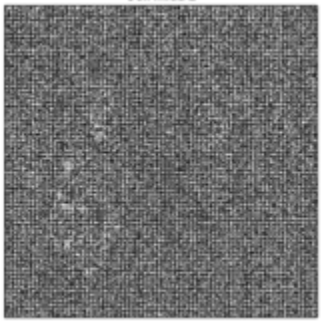
Cell mida 16



Cell mida 64

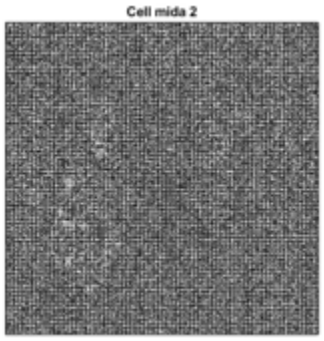


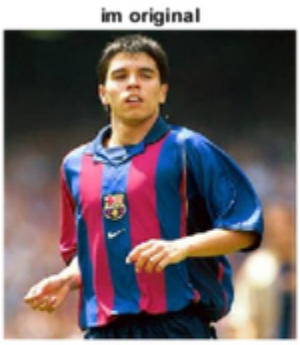
Cell mida 2



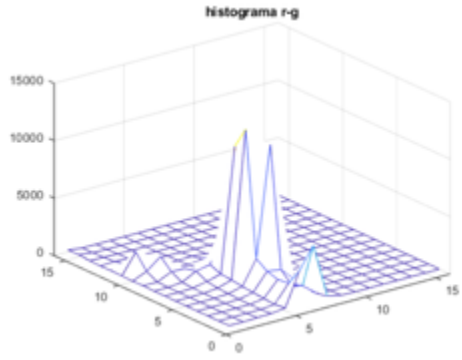
# HISTOGRAMA DE COLORS

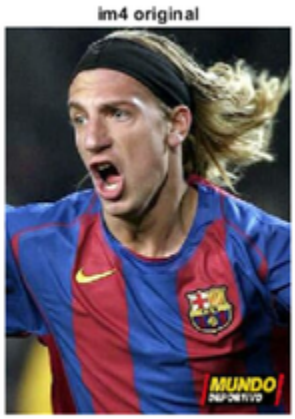
```
im = imread('team1.jpg');
figure; imshow(im); title('im original');
pause(0.5);

im = double(im);
imaux = im./(im(:,:,1)+im(:,:,2)+im(:,:,3)+1);
figure; imshow(imaux); title('im normalitzada');
pause(0.5);

h1 = histcounts2(imaux(:,:,1), imaux(:,:,2),16);
figure; mesh(h1); title('histograma r-g');
pause(0.5);

h1 = h1/sum(h1,'all');

% imatge 4
im4 = imread('team4.jpg');
figure; imshow(im4); title('im4 original');
pause(0.5);

im = double(im4);
imaux = im./(im(:,:,1)+im(:,:,2)+im(:,:,3)+1);

h4 = histcounts2(imaux(:,:,1), imaux(:,:,2),16);
h4 = h4/sum(h4,'all');

aux = min(h1,h4);
sim = sum(aux, 'all');
```



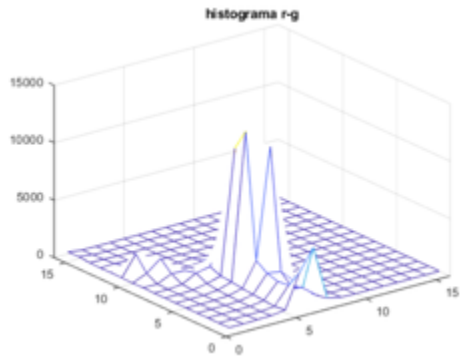

im original

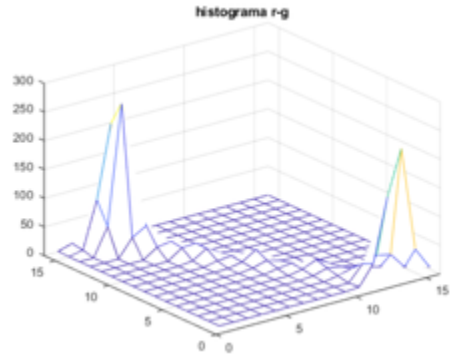

im normalitzada


histograma r-g
15000
10000
5000
0
15
10
5
0
0
5
10
15

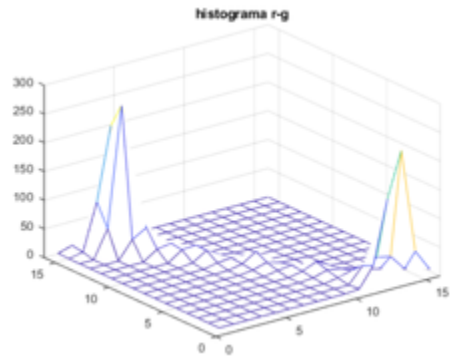


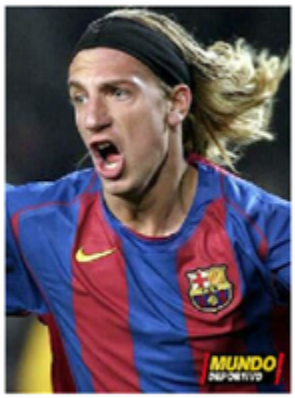

```
im = imread('team1.jpg');
im = double(im);
imaux = im./(im(:,:,1)+im(:,:,2)+im(:,:,3)+1);
patch = imaux(248:272,92:156,:);
figure; imshow(patch); title('patch');
pause(0.5);

h1 = histcounts2(patch(:,:,1), patch(:,:,2),16);
figure; mesh(h1); title('histograma r-g');
pause(0.5);
h1 = h1/sum(h1,'all');
```



