# Lab 5: Segmentació

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## Region Growing

```
global im eti MAXFILA MAXCOL TH seedVal
TH = 150;
im = imread('Ipces01.tif');
[MAXFILA MAXCOL nchan] = size(im);
eti = zeros(MAXFILA, MAXCOL);
imshow(im), title('Imatge original')
```



Imatge original

```
seedVal = im(18, 252, :);
```

## Region Growing function

```
type RG.m
```

```matlab
function RG(fila, col, label)
% Segmentació utilitzant la tècnica Region Growing. Necessita fila, columna
% i el label.
    global im eti MAXFILA MAXCOL TH seedVal

    eti(fila, col) = label;
%     val = im(fila, col, :); en el cas que fem servir el valor del pare no
%     de la llavor. Si l'haguéssim utilitzat hauríem hagut de fer la
%     següent crida sum(imabsdiff(val, pxVal))

    fila = fila - 1; % up
    if fila > 0
        if eti(fila, col) == 0 % 0 = no etiquetat
            pxVal = im(fila, col, :);
            if sum(imabsdiff(seedVal, pxVal)) < TH
                eti(fila, col) = label;
                RG(fila, col, label);
            end
        end
    end

    fila = fila + 2; % down
    if fila <= MAXFILA
        if eti(fila, col) == 0
            pxVal = im(fila, col, :);
            if sum(imabsdiff(seedVal, pxVal)) < TH
                eti(fila, col) = label;
                RG(fila, col, label);
            end
        end
    end

    fila = fila - 1; % fila actual
    col = col - 1; % left
    if col > 0
        if eti(fila, col) == 0
            pxVal = im(fila, col, :);
            if sum(imabsdiff(seedVal, pxVal)) < TH
                eti(fila, col) = label;
                RG(fila, col, label);
            end
