
```
close all; clc

f=dir(['*.jpg']);
files={f.name};
names = convertCharsToStrings(files);
for k=1: numel(names)
    names(k) = erase(names(k), ".jpg");
end
im_ors=cell(1,numel(names));
for k=1: numel(files)
    im_ors{k}=imread(files{k});
end

% 41-46, 59
%for k=15: numel(im_or)
for k=1: numel(im_ors)
    % Imatge Original
    imor = im_ors{k};

    % Passem a Blanc i negre i obtenim edges
    imgrey = rgb2gray(imor);
    imbin = imbinarize(imgrey);
    imedges = edge(imgrey, 'prewitt');
    imedges(200,:) = 0;

    % Seleccionem les zones tancades
    ee = strel('rectangle',[5,10]);
    immat = imdilate(imedges,ee);
    immat = imfill(immat,"holes");
    ee = strel('line',20,0);
    immat = imerode(immat,ee);
    ee = strel('line',10,90);
    immat = imerode(immat,ee);

    % Subdividim les zones massa grans
    ee = strel('rectangle',[200,200]);
    imgrans = imopen(immat,ee);
    imgrans = imreconstruct(imgrans,immat);
    imgransbordes = imdilate(imgrans,strel('disk',10));
    imgransbordes = imgransbordes - imgrans;
    imedges = logical(imedges - (imedges .* imgransbordes));

    % Repetim selecció de zones tancades
    ee = strel('rectangle',[5,10]);
    immat = imdilate(imedges,ee);
    immat = imfill(immat,"holes");
    ee = strel('line',20,0);
    immat = imerode(immat,ee);
    ee = strel('line',10,90);
    immat = imerode(immat,ee);

    % Eliminem les línies verticals o horitzontals molt finetes
```

```

immat = imopen(immat,strel("rectangle",[15,1]));
immat = imopen(immat,strel("rectangle",[1,15]));

% Separem blobs propers
td = bwdist(~immat);
td = imhmax(td,4);
segm = watershed(-td);
immat = ~(~immat | (segm == 0));

% Eliminem les zones no rectangulars
ee = strel('rectangle',[15,50]);
imnorectangles = imopen(immat,ee);
imnorectangles = imreconstruct(imnorectangles,immat);

immat = logical(immat .* imnorectangles);

% Eliminem les zones sense línies verticals o horitzontals
ee = strel('rectangle',[5,1]);
imlines_v = imopen(imedges,ee);
imlines = imreconstruct(imlines_v,immat);
ee = strel('rectangle',[1,5]);
imlines_h = imopen(imedges,ee);
imlines = imreconstruct(imlines_h,imlines);

immat = logical(immat .* imlines);

% Eliminem els blobs en contacte amb els bordes
[n, m] = size(imbin);
imbordes = logical(zeros(n,m));
imbordes(1:3,:) = 1;
imbordes(n-2:n,:) = 1;
imbordes(:,1:3) = 1;
imbordes(:,m-2:m) = 1;
imtouching = imreconstruct(imbordes,immat);

immat = logical(immat - imtouching);

% Emmarcat de Caràcters
Iprops=regionprops(immat,'BoundingBox','Area','Image');
count = numel(Iprops);

figure, imshow(imor);

MATRICULES = cell(1,200);
index = 1;

for i=1:count
    boundingBox=Iprops(i).BoundingBox;
    region = imcrop(imgrey,boundingBox+[-2,-2,+4,+4]);

    ridncalv = @ridncalv;
    regbin = ~imbinarize(region,ridncalv(region));

    % Eliminem les regions amb < 4 regions connexes,

