Project Final Report

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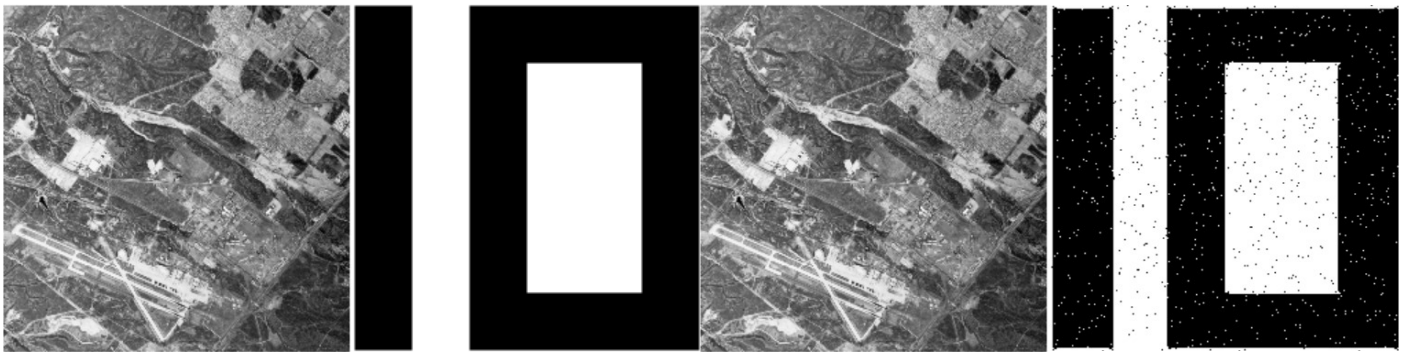
Aim:

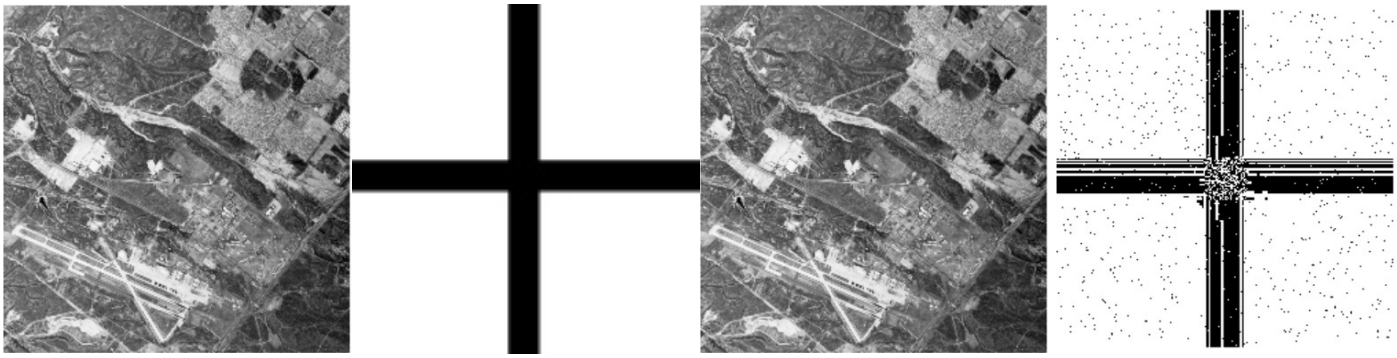
Image watermarking is the process of encrypting a watermark in the form of data in an image and then extracting or detecting it from the watermarked image. In this project we will be implementing a image watermarking scheme that embeds the data in the LSB

Results:

Original Image | Watermark | Watermarked Image | Reconstructed Watermark



Original Image | Watermark | Watermarked Image | Reconstructed Watermark



Original Image | Watermark | Watermarked Image | Reconstructed Watermark

Effect of Watermarking on image.

We applied our watermarking scheme on **SIPI Image Database at the university of southern california** and took the average of results on all images. The average **PSNR**(Peak Signal to Noise Ratio) of the water marked image was found to be **51.1544**.

Effect of addition of different noises on encoded image.

Noise Type	Strength	NCC
Gaussian	0.01	0.9439
Gaussian	0.05	0.9439
Gaussian	0.1	0.9439
Salt & Pepper	0.1	0.8467
Salt & Pepper	0.2	0.7503
Salt & Pepper	0.5	0.4656

Conclusion:

- The PSNR value between the original image and the watermarked image is very high(51.1544). This implies that there isn't any significant difference in the image on adding the watermark. Furthermore, this can be validated visually, in which there aren't major diffrences or artifacts as a result of adding the watermark.
- On attacking the image with a gaussian noise and re-extracting the watermark, the measured normalized cross correlation between the extracted attacked watermark and the original watermark is 0.9439 which is close to 1. This implies that gaussian attacks of low standard deviation don't majorly affect the watermark. Also, the NCC for various low standard deviation gaussian noise are consistently similar implying the method is robust for the same.
- On attacking the image with salt and pepper noise of varying strengths and re-extracting the watermark, the measured normalized cross correlation between the extracted attacked watermark and the original watermark decreases from 0.8467 to 0.4656 on increasing the salt pepper noise strength from 0.1 to 0.5. This implies that the watermark is sensitive to changes in the salt pepper noise strength and isn't completely robust for the same.