Universidad Popular del Cesar

Tratamiento de Señales

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MSER

[Capítulo 8]

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MSER: Maximally Stable Extremal Regions

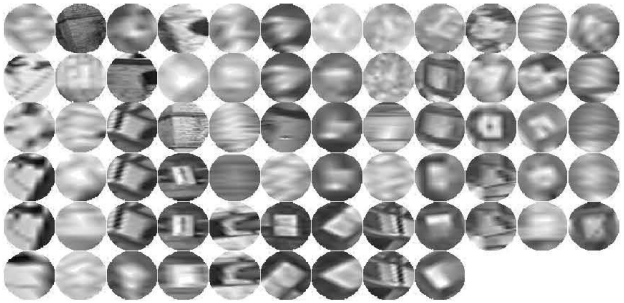
Reference: J. Matas, O. Chum, M. Urban, and T. Pajdla, "Robust wide baseline stereo from maximally stable extremal regions," in Proc. BMVC, 2002.

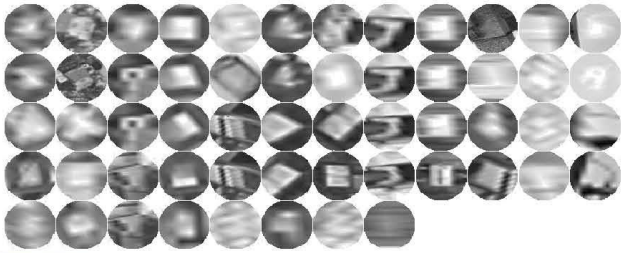
MSER Operator: Maximally Stable Extremal Regions

- MSER regions are connected areas characterized by almost uniform intensity, surrounded by contrasting background.
- They are constructed through a process of trying multiple thresholds.
- The selected regions are those that maintain unchanged shapes over a large set of thresholds.

Matas et al. 2001

Examples of MSER Regions





IMA

ISPG

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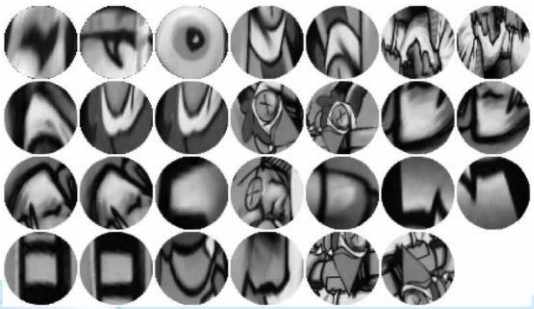
Another Example



