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Copy – Move Forgery Detection in Digital Images Based on deep Learning

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ABSTRACT: Due to development of technology, it is easy to manipulate the original images in digital media. So it is important to develop an effective copy move forgery technique to detect and localize the forged part in digital images. Actually there are some other techniques to detect the forgery based on Texture descriptors and DCT of circular blocks. But they are not suitable for low resolution images. So, here Proposed Deep learning Convolution Neural Network(CNN) to detect the forged part in low resolution images and specify the Localized area.

KEYWORDS: Copy move Forgery detection, Low resolution images, Deep learning convolution Neural Network.

I. INTRODUCTION

Now a days digital images play important role in current world. These digital images can be tampered by using different hardware and software techniques. There are different types of image forgery such as image splicing, image retouching and image morphing. Generally image forgery detection can be categorized into two methods, they are Active image authentication and Passive image authentication. Copy – Move forgery comes under passive image forgery detection

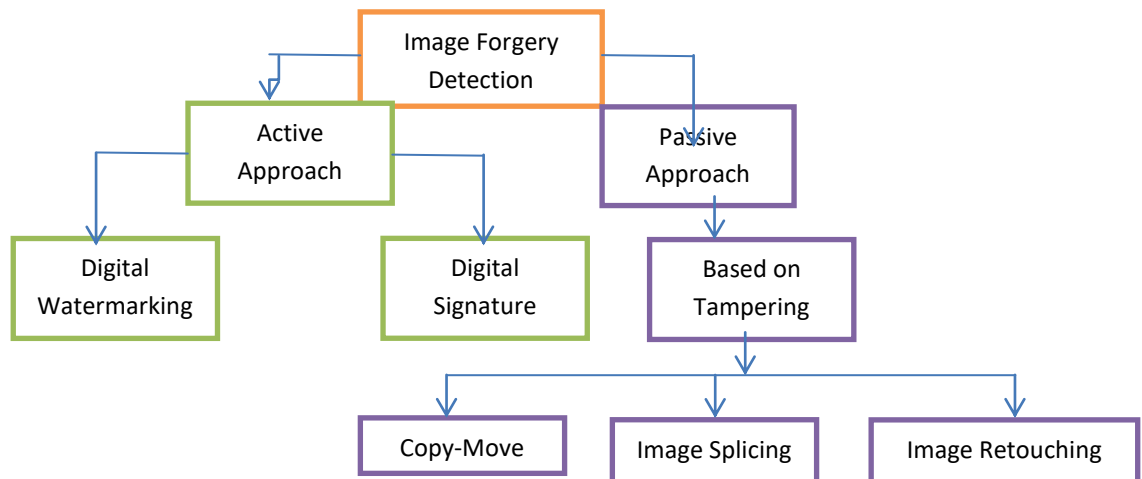


Fig 1: Classification of Image forgery detection

II. LITERATURE REVIEW

In the literature many techniques are implemented by researchers. Copy – Move forgery detection can be categorized into mainly three types. They are Key point based detection, Block Based detection and Brute forced detection. Key point based copy – move forgery detection uses key point descriptors to detect forgery clues and Block based method uses the overlapped image patches features. In Block based method firstly, the supposed image is split into overlapped blocks. Then DCT is applied for feature extraction and the feature matchings are obtained. Finally forgery is done. But the limitations of these techniques are they take high execution time and andthey are not applicable for low resolution images.And also researchers are implemented different transform techniques such as

Discrete Cosine Transform(DCT), Singular Value Decomposition(SVD), Principal Component analysis,(PCA), Discrete Wavelet Transform(DWT).These techniques also their own limitations.So here proposed deeplearning-basedforgery detection on low resolution digital images.

III. PROPOSED METHOD

Proposed deep learning algorithm, it can generalize well on low resolution images and compressed images. The differences between tampered part and original part is observed using deep learning. Deep learning is an AI function that imitates the working of the human brain in processing data and creating patterns for use in decision making.

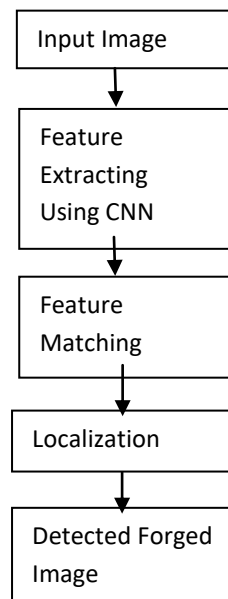


Fig 2 Steps involved in the proposed method

1) Feature Extraction using CNN

CNN architecture can be used to extract the features. In neural networks, the process of feature extraction removes elements of learned images out of pre trained CNN. These images can be used for training training image classifiers. CNN is used to classify and distinguish forged boundaries and original images. CNN often extract information from edges in the earliest layers. If more layers are used, the network tends to learn extra information such as shape and position.

2) Feature Matching

In feature matching, matching vectors are determined by Euclidean distance. The distance of vectors are compared with a predetermined threshold (∂) value which is equal to 1.5. Matches are checked according to the Euclidean distance among matched block. Matching of two vectors are checked by the condition of $d \geq \beta$ to avoid false matches, where β is taken experimentally. Euclidean distance can be calculated by using the formula

$$d = \sqrt{(x_i - x_j)^2 + (y_i - y_j)^2}$$

3) Localization

In this step, false matches are eliminated by shift vector between matched blocks. In this morphological operation dilation is used, the purpose of using dilation is it adds pixels to the boundaries of objects in the image. In localization the number of blocks that have same shift vector exceeds than the threshold value. If it exceeds, then image is forged. If the image is forged then morphological operation is applied in order to localize the forged region in the image.

