A Tale of Three Steganographers

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Once Upon a Time...

- Steganographers A,B,C
- Content-adaptive steganography
- Same embedding scheme
- Same Payload

How to treat saturated areas?
Disagreement!

- Steganographer A (embed and correct)
  \[ \rho_i^{+1} = \rho_i^{-1} = \rho_i \implies \text{Embedding} \implies \begin{cases} X_i = -1 & \implies X_i = 1 \\ X_i = 256 & \implies X_i = 254 \end{cases} \]

- Steganographer B (forbid changes outside range)
  \[ X_i = 0 \implies \rho_i^{-1} = \text{Wet Cost} \]
  \[ X_i = 255 \implies \rho_i^{+1} = \text{Wet Cost} \implies \text{Embedding} \]

- Steganographer C (avoid saturated pixels altogether)
  \[ (X_i = 0 \mid X_i = 255) \implies \rho_i^{+1} = \rho_i^{-1} = \text{Wet Cost} \implies \text{Embedding} \]
Results

- Steganographer A detection rate: 0.3020
- Steganographer B detection rate: 0.3404
- Steganographer C detection rate: 0.4817
Why?

- Database is noisier than BOSSbase
- Saturated pixels are more than BOSSbase (3.53% > 1.23%)
Why?

- Almost no detection when embedding on the content due to high noise level
- Most detection from saturated regions
Moral of the Story

Never gamble on embedding in saturated and over exposed areas of the images!