12082 Computer Vision

- **Classes** will be taught in **English**
- **Slides** are available in **Spanish** and **English**

  `http://webdiis.unizar.es/~neira/`

- **Lab** instructions will be in **Spanish**
- Students can **ask questions** in **Spanish** or **English**
- Students can **answer questions** in **Spanish** or **English**

12082 Computer Vision

Teachers:

José Neira Parra

Juan Domingo Tardós Solano

- **Theory: 2.5**
- **Problems: 0.5**

30 teaching hours
A.3

- **Lab work: 3.0**

3 hour sessions
in
Labs L0.01 y L1.02

Schedule

Computer Vision
Academic year 2006-2007

	Mon	Tue	Wed	Thru	Fri
8-9		Pr 1			
9-10		Pr 1			
10-11		Pr 1			
11-12				Tutorías	
12-13				Tutorías	Clase
13-14				Tutorías	Clase
14-15					
15-16		Tutorías			
16-17		Tutorías			
17-18		Tutorías		Pr 2	
18-19				Pr 2	
19-20				Pr 2	
20-21					

Preliminaries

- Course program:
  - Introduction
  - Lesson 1: Thresholding
  - Lesson 2: Connectivity Analysis
  - Lesson 3: Descriptors
  - Lesson 4: 2D recognition
  - Lesson 5: Morphology

  - Lesson 6: Contours
  - Lesson 7: Regions
  - Lesson 8: Colour

Preliminaries

- Requirements:
  - Discrete mathematics
  - Set theory
  - Algebra
  - Probability and statistics
  - Data structures and algorithms

Labs

P1: Threshoding (3 hrs).

P2: Connectivity (3 hrs).

P3: Descriptors (3 hrs).

P4: Recognition (3 hrs).

P5: Morphology (3 hrs).

P6: Segment detection (3 hrs).

P7: Hough transform (3 hrs).

P8: Colour (3 hrs).

Labs 1-5

- Computer vision,
  Part I: Binary Vision

- Goals:
  - Illustrate the theoretical foundations and usefulness of binary vision
  - Point out limitations of binary vision for the analysis of complex scenes

