STEGANALYSIS AND IMAGE TAMPERING DETECTION

1. Project description

With the advent of mainstream computing, Internet and digital photography, many digital images circulate around the world. The falsification of these images has become an unavoidable reality, especially in the area of cybercrime. These changes may be relatively innocuous (to change the appearance of a person in order to move skin imperfections or to eliminate the defects of an object for sale online) or have serious social consequences (to build the improbable meeting of political figures). The third case, the most serious in terms of the establishment of digital forgery, is the origin of this project.

Specifically, this project is in the field of digital forensics. This is to certify that an image is falsified. This certification must be as reliable as possible because the digital evidence of forgery can't be found if the detection method used provides very few false results. A picture is naturally composed of several distinct zones corresponding to different portions of the scene (objects, landscapes, etc.). The research of this inconsistency, which is often not very significant if the forgery is done with talent, is the main difficulty of digital forensics.

A reliable way to define consistency between areas of an image involves typically relying on "physical fingerprints" generated by the acquisition process photography. This project proposes to detect the fingerprints using a statistical hypothesis test that checks the consistency of these parameters in the image.

Thi-Ngoc-Canh Doan, Florent Retraint, Cathel Zitzmann: Image tampering detection based on a statistical model. Multim. Tools Appl. 80(21): 32905-32924 (2021)

Florent Retraint, Cathel Zitzmann: Quality factor estimation of JPEG images using a statistical model. Digit. Signal Process. 103: 102759 (2020)

Nhan Le, Florent Retraint: An Improved Algorithm for Digital Image Authentication and Forgery Localization Using Demosaicing Artifacts. IEEE Access 7: 125038-125053 (2019),

Thanh Hai Thai, Rémi Cogranne, Florent Retraint, Thi-Ngoc-Canh Doan: JPEG Quantization Step Estimation and Its Applications to Digital Image Forensics. IEEE Trans. Information Forensics and Security 12(1): 123-133 (2017).

2. Latest major journals in the field proposed by Florent Retraint

1/ Gaël Mahfoudi, Florent Retraint, Frédéric Morain-Nicolier, Marc Michel Pic: Statistical H.264 Double Compression Detection Method Based on DCT Coefficients. IEEE Access 10: 4271-4283 (2022)

2/ Thi-Ngoc-Canh Doan, Florent Retraint, Cathel Zitzmann: Image tampering detection based on a statistical model. Multim. Tools Appl. 80(21): 32905-32924 (2021)

3/ Florent Retraint, Cathel Zitzmann: Quality factor estimation of JPEG images using a statistical model. Digit. Signal Process. 103: 102759 (2020)

4/ Nhan Le, Florent Retraint: An Improved Algorithm for Digital Image Authentication and Forgery Localization Using Demosaicing Artifacts. IEEE Access 7: 125038-125053 (2019)

5/ Hoai Phuong Nguyen, Florent Retraint, Frédéric Morain-Nicolier, Agnès Delahaies: A Watermarking Technique to Secure Printed Matrix Barcode - Application for Anti-Counterfeit Packaging. IEEE Access 7: 131839-131850 (2019)

6/ Hoai Phuong Nguyen, Agnès Delahaies, Florent Retraint, Frédéric Morain-Nicolier: Face Presentation Attack Detection Based on a Statistical Model of Image Noise. IEEE Access 7: 175429-175442 (2019)

7/ Tong Qiao, Florent Retraint: dentifying Individual Camera Device From RAW Images. IEEE Access 6: 78038-78054 (2018)

8/ Tong Qiao, A Zhu, Florent Retraint : Exposing image resampling forgery by using linear parametric model, Multimedia Tools and Applications, 1-23 (2017)

9/ Tong Qiao, Florent Retraint, Rémi Cogranne, Thanh Hai Thai: Individual camera device identification from JPEG images. Sig. Proc.: Image Comm. 52: 74-86 (2017)

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11/ Thanh Hai Thai, Florent Retraint, Rémi Cogranne: Camera model identification based on the generalized noise model in natural images.Digital Signal Processing 48: 285-297 (2016)

12/ Thanh Hai Thai, Florent Retraint, Rémi Cogranne: Camera model identification based on DCT coefficient statistics. Digital Signal Processing 40: 88-100 (2015)

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14/ Thanh Hai Thai, Florent Retraint, Rémi Cogranne: Generalized signal-dependent noise model and parameter estimation for natural images. Signal Processing 114: 164-170 (2015)

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16/ Rémi Cogranne, Florent Retraint: Statistical detection of defects in radiographic images using an adaptive parametric model. Signal Processing 96: 173-189 (2014)

17/ Thanh Hai Thai, Florent Retraint, Rémi Cogranne: Statistical detection of data hidden in least significant bits of clipped images. Signal Processing 98: 263-274 (2014)

18/ Rémi Cogranne, Cathel Zitzmann, Florent Retraint, Igor V. Nikiforov, Philippe Cornu, Lionel Fillatre: A local adaptive model of natural images for almost optimal detection of hidden data. Signal Processing 100: 169-185 (2014)

19/ Thanh Hai Thai, Rémi Cogranne, Florent Retraint: Camera Model Identification Based on the Heteroscedastic Noise Model. IEEE Transactions on Image Processing 23(1): 250-263 (2014)

20/ Thanh Hai Thai, Rémi Cogranne, Florent Retraint: Statistical Model of Quantized DCT Coefficients: Application in the Steganalysis of Jsteg Algorithm. IEEE Transactions on Image Processing 23(5): 1980-1993 (2014)

21/ Rémi Cogranne, Florent Retraint: An Asymptotically Uniformly Most Powerful Test for LSB Matching Detection. IEEE Transactions on Information Forensics and Security 8(3): 464-476 (2013)