IV. EXPERIMENTAL RESULTS

In proposed method, by using deep learning Convolution Neural Networks(CNN) the forged part can detect in low resolution images and specify the localized area. Here F – measure parameter has taken, F – measure is used to perform the evaluation of the accuracy. Higher F – measure gives the better performance to give accuracy of forged region in low resolution images.

$$F - Measure = 2 * \frac{Precision * Recall}{Precision + Recall}$$

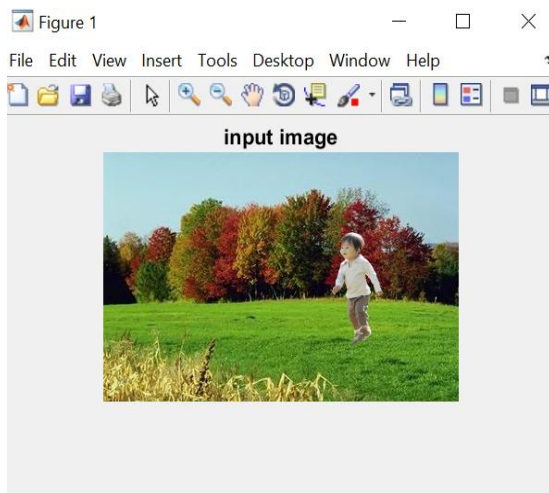


Fig 3: Input image 1

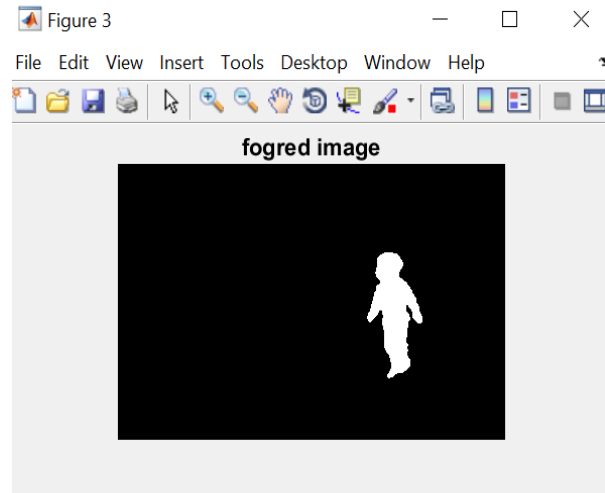


Fig 4: Detected forged part of the image

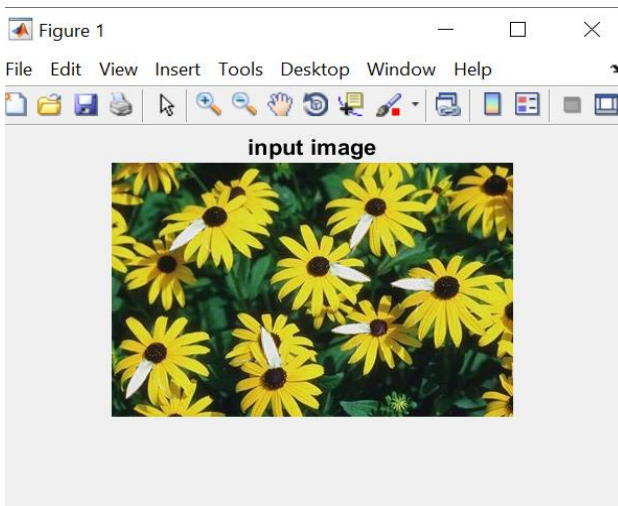


Fig 5: Input image 2

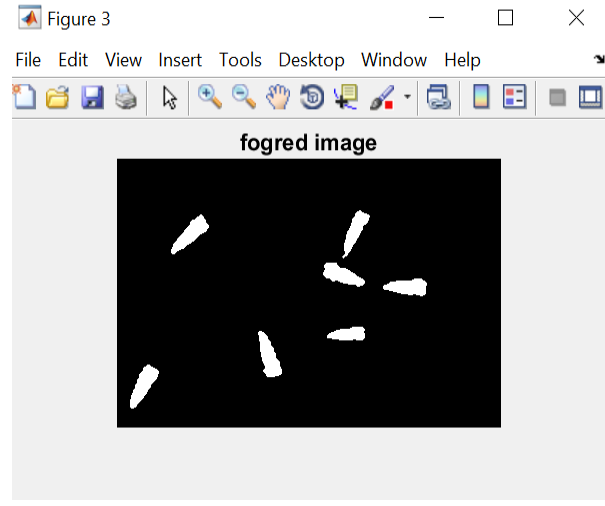


Fig 6: Detected forged part of the image.

Method	Precision(%)	Recall(%)	F – Measure(%)
Existing Method ^[10]	92.2	93.8	93
Proposed Method	94.8	95.3	95.02

Table: Comparison of Parameters



From the results, the exact localized area in forged images can be obtained by using deep learning techniques and also from the comparison table proposed method shows better performance compared with existing method [10].

IV. CONCLUSION

In this work, deep learning based method is used to extract the features to detect and localize the forgeries present in an image instead of using Block based method. And proposed model provides better performance with an accuracy of 95.02% when compared to other techniques.

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