Image Splicing Detection

Done By:
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*All images/content are taken from http://www.cs.albany.edu/~lsw/papers/iccp12.pdf

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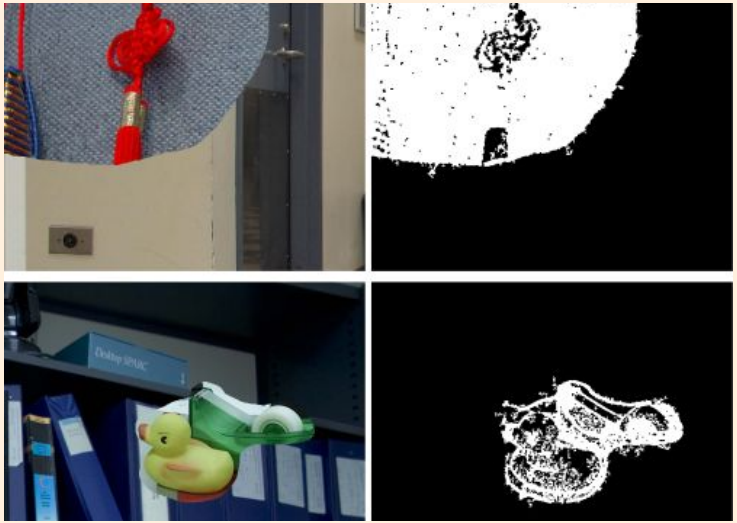
Abstract

- Image splicing is a simple and common image tampering operation, where a selected region from an image is pasted into another image with the aim to change its content

- We studied and used **Local Noise Variance Estimation** to detect the image splicing based on fact of Kurtosis concentration of natural images



Algorithm & Assumptions

Assumptions:

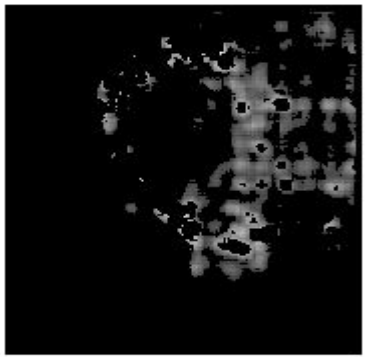
- Natural images has uniform noise distribution and different images have different noise distribution

Algorithm for Local Noise Variance Estimation:

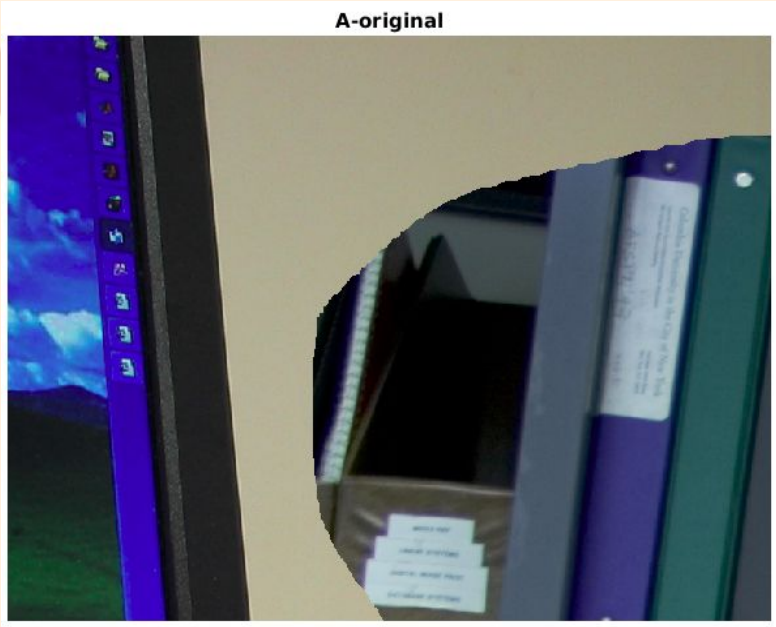
- Decompose the image into K band-pass filtered channels using AC filters from the DCT decomposition
- Compute the integral images of the first to the fourth order raw moments in each of the K band-pass filtered channels (BPFCs)
- Compute variance and kurtosis for each local window in each BPFC
- Estimate noise variance for each local window across all BPFCs

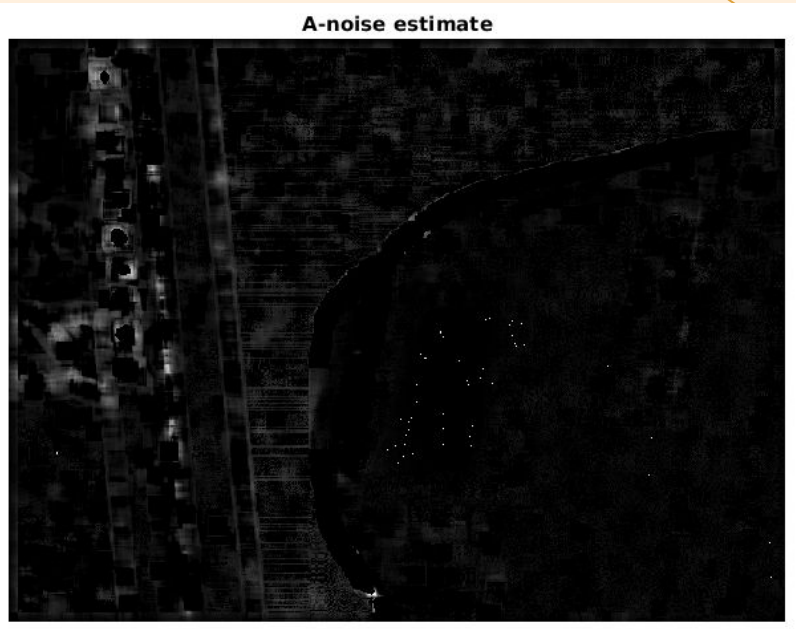
Results (1/3)

- These are examples of true positives where image is actually spliced and also can be detected from our algorithm.
- The example to the left, the top left part is added to the remaining image and it can be detected properly and can be seen directly from the image itself.
- On the other hand, In the right image, it cannot be directly seen from the picture itself that it’s a spliced image but our algorithm detects it.