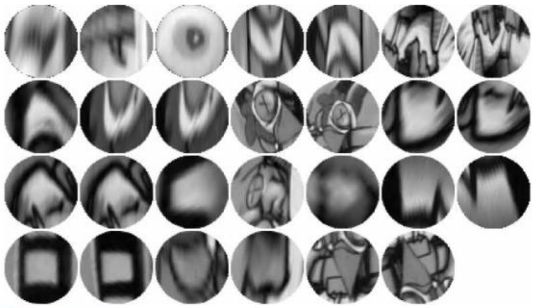
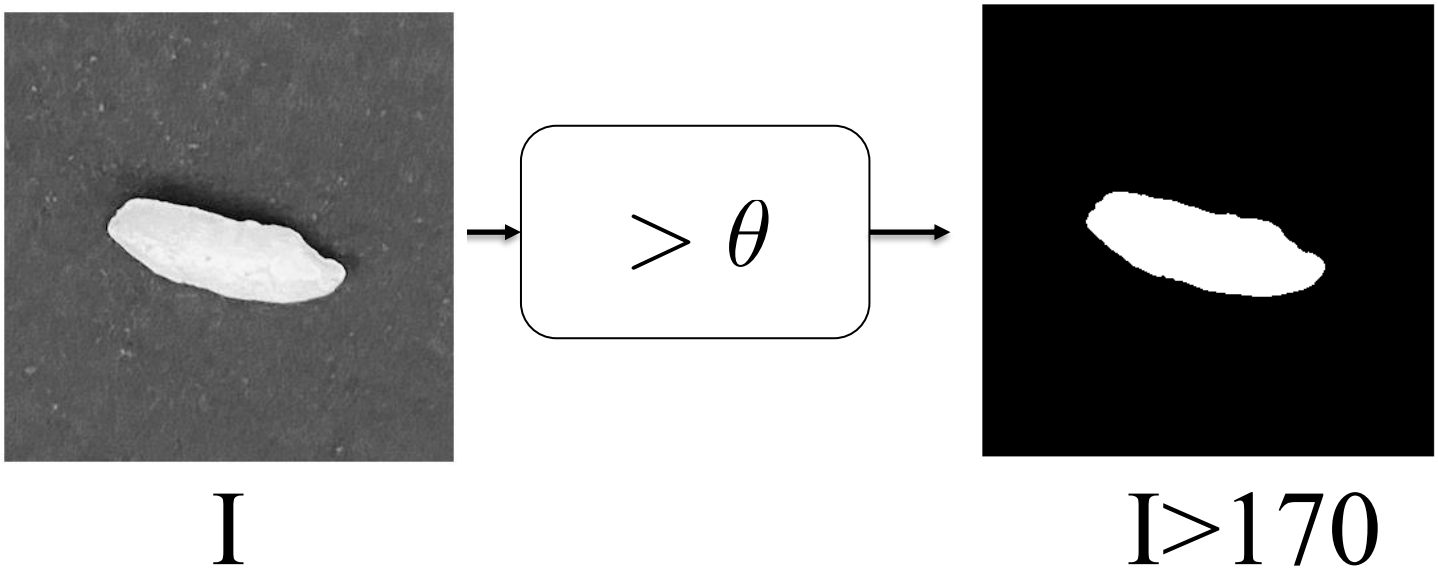


IMAGE AND SOUND
ISPG
PROCESSING GROUP

Idea general de MSER



Idea general de MSER

MSER Computation (3)

- For each threshold, compute the connected binary regions.
- Compute a function, such as area A(i), at each threshold value i.
- Analyze this function for each potential region to determine those that persist with similar function value over multiple thresholds.