```

```

% després de filtrar estructures petites
ee = strel("rectangle",[7,1]);
regero = imerode(regbin,ee);
regrec2 = imreconstruct(regero,regbin);

ee = strel("rectangle",[1,2]);
regero = imerode(regrec2,ee);
regrec2 = imreconstruct(regero,regrec2);

regrec2 = imclose(regrec2,strel("rectangle",[2,1]));

regrec2 = padarray(regrec2,[1,1],1);
cc = bwconncomp(regrec2);

regSize = size(regrec2);

if (cc.NumObjects > 5 && regSize(2) > 115)
    %figure, imshow(regbin);
    %matricula = double(regrec2);
    matricula = double(regbin);
    figure, imshow(matricula), title(['Matricula ', num2str(k)]);
    matricula = padarray(matricula,[5 5],0,'both');
    etiq = bwlabel(matricula);
    objects = regionprops('table', etiq, 'BoundingBox');
    rectangles = table2array(objects);
    imRectangles = insertShape(matricula, 'Rectangle',
    table2array(objects), 'LineWidth', 1);
    figure, imshow(imRectangles), title(['Matricula delimitda ',
    num2str(k)]);
    nRectangles = size(rectangles);
    for i = 2:nRectangles(1)
        xmin = ceil(rectangles(i,1));
        ymin = ceil(rectangles(i,2));
        xmax = rectangles(i,3) + xmin;
        ymax = rectangles(i,4) + ymin;
        area = (xmax-xmin) * (ymax - ymin);

        if (area > 80)
            Image=etiq((ymin-2):(ymax+2),(xmin-2):(xmax+2));
            figure,imshow(Image), title(['Regio ', num2str(i)]);
        end
    end
end
end

```



Matricula 1

ZMZ-9157

Matricula delimitda 1

ZMZ-9157

Regio 2

[REDACTED]