        end
    end

    col = col + 2; % right
    if col <= MAXCOL
        if eti(fila, col) == 0
            pxVal = im(fila, col, :);
            if sum(imabsdiff(seedVal, pxVal)) < TH
                eti(fila, col) = label;
                RG(fila, col, label);
            end
        end
    end
end
```
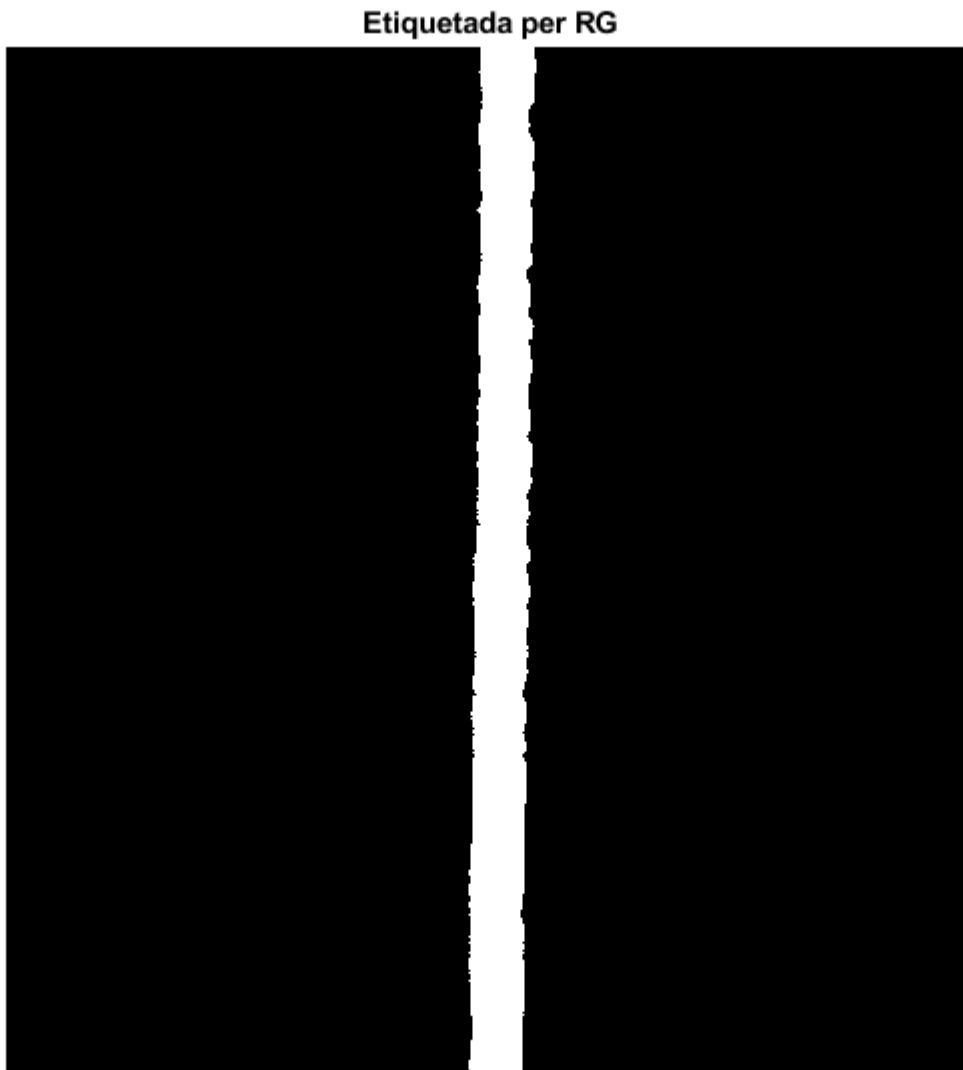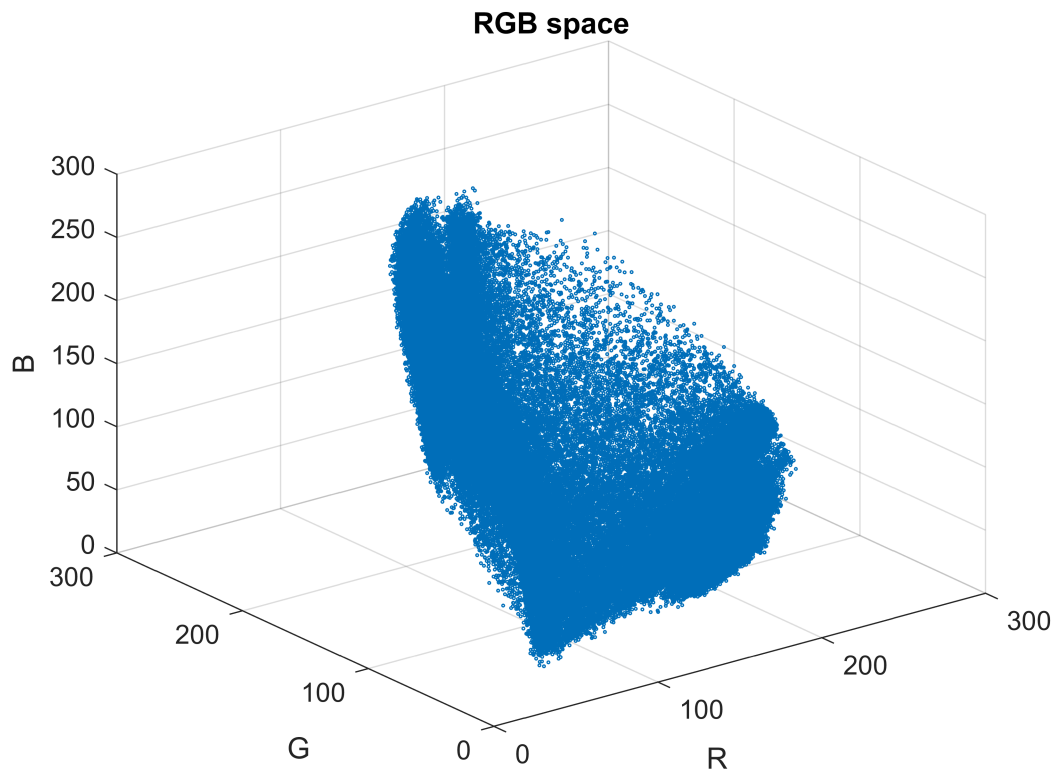
```
RG(18, 252, 1);
figure, imshow(eti, []), title('Etiquetada per RG')
```
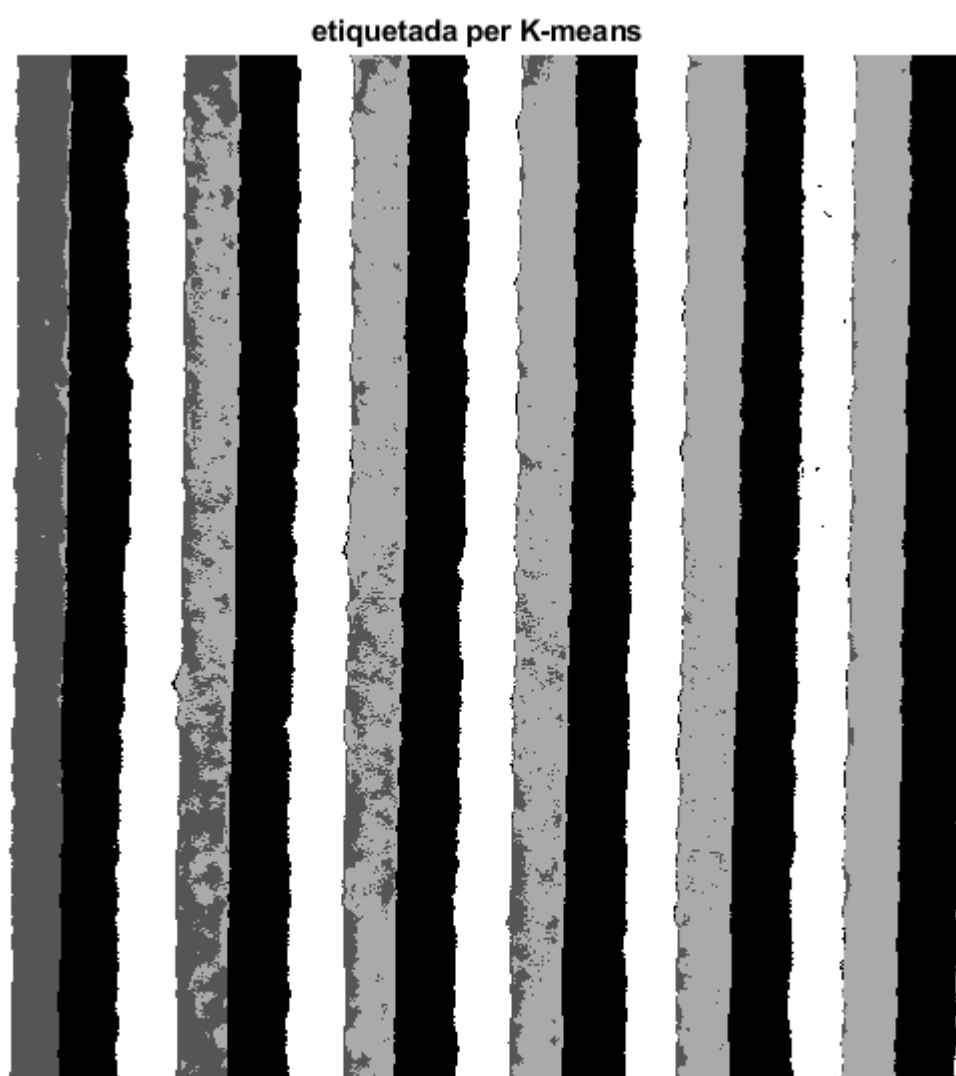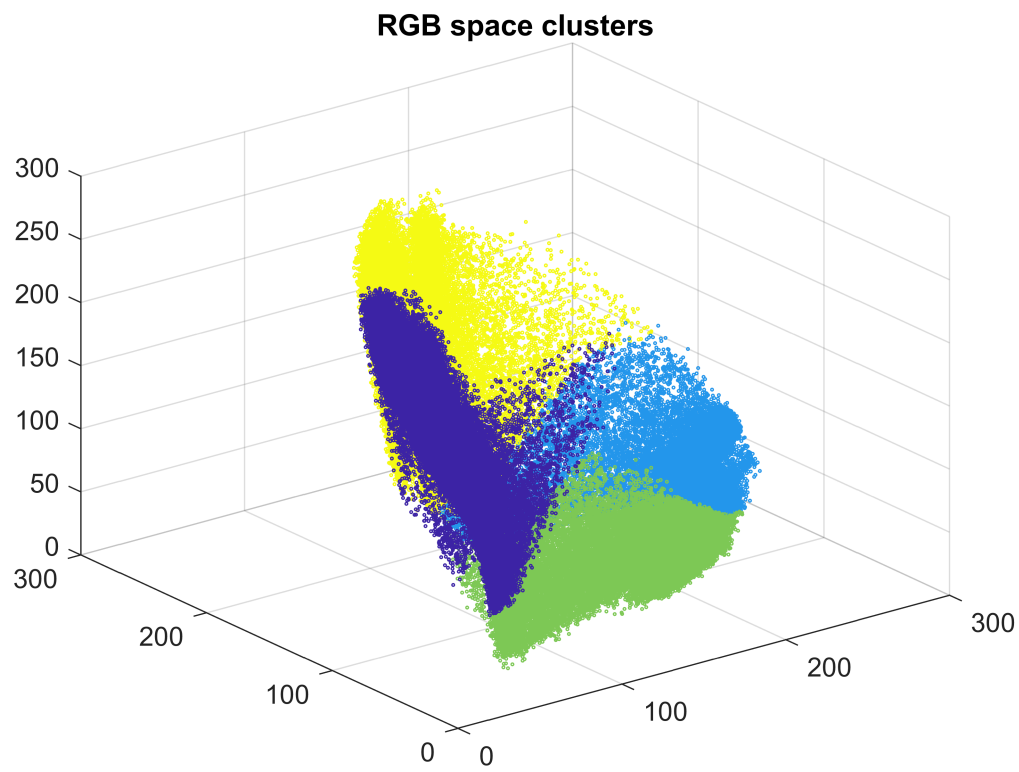


