

# ENSE 496AE

# Midterm Assignment

# Watermarking

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# Original Assignment

- From 2 similar images, determine which has the watermark and display it
- Using the unwatermarked image, insert into it a given watermark file
- Alter this new watermarked image using: Greyscale, cropping, and other filters. Record the effects this has on the image
- Using another large scale image, insert our new watermarked image into it using OpenStego
- Verify and generate back the original watermarked image

# Challenges with the Initial Assignment

## Problems

- With the images we were provided, it is difficult to identify which image is watermarked
- OpenStego requires the signature originally used to watermark the image in order to verify the existence of the watermark
- Without the signature we unable to obtain the strength watermark
- We would not be able to acquire the strength image when applying various tests
- Using certain images resulted in errors with openstego
- There is no way choose what the watermark is

# Challenges with the Initial Assignment

## Solutions

- As there is no signature file, its almost impossible to detect the watermark in the given images
- We still follow the same process outlined for the assignment
- We just used the the text that we were given as the signature file

# No watermark and watermarked image



ice coffee.bmp  
Strength: 0%  
No Watermark



ice coffee.bmp  
Strength: 88%  
Watermarked

# Text file within image file

We used the the text file as the signature file for the watermark



Text file: “The best way predict  
future is to invent it”

ice coffee.bmp  
Strength: 0%  
No  
Watermark

ice coffee.bmp  
Strength: 100%  
Watermarked

# Applying different effects to the watermarked image

- Cropping
- Grayscale
- High contrast filters
- screen capture

# Cropping in Height

Picture 1

1 pixel - 89%

2 pixel - 89%

3 pixel - 0%

Picture 2

1 pixel - 100%

2 pixels - 100%

3 pixels - 100%

4 pixels - 0%

\*Very random approach in distributing the watermark

# Cropping in Width

Picture 1

1 pixel - 100%

2 pixel - 67%

3 pixel - 67%

4 pixel - 33%

5 pixel - 33%

6 pixel - 33%

9 pixel - 0%

Picture 2

1 pixel - 100%

2 pixel - 100%

3 pixel - 11%

4 pixel - 0%

# Grayscale



# Effect of Grayscale

Intensity 100 - Strength 89%

Intensity 50 - Strength 89%

Glow Grayscale - Strength 89%

# Effect of Contrast

Increase in contrast - Decrease in strength

Contrast 0 (without contrast) - 100%

Contrast 50 - 56%

Contrast 100 - 0%

Contrast -100 - 100%

# Effect of other filters

B&W 1 - 22%

Lomo - 100%

Retro warm - 100%

Vintage - 100%

B&W 2 - 67%

B&W 3 - 67%

\*Black and white filters has altered the strength whereas others filters has no effect.

# Comparing watermark image with screen capture of watermarked Image



Strength: 88%



Strength: 0%

# Embedding watermark in a cover file



Cover file 955KB



Watermarked image 780KB

# Observations when Embedding Watermarked Images

- The cover file is larger than the watermarked file
- Able to embed the watermarked image in a cover file using the data hide feature

Case 1:

- Checked for strength directly
- No watermark in the final image

Case 2:

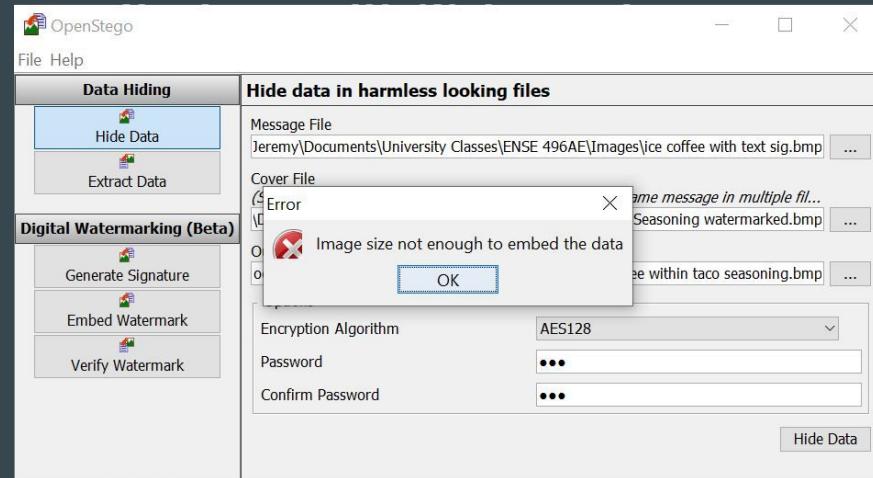
- Extracted the final image for the watermarked image
- The watermark is still present with no change in strength

# Observations when Embedding Watermarked Images



ice coffee.bmp  
Strength: 100%  
Watermarked  
File size: 35722KB or 35.722MB  
Original File Size: 5230KB

Taco seasoning.bmp  
Cover Image  
Strength: 100%  
Watermarked  
File Size: 35722 or 35.722MB  
Original File Size: 2780KB



We believe this is due to the file sizes being the same.  
The cover image would need to be larger in order to  
embed the the watermark image into it

# Conclusions

- Using a larger signature stronger the watermark
- Using a longer signature does not change the file size
- Random distribution of watermark each time
- Effects of filters is not same for different kinds
- Can use the watermarked image to embed in a cover file
- Having control over the watermark would allow us to manipulate the file size

# Questions?