Regio 4



Regio 5



Regio 7



Regio 8



Regio 9



Regio 12



Regio 13



Regio 15

5

Regio 16

7



Matricula 2

Y-KM-2435

Matricula delimitda 2



Regio 3

Y

Regio 5

K

Regio 6

M

Regio 9

Regio 10

Z

Regio 11

4

Regio 12

3

Regio 13

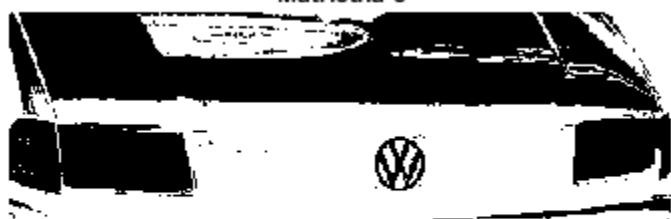
5







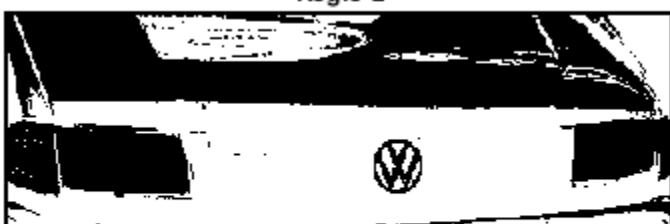
Matricula 5



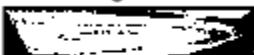
Matricula delimitada 5



Regio 2



Regio 19



Regio 21



Regio 22



Regio 26



Regio 27



Regio 29



Regio 34



Regio 35



Regio 37



Regio 41



Regio 49



Regio 55



Matricula 6

YHE-2993

Matricula delimitda 6

YHE-2993

Regio 3

Y

Regio 4

H

Regio 5

E

Regio 9

2

Regio 10

9

Regio 11

9

Regio 12

3



Matricula 7

ZZH 8585

Matricula delimitada 7

ZZH 8585

Regio 2

ZZH⁹8585

Regio 5



Regio 6

Z

Regio 7

Z

Regio 8

H

Regio 9

A

Regio 11

8

Regio 12

5

Regio 13

8

Regio 14

5



Matricula 8

YZP-4923

Matricula delimitada 8

YZP-4923

Regio 4

Regio 6

Y

Regio 7

YZP-4923

Regio 8

Z

Regio 9

P

Regio 19

4

Regio 20

9

Regio 22

2

Regio 25

3





Matricula 10



Matricula delimitada 10



Regio 2



Regio 5



Regio 6



Regio 7



Regio 8



Regio 9



Regio 12



Regio 14

5

Regio 16

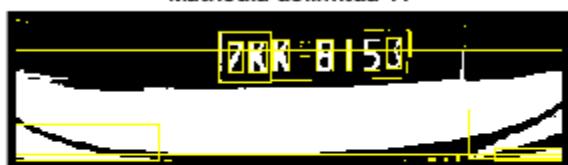
6



Matricula 11



Matricula delimitada 11



Regio 2



Regio 3



Regio 8



Regio 9



Regio 10



Regio 12



Regio 18



Regio 22



Regio 24



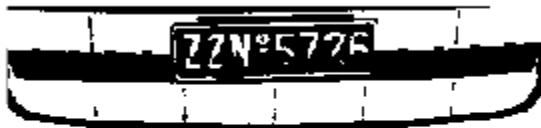
Regio 37



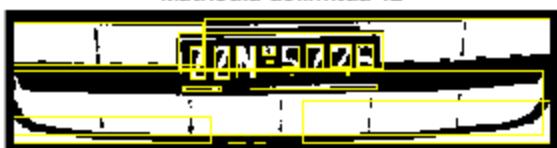
Regio 38



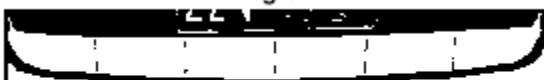
Matricula 12



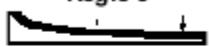
Matricula delimitada 12



Regio 2



Regio 3



Regio 4



Regio 7



Regio 8



Regio 9



Regio 11



Regio 14



Regio 18



Regio 20