Analysis of Area Function

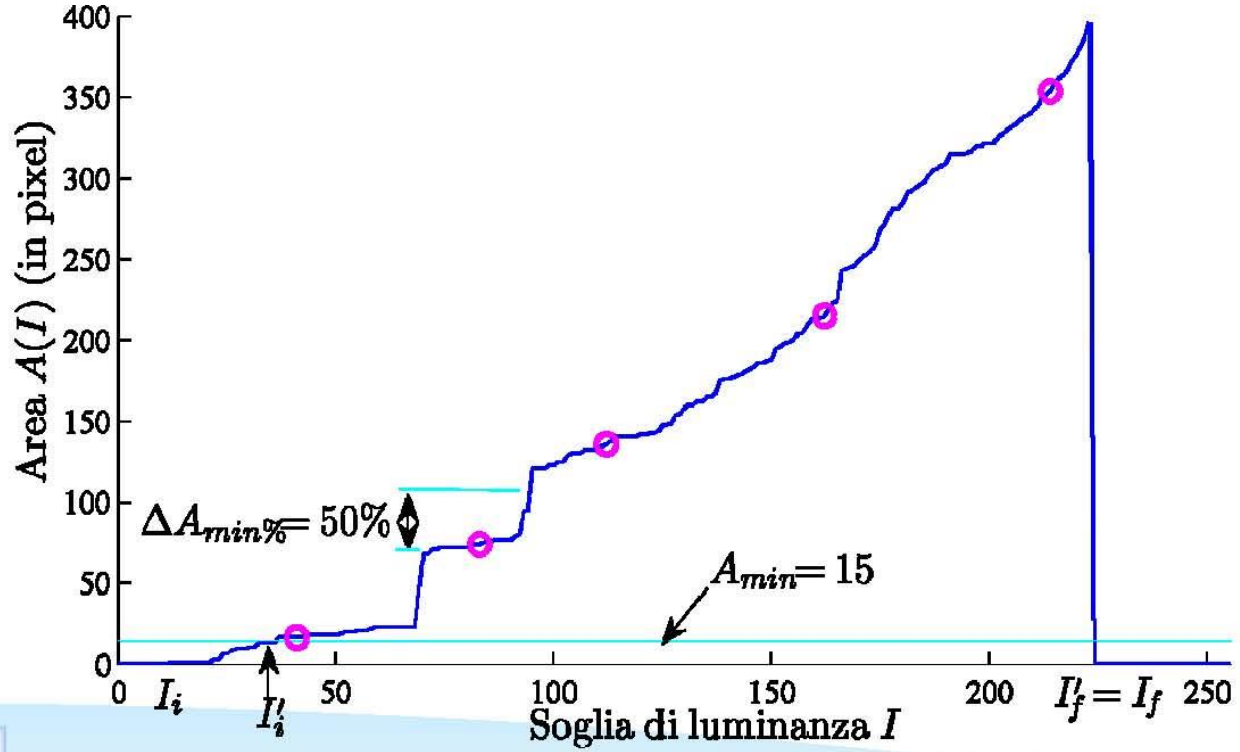


IMAGE AND SOUND
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PROCESSING GROUP

