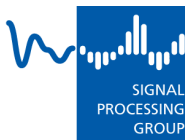# Maximum-Likelihood Detection in DWT Domain Image Watermarking using Laplacian Modeling

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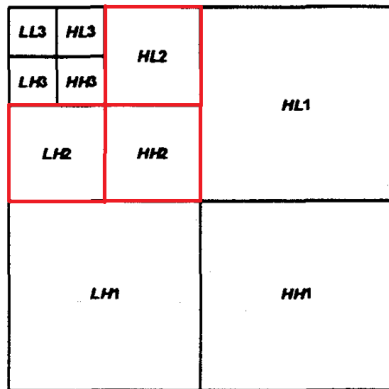Institute of Telecommunications
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SPG

Outline

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Experimental Results

- Daubechies filter used for DWT
- three-level pyramid decomposition
- watermark embedding in high resolution subbands LH_3, HL_3, HH_3
- embedding strength α constant $\rightarrow$ chosen that PSNR = 45dB
- each subband B has $N_B = 4096$ coefficients

Experimental Results

- blind detection is used
- estimation of μ_i and σ_i from watermarked image:

$$\hat{\mu}_i = \frac{1}{N_B} \sum_{y \in B} y$$

$$\hat{\sigma}_i = \frac{1}{N_B - 1} \sum_{y \in B} (y - \hat{\mu}_i)^2$$

with y as DWT coefficient in B of watermarked image

Peppers

Lena

Harbour

F16