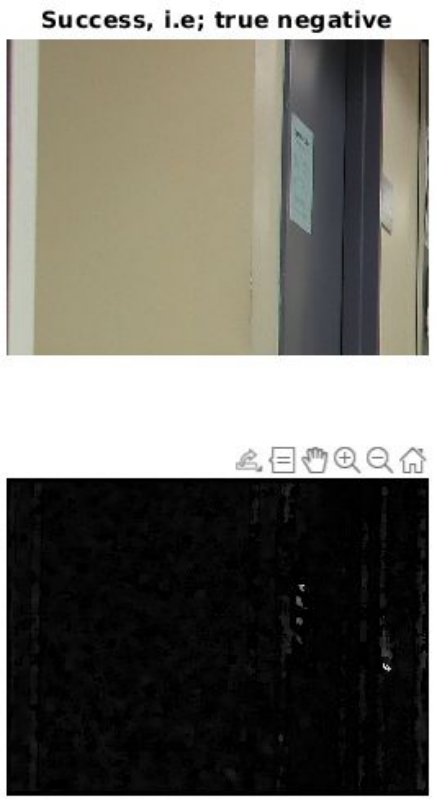


Results (2/3)

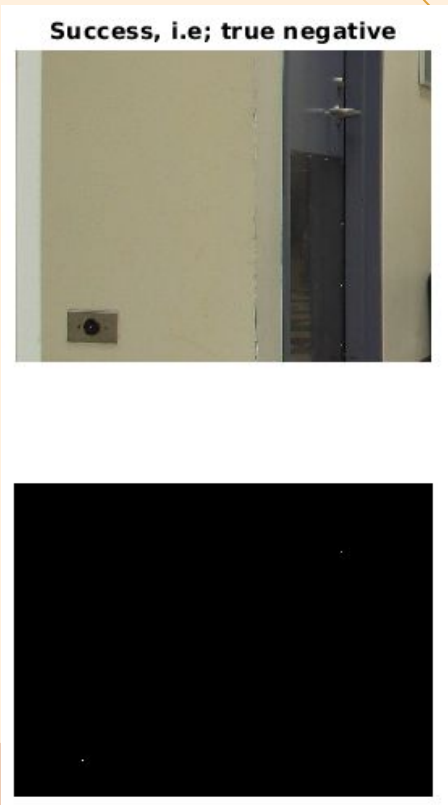




Results (3/3)



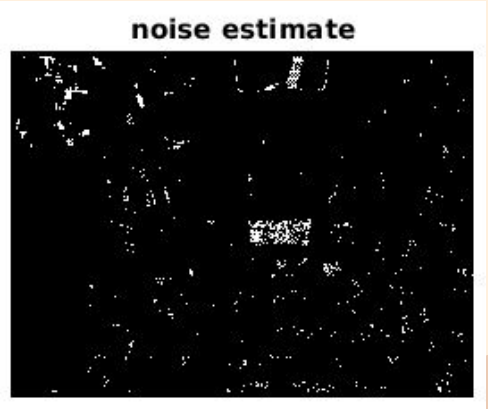
- These are examples of true negatives i.e., the images are original images and our algorithm also detects it properly.
- In both the images, it can be seen that the noise estimate is completely black indicating that noise pattern is uniform and this means that it is an authenticated single image and not a spliced image.



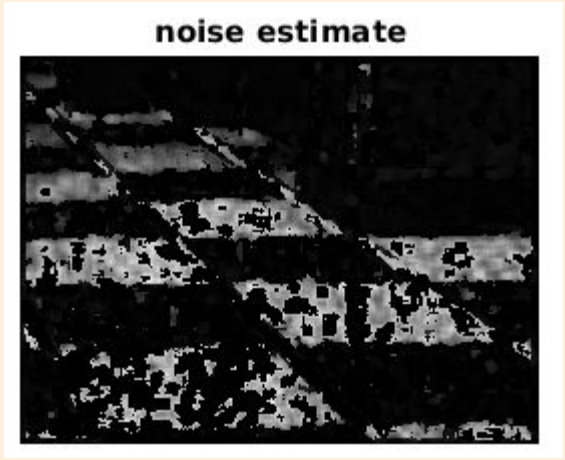
Drawbacks

Drawbacks:

1. We cannot detect if imposed image has same local variance as the original
2. Algorithm can detect splicing in a single original image if noise distribution is different across the layout i.e. false detection or false positive



we assumed that the intrinsic noise variances are similar across different pixel locations within the original image but this may not hold for images with distinct texture and smooth regions



Conclusion:

- In this work, we discussed an effective method for detection of spliced images using local noise variance estimation.
- This method may not work in the situation where pixels are saturated with intensity.
- Future work in the extension of this project could be reducing the false detections by using other different methods like estimating the full second order correlations among the pixels.


thank you