
Abstract

ABSTRACT

Image forgery or tampering is the art of manipulating or modifying an image in either an intentional or unintentional manner. Tampering of images is widely used by tabloid magazine, fashion industry, scientific journals, court rooms, main media outlet and photo hoaxes received in email. In most of the cases, these manipulations result in copyright violation and hence, have to be detected.

This research work uses the camera properties to detect tampered images and is working under the fact that different cameras have dissimilar properties and any tampering operation will reflect in a change in these features. The proposed automatic algorithm performs tamper detection in three steps, feature selection, feature extraction and one-class classification. The system extracts four types of features, namely, color feature, image quality features, wavelet features and bicoherence features, to form feature database. To improve the detection process, dimensionality reduction is performed using Fisher classifier algorithm. The third stage, uses two one-class classification algorithms, Radial Basis Function and Support Vector Machine, to detect tampered and genuine images. The tamper detection process is performed in two steps, training and testing. During training, the training images are segmented into 128 x 128 blocks and the features are extracted for each block. These features are used for training the classifiers. During testing, the same features are extracted and the trained classifier is used to detect the presence or absence of manipulation.

The CASIA TIDE dataset was used during the evaluation steps of the research work. Three different cameras, Canon, Nikon and Sony, were selected and the splice tampering was performed using three main variations. The first is to splice images in different manners, using different camera combinations, using different image transformations and using different shape methods. Nine different camera combinations, namely, Canon-Canon, Canon-

Nikon, Canon-Sony, Nikon-Nikon, Nikon-Canon, Nikon-Sony, Sony-Sony, Sony-Canon and Sony- Nikon were formed. During photomontage creation, four different types of transformations (Resize, Deform, Rotate, Do Nothing) were used with four different shapes (Circle, Rectangle, Triangle and Arbitrary). Thus, a total of 1725 (800 authentic and 925 spliced color images) were used during experimentation.

From the experimental results, it can be concluded that the maximum efficiency was produced by SVM one-class classifier with both tamper and authentic image identification. The system is efficient in identifying tampered images formed using rectangle shape followed by triangle. Poor performance was obtained when arbitrary shape was used during splice creation. Considering transformations, best performance was achieved when no transformation was used during the creation of tampered images. The system found rotate transformation tampering easily followed by resizing modifications. Thus, it could be concluded that the four features, color, image quality, wavelet and bicoherance, when combined with SVM one class classifier, is efficient in identifying tampered and untampered images and can be used in important applications like legal, media and World Wide Web.