Regio 21



Regio 23



Regio 27

F



Matricula 13

GR IEA-6907

Matricula delimitada 13

GR IEA-6907

Regio 5



Regio 6



Regio 7



Regio 14



Regio 15



Regio 16



Regio 17



Regio 18

7



Matricula 14

GR IEA-5511

Matricula delimitda 14



Regio 3



Regio 4



Regio 5



Regio 14



Regio 15



Regio 16

1

Regio 17

1



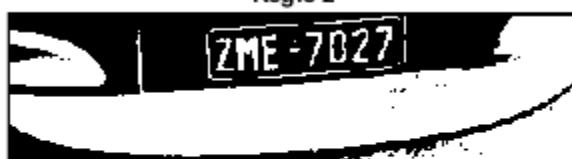
Matricula 15



Matricula delimitada 15



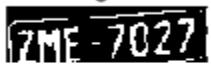
Regio 2



Regio 4



Regio 5



Regio 6

Z

Regio 8

M

Regio 9

~~██████████~~

Regio 10

E

Regio 13

7

Regio 15

O

Regio 18

Z

Regio 19



Regio 20

7



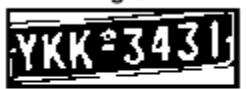
Matricula 16

YKK 3431

Matricula delimitada 16



Regio 2



Regio 5



Regio 6



Regio 7



Regio 10



Regio 11

4

Regio 12

3

Regio 13

1



Matricula 17



Matricula delimitada 17



Regio 3

Regio 5



Regio 7



Regio 11



Regio 15



Regio 21

2

Regio 22

0

Regio 24

1



Matricula 18



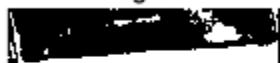
Matricula delimitada 18



Regio 3



Regio 5



Regio 6



Regio 28



Regio 29



Regio 33



Regio 38



Matricula 18

YAZ 2074

Matricula delimitada 18

YAZ 2074

Regio 2

Y

Regio 7

YAZ

Regio 8

A

Regio 10

Z

Regio 15

2

Regio 16

0

Regio 17

7

Regio 19

3



Matricula 19

YPE-2367

Matricula delimitada 19

YPE-2367

Regio 2

YP

Regio 4



Regio 5

Y

Regio 6

E

Regio 9

Z

Regio 10

3

Regio 11

6

Regio 12

7





Matricula 21

ZZA 9341

Matricula delimitada 21

ZZA 9341

Regio 2

ZZA²9341

Regio 3

Z

Regio 4

Z

Regio 5

A

Regio 8

9

Regio 9

3

Regio 10

4

Regio 11



Matricula 22

BIZ-1100

Matricula delimitada 22

BIZ-1100

Regio 2



Regio 4



Regio 5



Regio 6



Regio 7



Regio 10



Regio 11



Regio 12

0





Matricula 24

