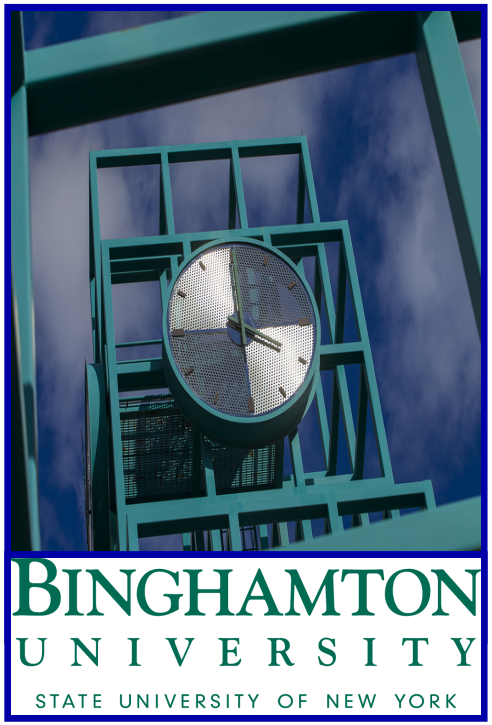
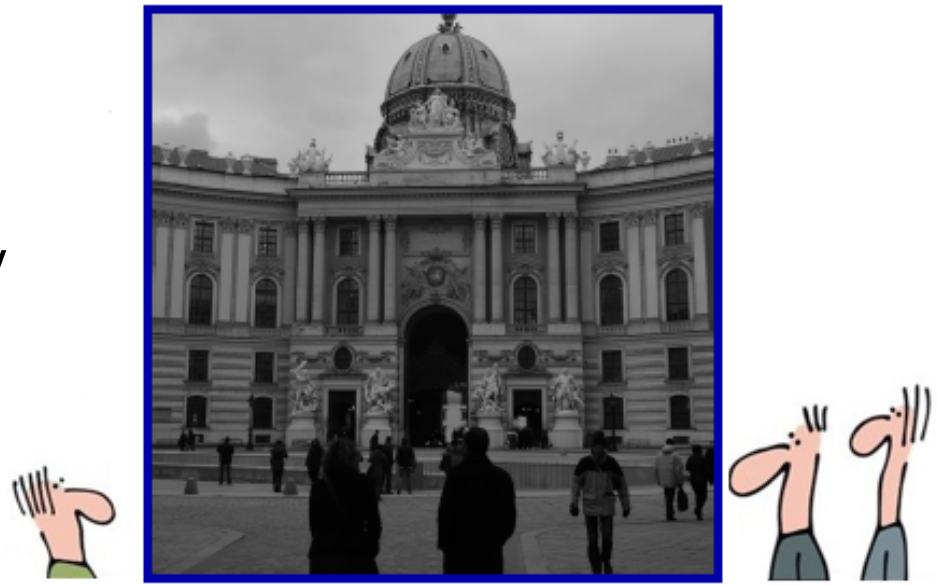


A Tale of Three Steganographers

Vahid Sedighi and Jessica Fridrich, June 18, IH 2015

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)

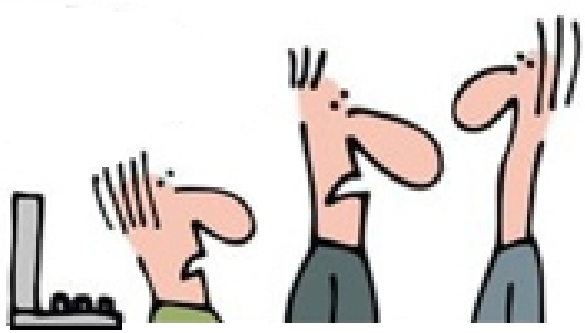
$$\begin{cases} X_i = 0 & \implies \rho_i^{-1} = \text{Wet Cost} \\ X_i = 255 & \implies \rho_i^{+1} = \text{Wet Cost} \end{cases} \implies \text{Embedding}$$

- Steganographer C (avoid saturated pixels altogether)

$$(X_i = 0 \,|\, X_i = 255) \implies \rho_i^{+1} = \rho_i^{-1} = \text{Wet Cost} \implies \text{Embedding}$$

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!