Regions detected at different thresholds have different areas

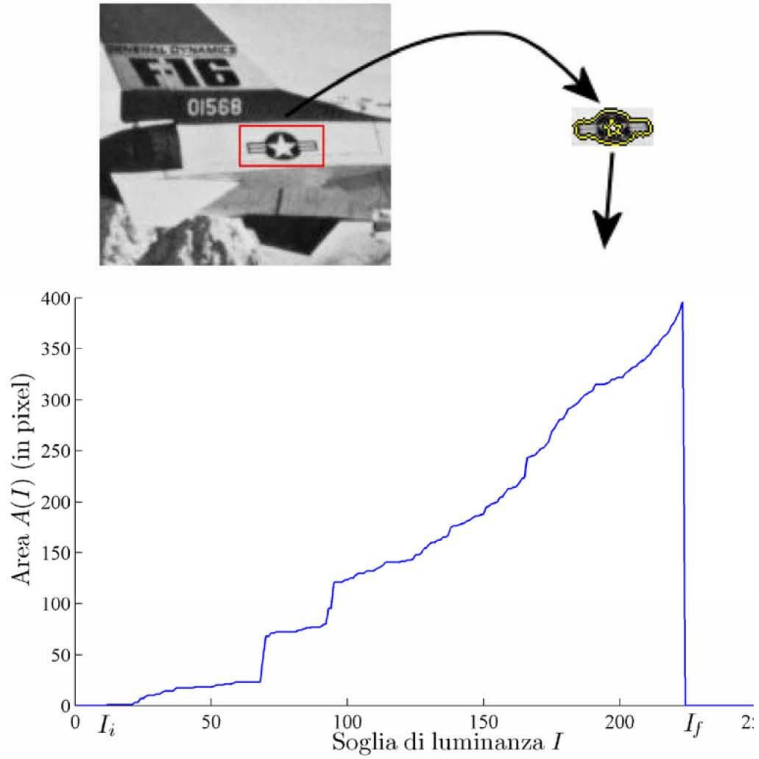


IMAGE AND SOUND PROCESSING GROUP

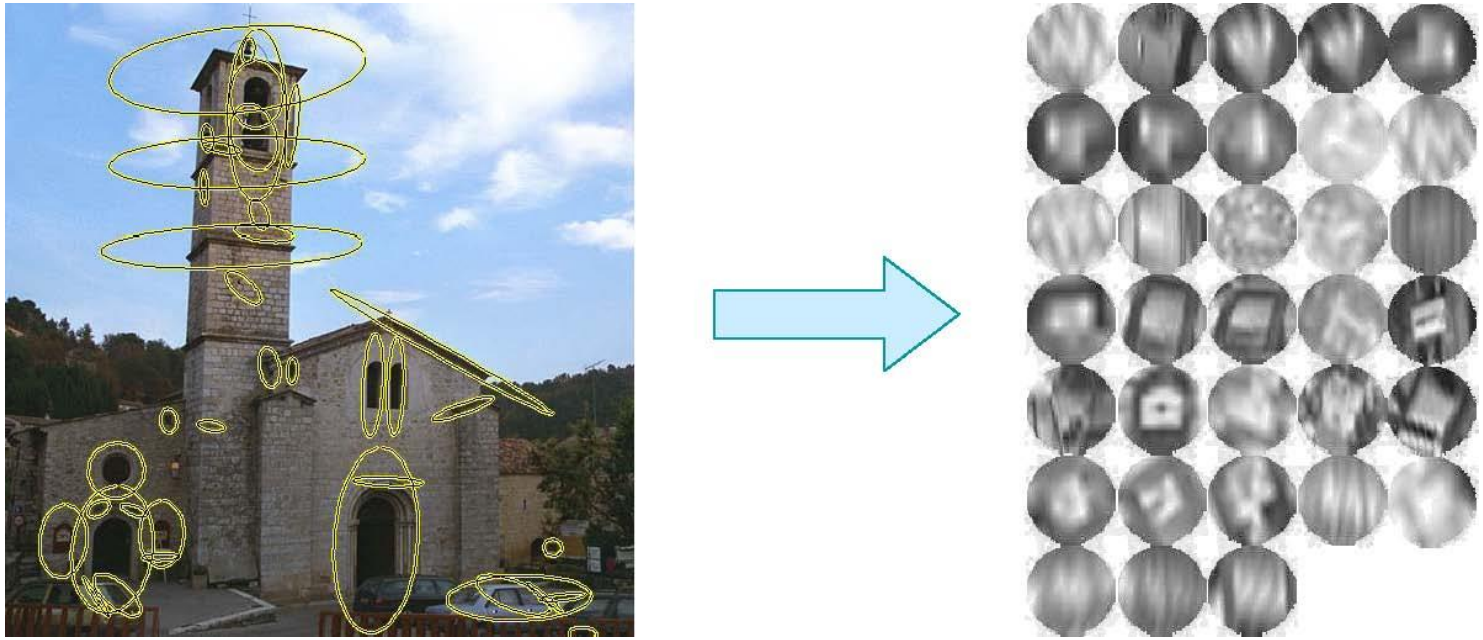
Normalization

MSER regions

Ellipse Fitting

Ellipse Dilation

Affine transformation from ellipses to circular regions plus intensity normalization