GR **YPP-7390**

Matricula delimitada 24

GR **YPP-7390**

Regio 2



Regio 4



Regio 5



Regio 6



Regio 8



Regio 9



Regio 10

9

Regio 11

0



Matricula 25



Matricula delimitda 25



Regio 2



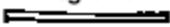
Regio 3



Regio 12



Regio 15



Regio 16



Regio 19



Regio 20



Regio 24



Regio 27



Regio 29



Regio 34



Regio 35



Regio 41



Regio 44



Regio 51



Regio 52





Matricula 26

• IZI-2154

Matricula delimitada 26

• IZI-2154

Regio 3

Regio 6



Regio 7



Regio 8



Regio 9



Regio 12



Regio 13



Regio 14



Regio 15

5

Regio 16

4



Matricula 27

ZHM 1169

Matricula delimitda 27



Regio 7



Regio 11



Regio 14



Regio 26



Regio 29





Matricula 28

IEO-8056

Matricula delimitada 28

□ I E O - 8 0 5 6 □

Regio 3



Regio 4



Regio 5



Regio 7



Regio 10



Regio 13

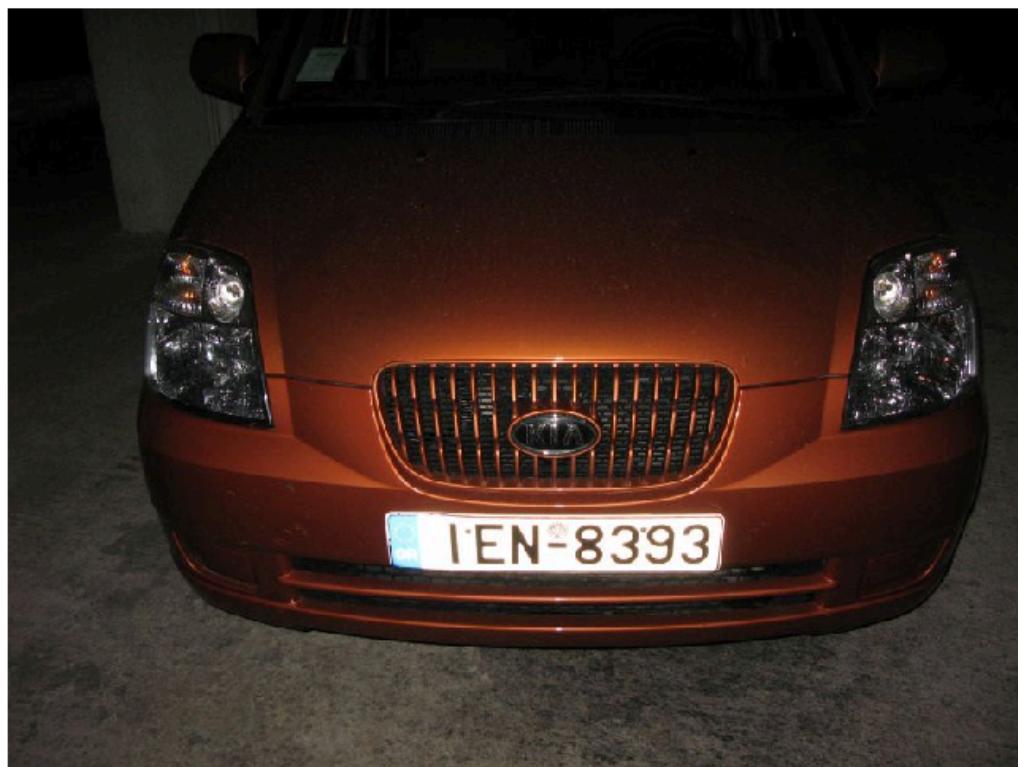


Regio 14

05

Regio 16

6



Matricula 29

IEN-8393

Matricula delimitada 29



Regio 2



Regio 6



Regio 7



Regio 10



Regio 14



Regio 18

8

Regio 20



Regio 21

3

Regio 23

9

Regio 25

3



Matricula 30

ZYM-7983

Matricula delimitada 30

ZYM-7983

Regio 4

Regio 6

Z

Regio 7

Y

Regio 8

H

Regio 12

Z

Regio 15

9

Regio 18

B

Regio 22

3



Matricula 31

ZYY-6708

Matricula delimitada 31

ZYY-6708

Regio 3

Z

Regio 4

Y

Regio 5

Y

Regio 12

6

Regio 14

7

Regio 16

0

Regio 19

8



Matricula 32

ZZA-9341

Matricula delimitada 32

ZZA-9341

Regio 2



Regio 3

Z

Regio 4

Z

Regio 5

A

Regio 8

9

Regio 9

3

Regio 10

4

Regio 11



Matricula 33

YKK-3876

Matricula delimitada 33

YKK-3876

Regio 2

[YKK-3876]

Regio 3

[]

Regio 4

[Y]

Regio 6

[K-3876]

Regio 7

[K]

Regio 12

[3]

Regio 14

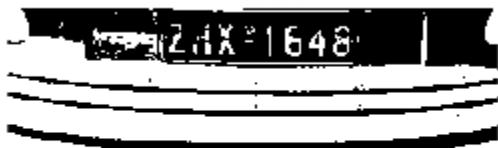
[8]