$\Rightarrow$Gray level vision

1. Thresholding

Umbralización

Gray level image

- Pixels 0..255

Binary image

- Pixels 0 y 1

2. Connectivity analysis

Conectividad

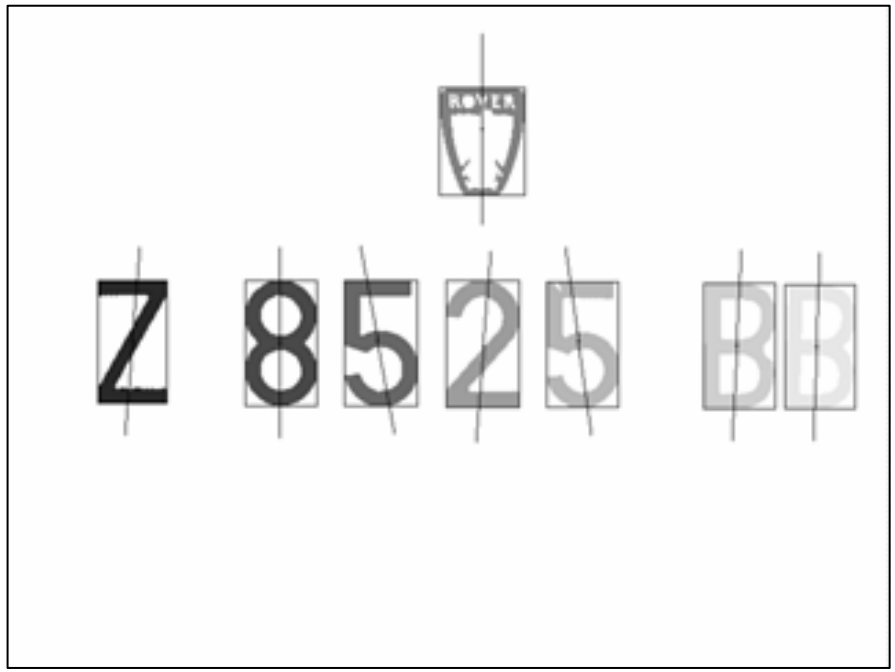
Binary image

Tagged image

- Partition of 1-pixels
- Elimination of uninteresting regions

3. Descriptors

Descriptores

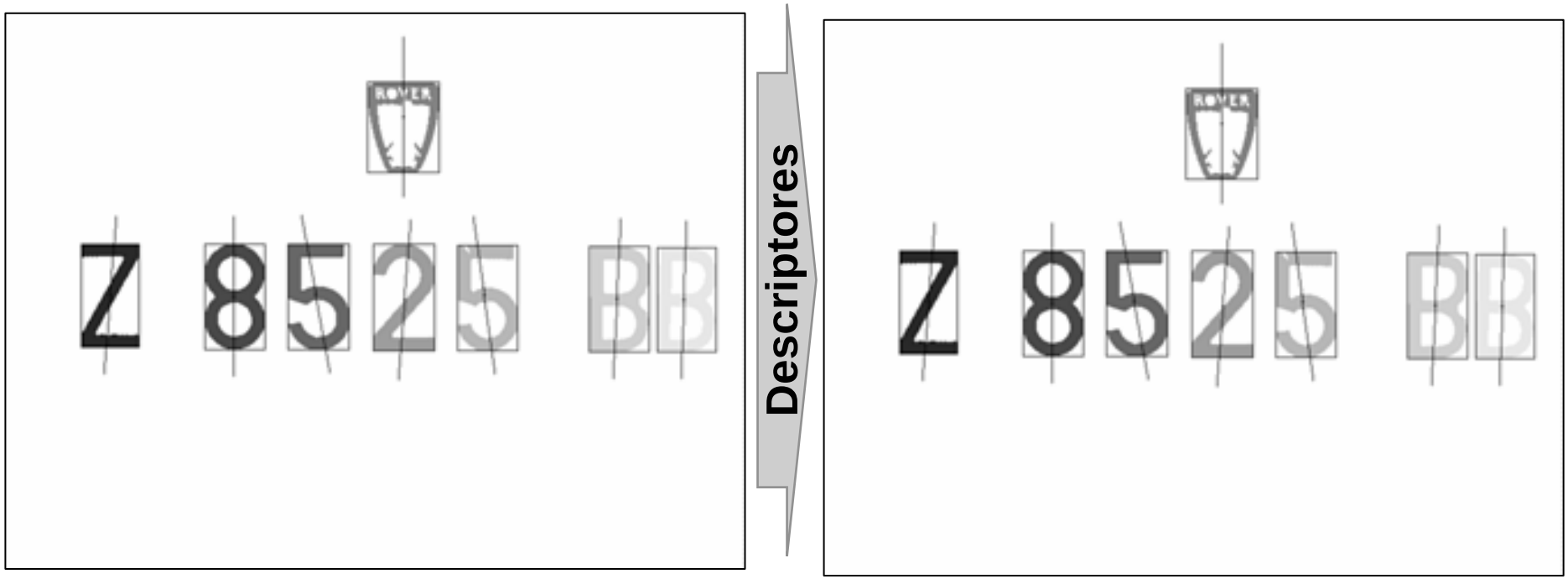


Tagged image

Annotated image

- Bounding box
- Centroid
- Orientation
- Image moments

4. Descriptor-based recognition



Annotated image

Z8525BB
(or unknown)

5. Morphological operators

Morfología

Binary image

Smoothed image

5. Morphological operators

Morfología

Smoothed image

Borders

- Perimeter
- Minimum and maximum radii

Preliminares: bibliografía

R.Jain, R.Kasturi, and B.G. Schunck.
Machine Vision.
McGraw-Hill, New York, NY, 1995.

J. González.
Visión por Computador.
Editorial Paraninfo. Madrid, 2000.

R.C. Gonzalez and R.E. Woods.
Digital Image Processing.
Addison Wesley, Reading, MA, 1993.

R.M. Haralick and L.G. Saphiro.
Computer and Robot Vision.
Addison Wesley, Reading, MA, 1992.

O.Faugeras.
Three Dimensional Computer Vision: a Geometric Viewpoint.
MIT Press, Cambridge, MA, 1993.

General vision

Castellano

Part of CV

Vision and robotics

Advanced vision

Labs

- Attendance to labs is **highly recommended**.
- Lab work is submitted and presented in the school's machine (**merlin**).

Do you have an account in **merlin**?

- If you don´t **prepare the labs prior** to the lab session, you will not have time enough to finish.
- The deadline for submitting is **the day and time** of the lab session.

Evaluation

- The final grade will be the **mean** of the grades of each lab.
- To pass the course, you need **at least** a mean of **5.0** in the labs.
- The labs submitted late will be **penalized** with one point per week or fraction.
- If a lab works correctly and you explain it clearly, the **minimum grade** will be **5.0**.