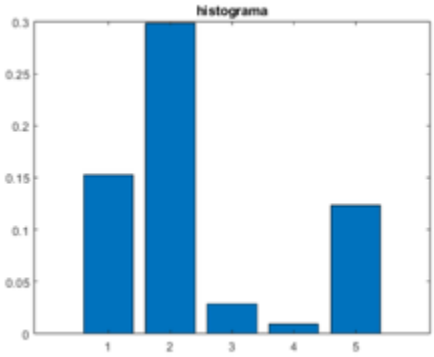




```
vec_sim = zeros(5,1);

j = 1;

for i = [4,6,7,11,12]
    imatge = sprintf('team%d.jpg', i);
    im = imread(imatge);
    figure; imshow(im); title('imatge de test');
    pause(0.5);
    patch = double(imcrop(im));
    patch = patch./(patch(:,:,1)+patch(:,:,2)+patch(:,:,3)+1);

    hi = histcounts2(patch(:,:,1), patch(:,:,2),16);
    hi = hi/sum(hi,'all');

    aux = min(h1,hi);
    vec_sim(j) = sum(aux, 'all');

    j = j +1;
end

figure; bar(vec_sim); title('histograma');
pause(0.5);
```




MUNDO

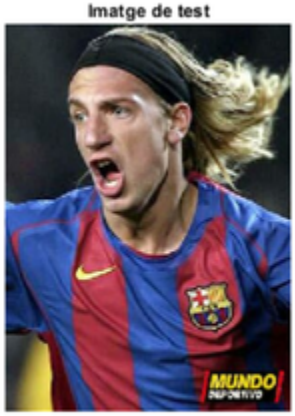

FASTWEB



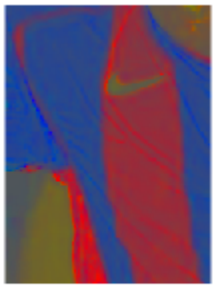

```
vec_sim = zeros(5, 1); % Vector para guardar las similitudes
j = 1;

% Dividir en una cuadrícula 3x3
grid_size = 2;

for i = [4, 6, 7, 11, 12]
    imatge = sprintf('team%d.jpg', i);
    im = imread(imatge);
    figure; imshow(im); title('Imatge de test');
    pause(0.5);

    [rows, cols, ~] = size(im);

    patch_rows = floor(rows / grid_size);
```

```
    patch_cols = floor(cols / grid_size);

    best_similarity = -inf;
    best_patch = [];

    for row_idx = 0:(grid_size-1)
        for col_idx = 0:(grid_size-1)
            r_start = row_idx * patch_rows + 1;
            r_end = (row_idx + 1) * patch_rows;

            c_start = col_idx * patch_cols + 1;
            c_end = (col_idx + 1) * patch_cols;

            patch = double(im(r_start:r_end, c_start:c_end, :));

            patch = patch ./ (patch(:, :, 1) + patch(:, :, 2) + patch(:, :,
3) + 1);

            hi = histcounts2(patch(:, :, 1), patch(:, :, 2), 16);
            hi = hi / sum(hi, 'all');

            aux = min(h1, hi);
            similarity = sum(aux, 'all');

            if similarity > best_similarity
                best_similarity = similarity;
                best_patch = patch;
            end
        end
    end

    vec_sim(j) = best_similarity;
    j = j + 1;

    figure; imshow(uint8(best_patch * 255)); title('Parche més similar');
    pause(0.5);
end

figure; bar(vec_sim); title('Histograma de similituts');
pause(0.5);
```

Imatge de test




Parche més similar

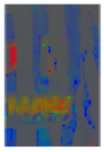


Imatge de test

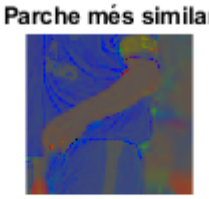
Parche més similar

Imatge de test

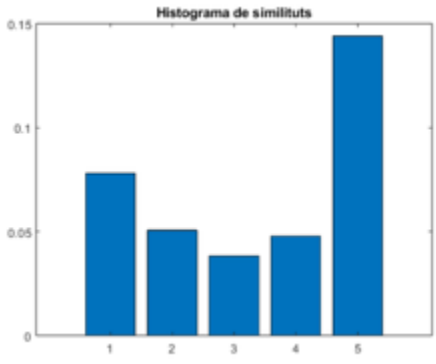
Parche més similar



Imatge de test



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