Regio 18

6



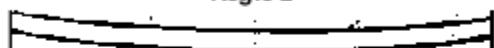
Matricula 34



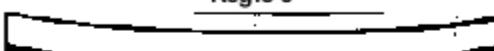
Matricula delimitda 34



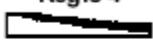
Regio 2



Regio 3



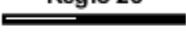
Regio 4



Regio 22



Regio 23



Regio 32



Regio 33



Regio 41



Regio 42



Regio 43



Regio 49



Regio 51





Matricula 35

ZYX-5517

Matricula delimitada 35

ZYX-5517

Regio 5

Z

Regio 6

Y

Regio 9

X

Regio 11

5

Regio 12

5

Regio 13

1

Regio 14

7







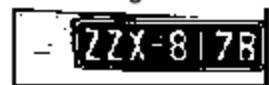
Matricula 38

ZZX-8178

Matricula delimitada 38

ZZX-8178

Regio 2



Regio 7



Regio 10



Regio 15



Regio 16

Regio 21



Regio 24



Regio 25

8



Matricula 39

ZMZ-2317

Matricula delimitada 39

ZMZ-2317

Regio 2



Regio 5



Regio 6



Regio 8



Regio 9



Regio 16



Regio 19



Regio 22

1

Regio 23

7



Matricula 40

ZZY-4006

Matricula delimitada 40



Regio 3



Regio 4



Regio 5



Regio 7



Regio 8



Regio 11



Regio 12

DCE

Regio 13

0

Regio 14

C

Regio 15

S



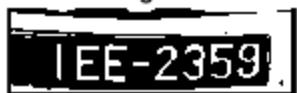
Matricula 41



Matricula delimitada 41



Regio 2



Regio 8



Regio 9



Regio 10



Regio 12



Regio 14



Regio 16



Regio 17

5

Regio 18

9





Matricula 43



Matricula delimitada 43



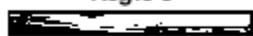
Regio 4



Regio 7



Regio 8



Regio 12



Regio 15



Regio 17



Regio 18



Regio 21

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Regio 24

9



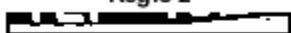
Matricula 44

IEP-1025

Matricula delimitda 44

IEP-1025

Regio 2



Regio 5

I

Regio 6

E

Regio 7

P

Regio 9

Q

Regio 11

1

Regio 12

0

Regio 13

2

Regio 16

5





Matricula 46

YKX-1115

Matricula delimitda 46

YKX-1115

Regio 4

Regio 5



Regio 6



Regio 7



Regio 10



Regio 12



Regio 13



Regio 14





Matricula 47

ZKT 1403

Matricula delimitada 47

ZKT 1403

Regio 2

Regio 3

Z

Regio 4

K

Regio 5

T

Regio 7

Q

Regio 11

I

Regio 13

4

Regio 14

O

Regio 16

3



Matricula 48



Matricula delimitda 48



Regio 24



Regio 25



Regio 26



Regio 28



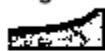
Regio 29



Regio 30



Regio 41



Matricula 48



Matricula delimitda 48



Regio 2



Regio 8



Regio 9

Z

Regio 13

A

Regio 21

6

Regio 23

4

Regio 24

I

Regio 25

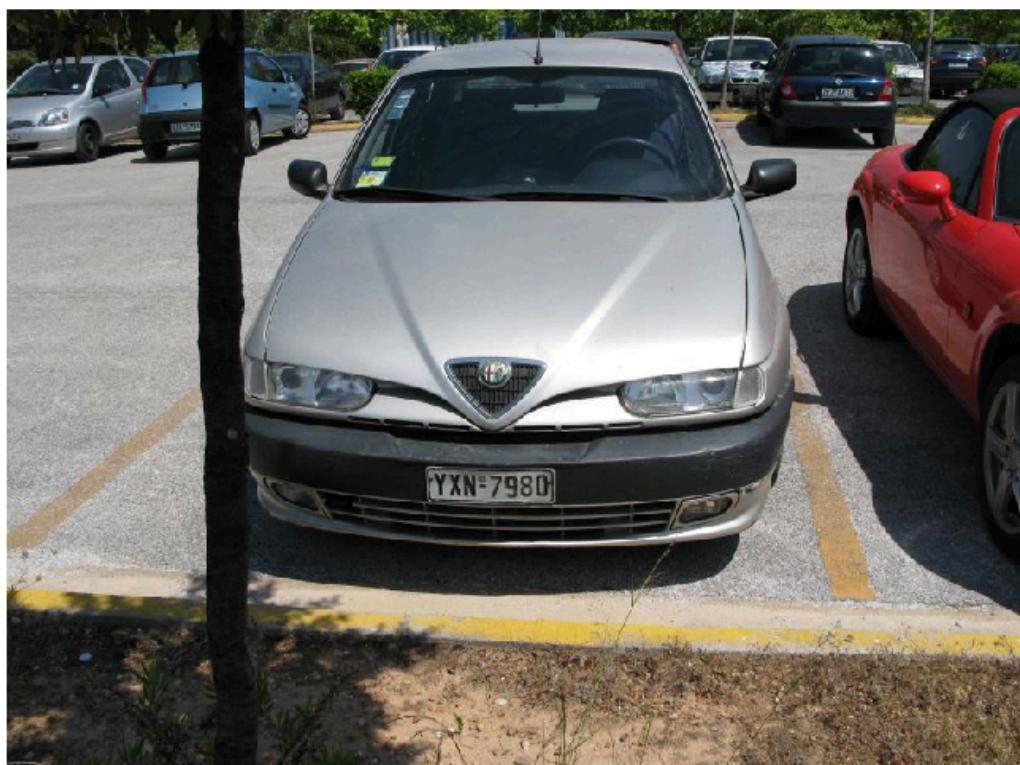
0

Regio 29

6

Regio 31

6



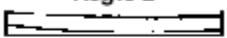
Matricula 49

[YXN-7980]

