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%%LAB 10 - Aina Garcia i Martí Ramon

im = double(imread('team1.jpg'));
rb = NormalitzaRGB(im);
s = 16;
aux2 = im(248:272,92:156,:);
rb = NormalitzaRGB(aux2);
h1 = histo2D(aux2,s);
figure, surf(h1);
sim= zeros(13,1);

for k = 2:13
    im = double(imread(sprintf('team%d.jpg',k)));
    minim = 1000;
    for l = 1:10 %numero patchs
        [x1, x2, y1, y2] = findPatch(24,64, im);
        im = im(x1:x2, y1:y2, :);
        rb = NormalitzaRGB(im);
        h = histo2D(rb,16);
        h = imgaussfilt(h,0.5);
        aux = min(h1,h);
        if aux < minim
            minim = aux;
        end
    end
    sim(k) = sum(aux(:));
end

figure,bar(sim);

function rb = NormalitzaRGB(im)
    aux(:,:) = im(:,:,1)+im(:,:,2)+im(:,:,3);
    [x, y, z] = size(im);
    rb = uint8(zeros(x,y,2));

    rb(:,:,1) = uint8(255*im(:,:,1)./aux);
    rb(:,:,2) = uint8(255*im(:,:,3)./aux);
end

function histo = histo2D(rb, s)
    histo = zeros(s, s);
    [x, y, z] = size(rb);
    scale = 255/s;
    for m=1:x
        for n=1:y
            r = ceil(rb(m,n,1)/scale);
            b = ceil(rb(m,n,2)/scale);
            if r == 0
                r = 1;
            end
            if b == 0
                b = 1;
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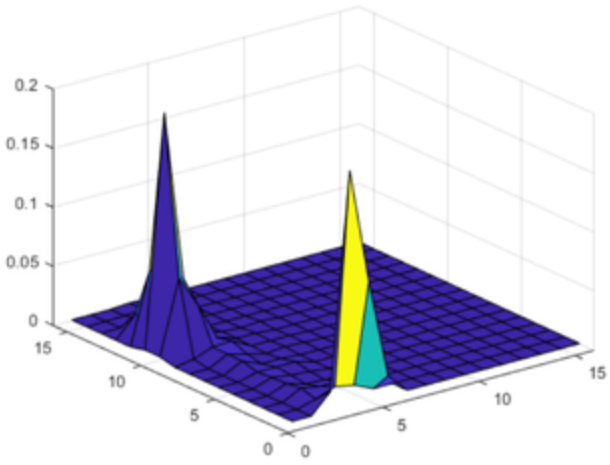
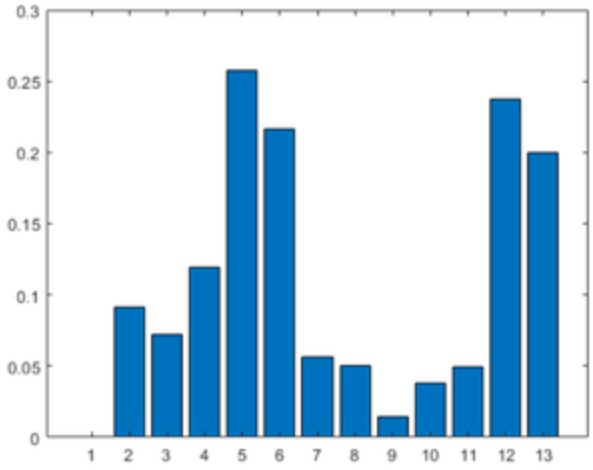
            end
            histo(r, b) = histo(r, b) + 1;
        end
    end
    %normalitzem
    histo = histo./(x*y);
end

function [x1, x2, y1, y2] = findPatch(n1, n2, im)
    [x, y, z] = size(im);
    x = x - n1;
    y = y - n2;

    % randomnum
    r1 = randi([1, x]);
    r2 = randi([1, y]);

    x1 = r1;
    x2 = r1 + n1;
    y1 = r2;
    y2 = r2 + n2;
end
```





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