**Etiquetada per RG**

# Clusters

### 4 clusters

```
vect = reshape(double(im), MAXFILA*MAXCOL, 3);
figure, scatter3(vect(:, 1), vect(:, 2), vect(:, 3), 1), title('RGB space')
xlabel('R'), ylabel('G'), zlabel('B')
```
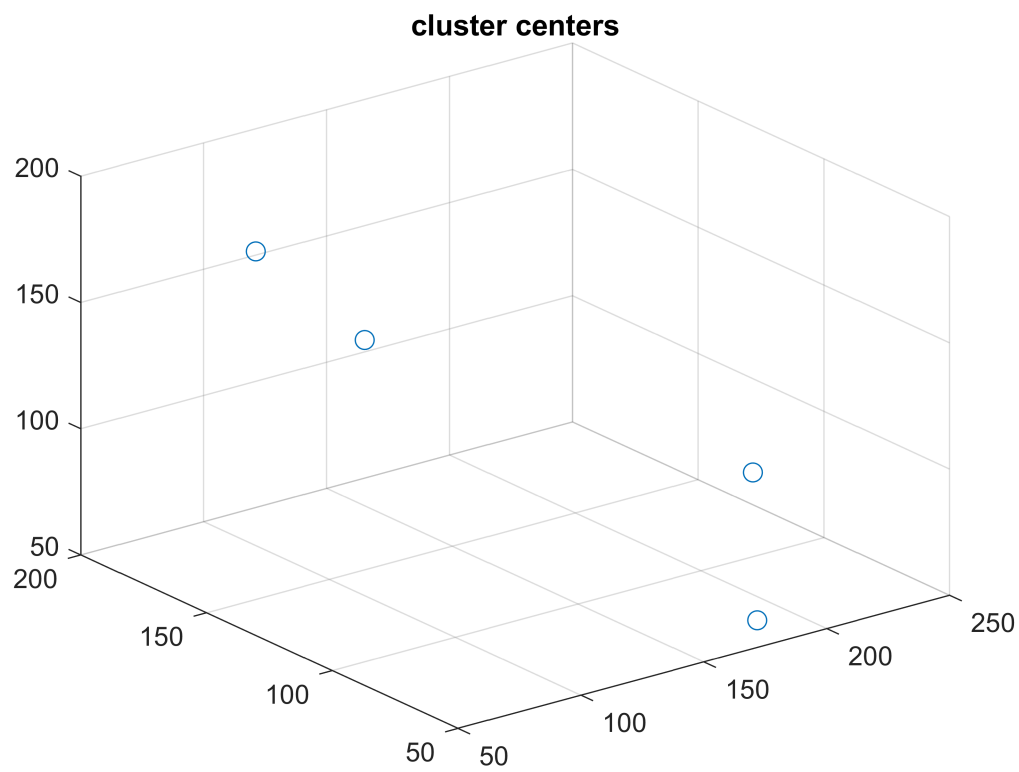
## RGB space



```
Nclusters = 4;
[cl_eti, cl_ct] = kmeans(vect,Nclusters,'distance', 'cityblock');
eti=reshape(cl_eti,MAXFILA, MAXCOL);
figure, imshow(eti,[]), title('etiquetada per K-means');
```

**etiquetada per K-means**



```
figure, scatter3(vect(:, 1), vect(:, 2), vect(:, 3), 1,cl_eti), title('RGB space clusters');
```

