Abstract

With the rise of realistic AI-generated images and continuously advancing photo-editing software, it has become increasingly difficult to reliably distinguish between authentic and manipulated images. Using Digital Image Forensics, the primary objective of this work is to conduct a comprehensive quantitative and qualitative study that compares traditional forensic techniques to a state-of-the-art AI based approach. A practical underpinning for this work is the development of a toolset capable of providing reliable and transparent evidence regarding the authenticity of an image.

In total, three traditional techniques were implemented based on their publishing papers: Ghost Maps, Resampling detecting, Noise Wavelet Blocking. These techniques were compared to MM-Fusion, a recent state-of-the-art AI approach.

Results indicate that the developed algorithms were implemented correctly. The quantitative comparison suggests that the combined traditional techniques outperform a MM-Fusion by an average of 17% more detections in scenarios where 0% False Positives are allowed. However, the study acknowledges potential biases in the validation process and further experimentation is necessary to ascertain the reliability of these findings. A qualitative comparison suggests that traditional techniques are more dependable than AI.

This work emphasizes the importance of developing reliable digital image forensic tools and outlines a future vision where AI can be utilized in a key support role to assist forensic analysts. Guided by an open-source philosophy, each algorithm was successfully integrated into Sherloq, an established open source image forensic toolset, which has garnered positive feedback from the community.