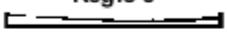
Matricula delimitada 49



Regio 2



Regio 3



Regio 4



Regio 5



Regio 6



Regio 11



Regio 12

9

Regio 13

8

Regio 15

C



Matricula 50



Matricula delimitda 50



Regio 2



Regio 5



Regio 6



Regio 7



Regio 8



Regio 9



Regio 11



Regio 12



Regio 13



Regio 14





Matricula 51

YHK-9499

Matricula delimitada 51

YHK-9499

Regio 5



Regio 6



Regio 8



Regio 10



Regio 11



Regio 12



Regio 14



Regio 15



Regio 17

9



Matricula 52

ZKE-5495

Matricula delimitada 52

ZKE-5495

Regio 2

Z

Regio 3

K

Regio 4



Regio 5

E

Regio 6

Q

Regio 8

5

Regio 9

4

Regio 10

9

Regio 11

5



Matricula 53

ZYB-9024

Matricula delimitada 53



Regio 2



Regio 3



Regio 5



Regio 6



Regio 9



Regio 10





Matricula 54

YOO-5657

Matricula delimitada 54

YOO-5657

Regio 5



Regio 131



Regio 132



Regio 144



Regio 150



Regio 178



Regio 204



Regio 206



Regio 252



Regio 257



Regio 258



Regio 263



Regio 292



Regio 295



Regio 308



Regio 315



Regio 348



Regio 386



Regio 442



Regio 567



Regio 584



Regio 598



Matricula 55

ZZH-3597

Matricula delimitda 55



Regio 2



Regio 4



Regio 7



Regio 8



Regio 9



Regio 10



Regio 12

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Regio 13

5

Regio 14

9

Regio 15

7





Matricula 5

ZKB-1454

Matricula delimitada 57

ZKB-1454

Regio 3



Regio 5

Z

Regio 6

KB 1454

Regio 7

K

Regio 9

Regio 10

B

Regio 11

□

Regio 13

I

Regio 14

4



Matricula 58



Matricula delimitda 58



Regio 12



Regio 15



Regio 20



Regio 33



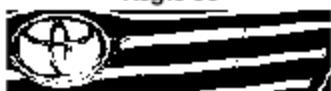
Regio 38



Regio 45



Regio 55



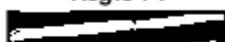
Regio 58



Regio 64



Regio 71



Regio 72



Regio 75



Regio 76



Matricula 58



Matricula delimitada 58



Regio 3

Regio 4

Regio 6



Regio 7



Regio 11

B

Regio 12

Regio 13

C

Regio 15

2

Regio 17

0

Regio 18

1



Matricula 59



Matricula delimitada 59



Regio 2



Regio 10



Regio 23



Regio 24

Regio 25

B

Regio 26

Y

Regio 30

V

Regio 41

Z

Regio 46

Z

Regio 49

5

Regio 52

4

