

Slide 1

Hello everyone, so my presentation is the third and last about image forgery and it's detection.

slide 2

So heres the plan ill follow during this presentation, I will first do a quick recap on what is image forgery, then ill show you some historical forged images and more current ones, and i will finish the first part by showing you some techniques of image forgery and their current popularity.

Then for the second part, I will quickly show you the difference between active and passive detection and then we will focus on the splicing detection technique how it works annd how it can be detected

slide 3

So as you all know, the image forgery is the altering of a digital image in order to lure the viewer to think it is authentic.

slide 4 LIL BIT OF HISTORY

So even if image forgery is at it's paroxysm nowadays, it is quite old

On the left you can see that the first known apparition happened in eighteen forty, the french photographer Hypolite bayard faked his suicide

And 20 years later during the american civil war there was this photo of General grant sitting in front of his troops, which we will see was also fake.

Slide 5 splicing of General grant image

Here we can see which images they used to fake General grant apparition in front of the troupes by splicing the head body and background to obtain the result image. It was used as propaganda at the time.

slide 6 PUTIN G20 Summit

Nowadays Image forgery usage has exploded and it is very current to find them on social medias. here is a fake image that happend during the G20 Summit a few years ago were we can see that they used image splicing to put Putin inside the photo. It was retweeted thousands of times.

slide 7 techniques

So now im going to show you some image forgery techniques. On top there is the copy move, where we juste replicate some element of the photo within itself, then there is the splicing where we combine elements of 2 different photo, usually we take one key element of one and paste it in the other one

slide 8 techniques 2

Then there is retouching, where we simply retouch the image using tools like photoshop. This one is very frequent, even that it became some kind of business, like this photo, on the internet people photoshop your photos for some money.

And finally there is resampling, where we either downsample or upsample some regions or the whole image. upsampling can be made using interpolation and downsampling by meaning surrounding pixels for example.

slide 9 graphs

Here we can see the apparition of those techniques in publication. Even if retouching seems quite rare, it is one of the most used image forgery techniques. this can be explained by the fact that the majority of the time, retouching has not as malicious intention as the other techniques.

slide 10 Detection active

So we will now see the detection side of the images forgery. There is 2 types of image forgery detection, passive and active and here is the active one, we you can see we can use known parameters of the image to detect it.

slide 11 Detection passive

Here are passive detection, where we do not need any prior information about the image. 2 weeks ago Marco showed us the detection technique for copy move attacks, so i will now show you how detection works for splicing attacks

slide 12 Splicing

slide 13 YCRCB

Ycrb is a way to encode an rgb image using the shown formula. It is used because according to new research it increases performances for image forgery detection. In their paper, they explain that using only hsv or rgb they had about 80% accuracy on their dataset, and just by changing it to ycrb it increased to the previously shown statistics.

Afterwards they divide the image in blocks of 16 by 16 which was after experience the best size.

slide 14 LBP efficient texture operator

the local binary pattern is an algorithm that will assign to each pixel a decimal value based on its neighbors value. here r is a choosable parameters where r is the radius of neighborhood we want and p the number of such neighbors pixels, P_i is the value of the pixel i and p_c the center pixels value.

slide 15 DWT wavelet transform

Discrete wavelet transform is a widely used technique in order to analyse both in frequency and in time domain images. they detect features well and can help removing noise. We used dct in the previous Lab, which is comparable to dwf.

slide 16 PCA

The PCA is one of the most common linear dimension reduction approach, they used it in this paper to extract features and decrease data dimensionnality

Slide 17

Finally everything is fed to the svm which will have a final word on the authenticity of the image, after it has been trained.