**RGB space clusters**
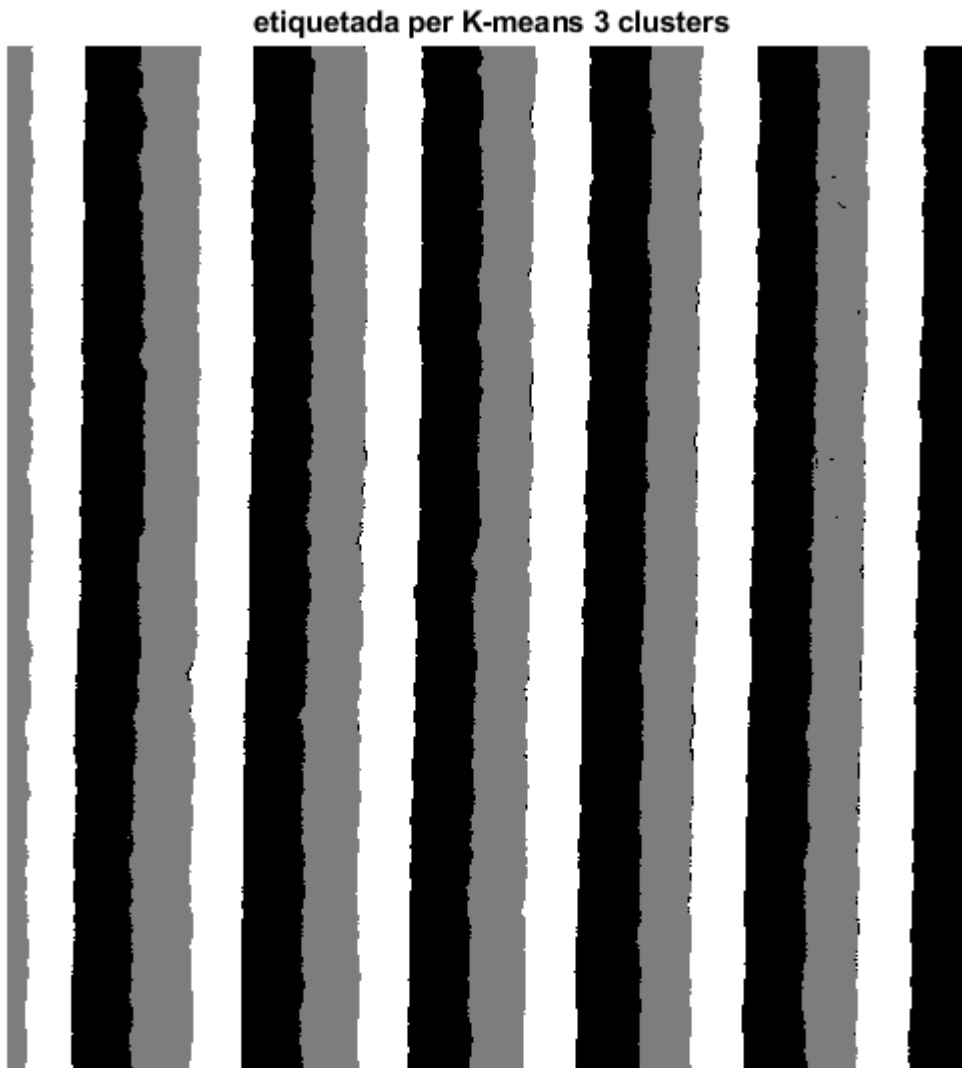


```
figure, scatter3(cl_ct(:, 1), cl_ct(:, 2), cl_ct(:, 3), 50), title('cluster centers')
```
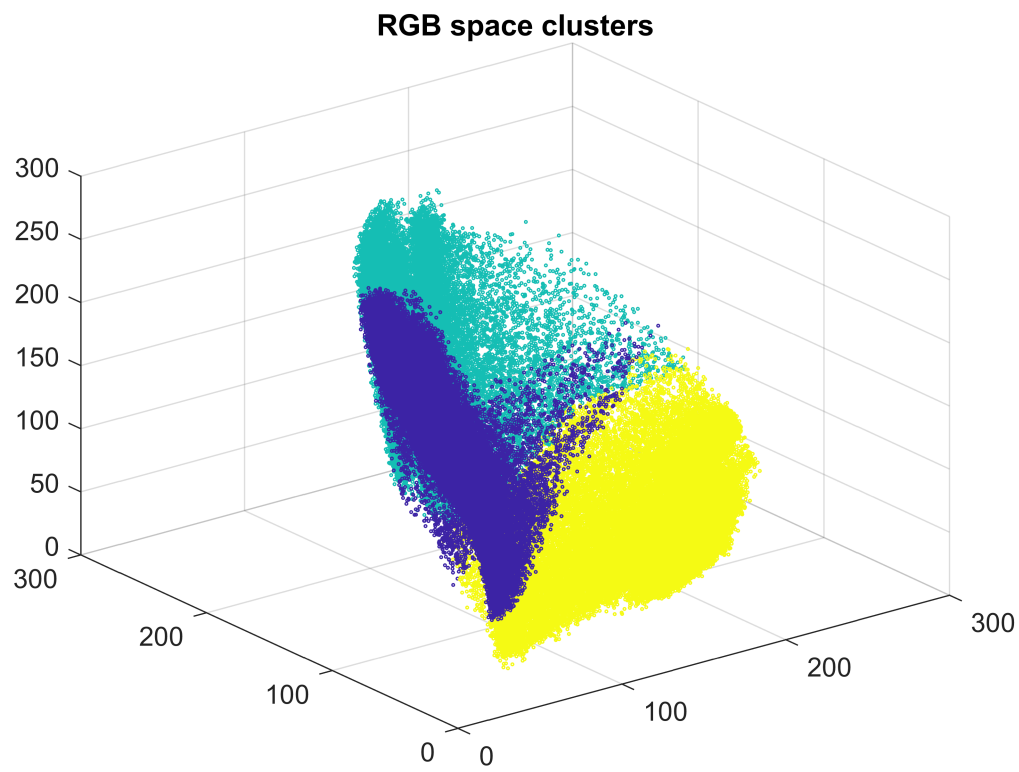
**cluster centers**