Regio 87



Matricula 60

IET-2457

Matricula delimitada 60



Regio 4



Regio 7



Regio 8



Regio 9



Regio 10



Regio 12

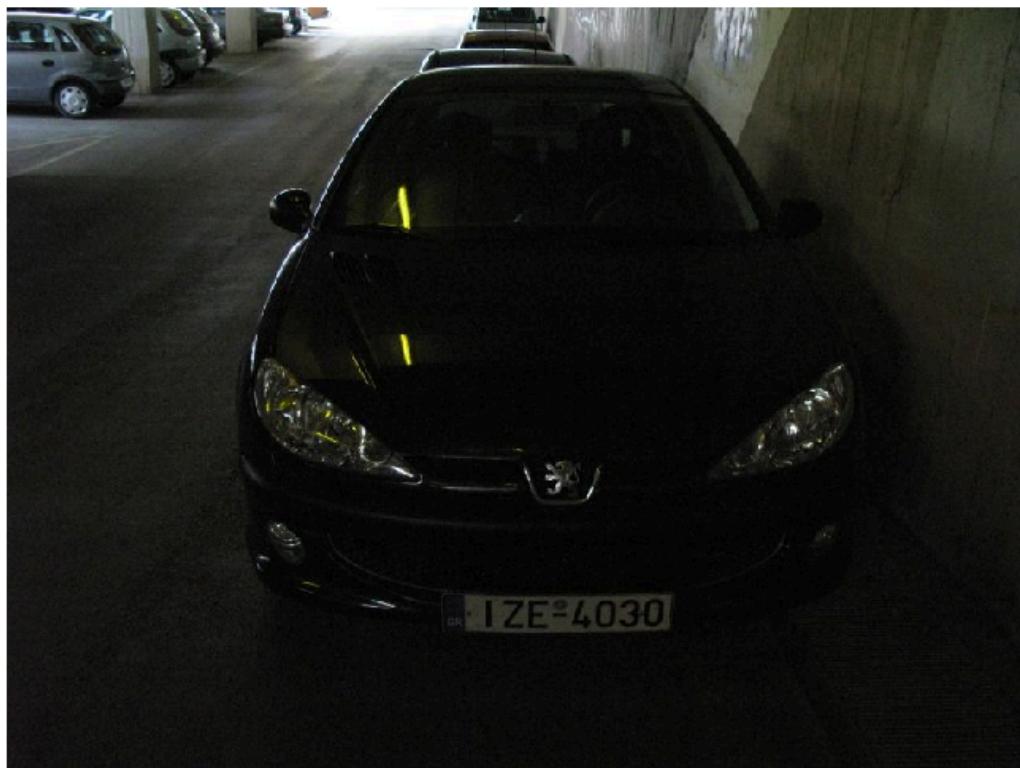


Regio 13

5

Regio 14

7



Matricula 61

I ZE²-4030

Matricula delimitda 61

I ZE²-4030

Regio 2



Regio 3



Regio 4



Regio 5



Regio 8



Regio 9

0

Regio 10

30



Matricula 62

- IZE-4030 -

Matricula delimitada 62

12E-4030

Regio 6

Z

Regio 7

E

Regio 13

4

Regio 15

2030

Regio 16

0

Regio 17

30



Matricula 63

NZB 2491

Matricula delimitada 63

NZB 2491

Regio 3

Regio 4

7

Regio 5

8

Regio 8

2

Regio 9

4

Regio 10

9

Regio 11

1



Matricula 64

ZZA 7958

Matricula delimitada 64

ZZA 7958

Regio 2

7

Regio 3



Regio 4



Regio 5



Regio 8



Regio 11



Regio 13



Regio 14



Regio 15

8



Matricula 65

IBM-9201

Matricula delimitada 65

IBM-9201

Regio 5

1

Regio 8

B

Regio 12

M

Regio 17



Regio 20

9

Regio 21

2

Regio 23

0

Regio 27

1



Matricula 66



Matricula delimitada 66



Regio 2



Regio 6



Regio 8



Regio 14



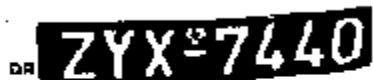
Regio 20



Regio 22



Matricula 66



Matricula delimitada 66



Regio 4



Regio 5



Regio 7



Regio 12

7

Regio 13

4

Regio 14

4

Regio 15

0



Matricula 67



Matricula delimitada 67



Regio 2



Regio 3



Regio 6



Regio 7



Regio 8



Regio 9



Regio 10



Regio 11



Regio 12



Regio 13



Regio 14



Regio 18



Regio 19



Regio 23



Regio 24



Regio 25



Regio 26



Regio 28



Regio 29



Regio 30



Regio 31



Regio 32



Regio 34



Regio 37



Regio 54



Regio 59



Regio 60



Regio 62



Regio 65



Regio 66



Regio 68



Regio 71



Regio 72



Regio 75



Regio 76



Regio 77



Regio 78



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Regio 82



Regio 83



Regio 84



Regio 86



Regio 87



Regio 88



Regio 89



Regio 91



Regio 92



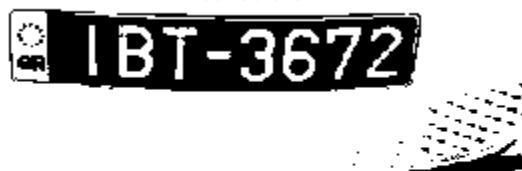
Regio 94



Regio 95



Matricula 67



Matricula delimitada 67



Regio 4



Regio 5



Regio 6



Regio 8

Regio 9

3

Regio 10

6

Regio 11

7

Regio 12

2

Regio 13

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