

University of Trento

Engineering Faculty

Telecommunication Engineering Master Degree



FINAL THESIS

GA-BASED ROBUSTNESS EVALUATION METHOD FOR DIGITAL IMAGE WATERMARKING

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Application field

Multimedia content security



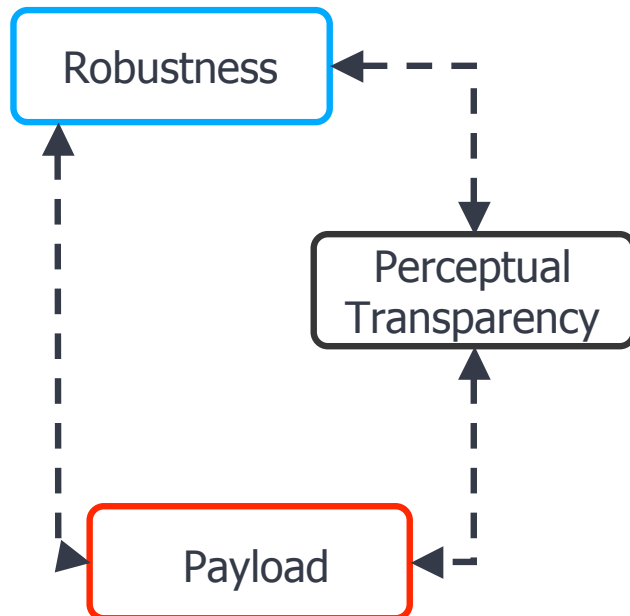
- Copyright protection
- Authenticity of the document
- Copy protection
- Traitor tracing

Proposed approach: **DIGITAL WATERMARKING**

(the art of hiding a message (*watermark*) within a host (*cover*) signal)

Purpose of the thesis

Benchmarking tool to automatically evaluate robustness of Digital Watermarking techniques

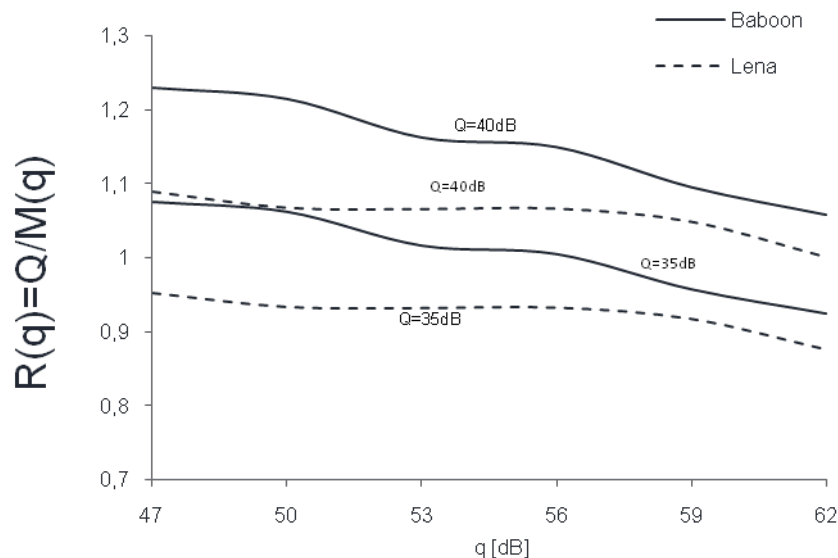


AIM : given a set of attacks, remove the watermark while granting the perceptual quality of the image as high as possible, here measured in terms of *Weighted Peak Signal to Noise Ratio*

→ Stochastic search of the most suitable parameterization of attacks through the use of Genetic Algorithms.

Innovation & Results

- Combination of attacks
- Dynamic parameterization of attacks
- Definition of a new metric to evaluate robustness in term of perceptual quality
- Use of optimization algorithms (Genetic Algorithm) in a watermarking benchmark

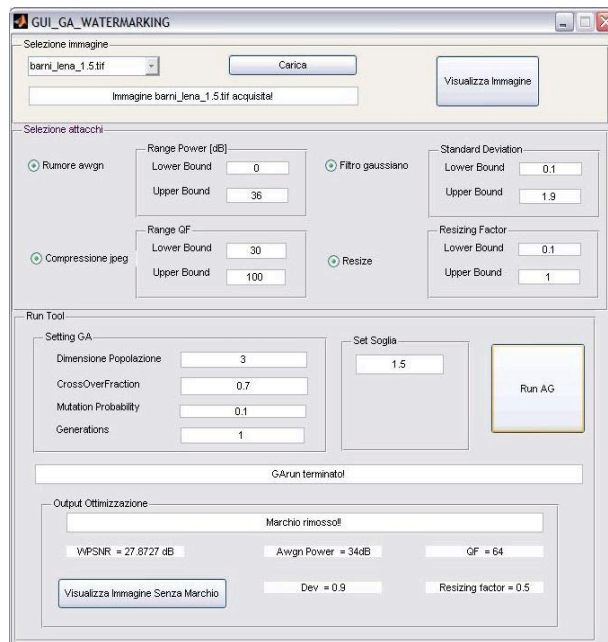


Lena image watermarked with $q = 47\text{dB}$ (left) and unmarked with $M(q) = 37.37\text{ dB}$ (right).

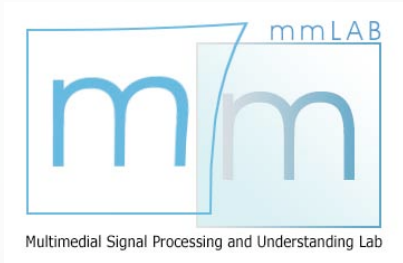
Performances plots for $Q = 40\text{ dB}$ and $Q = 35\text{ dB}$ under the combination of JPEG2000 compression, addition of WGN and resize attack.

Applications

- Developers : improvement of the algorithm under development, by identifying method's weaknesses and failings.
- Users : fair comparison of existing techniques in order to choose the most suitable for the intended application.



- A user-friendly interface has been developed



Thank you!

For further information:

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