## 3 clusters

```
Nclusters = 3;
[cl_eti, cl_ct] = kmeans(vect,Nclusters,'distance', 'cityblock');
eti=reshape(cl_eti,MAXFILA, MAXCOL);
figure, imshow(eti,[]), title('etiquetada per K-means 3 clusters');
```



etiquetada per K-means 3 clusters

```
figure, scatter3(vect(:, 1), vect(:, 2), vect(:, 3), 1,cl_eti), title('RGB space clusters');
```

## RGB space clusters



```
figure, scatter3(cl_ct(:, 1), cl_ct(:, 2), cl_ct(:, 3), 50), title('cluster centers')
```

## cluster centers
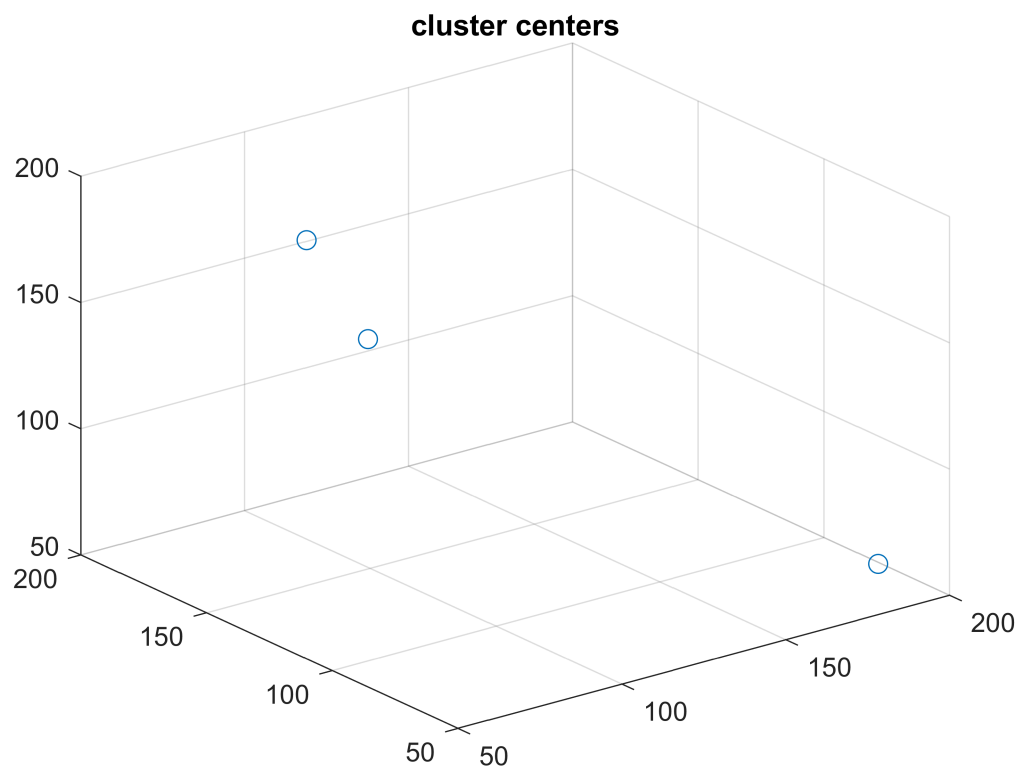
```
eti2 = ind2rgb(eti, cl_ct/255);
figure, imshow(eti2,[]), title('etiquetada per K-means 3 clusters 2');
```

**etiquetada per K-means 3 clusters 2**