Idea general de MSER

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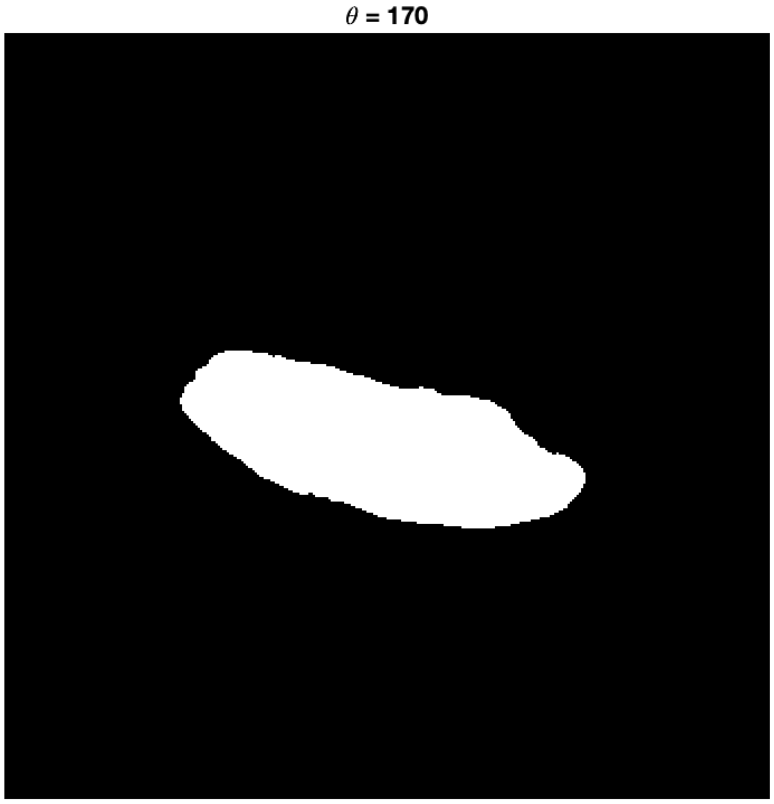
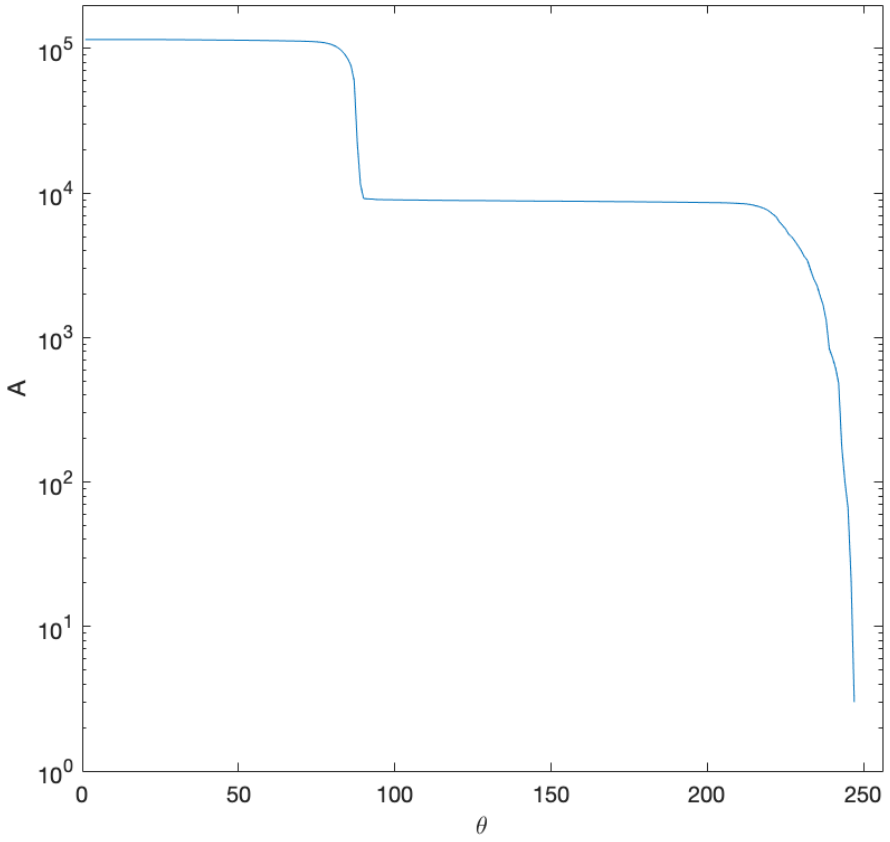
El área de una región es función de θ

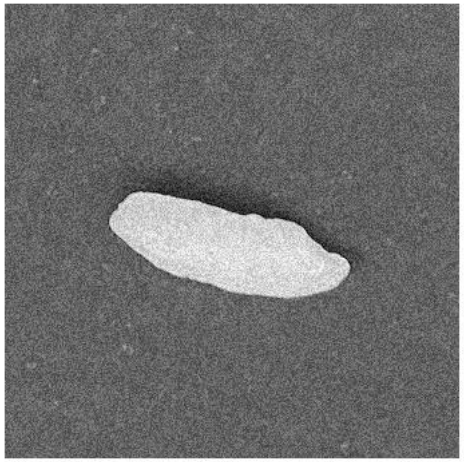
$$\frac{\Delta A}{\Delta \theta}$$

Si tenemos una región “estable”, entonces su área no varía mucho al cambiar su umbral

Idea general de MSER







I

Si tenemos una región “estable”, entonces su área no varía mucho al cambiar su umbral

$$\frac{\Delta A}{\Delta \theta}$$ es pequeño

I >160

I >170

I >180

Idea general de MSER

$$\frac{\Delta A}{\Delta \theta} \downarrow$$

MSER segmenta aquellas regiones "estables", cuyas áreas no varían mucho al cambiar su umbral.

Cada región tiene su propio umbral.

Ejemplo